ORTHOPAEDIC SURGERY

IN-HOUSE

SAFETY

RULES AND REGULATIONS

for

RESEARCH LABORATORIES

Prepared By	Approved By	Review Date	Next Review Date
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AMENDMENT TABLE

Section	Amendment	Revision
	June 2016 Amendment	Version 2.5
1	DSC Committee updated to DSHC Committee	Version 2.6
6.6	Included RA & SOP for work after office hours	
13	Packing & Transportation of Samples/Specimens Reference Updated	
Section 15	Emergency Contact Information updated	
Appendix A	List of Principal Investigator, Safety Lead, Laboratory updated	
Appendix D	Card Access Authority updated	
Appendix F	SS ISO 45001 and NUSSHA correspondence	
	Change of Approving Officer & Review date & safety lead for cadaveric dissection lab	Version 2.7
Appendix A	Update of Safety leads of PI & Core facilities	
References	Update of manual version & references	
Appendix D	Update of RFM sharepoint	

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SECTION 1: Introduction

1.1 Objective

The objective of this in-house safety rules and regulations is to provide guidance on all activities in the Department in addition to the Faculty, University and legal requirements to achieve and establish a positive Safety and Health (S&H) culture that is not covered by a specific policy, directive, manual or standard.

1.2 Scope

Everyone, internal or external parties, are to adopt the practices in this set of rules and regulations.

1.3 Responsibility

2. Everyone is responsible for their own safety and health.
3. The responsibility of the Head of Department (HOD) and Research Director (RD) is to endorse the In-House safety and health rules and regulations together with the Department Safety & Health Committee (DSHC).
4. The DSHC is responsible to come out with relevant effective and practical Safety and Health rules and regulations to establish a safe workplace for all users to conduct their activities within the department.
5. The DSHC is responsible to communicate with respective Principal Investigator (PI) and Safety Lead on the In-House Safety and Health rules and regulations.
6. The Principal Investigator is primarily responsible for the safety and health of all users working in the laboratories under their jurisdiction as well as staff and or students under their care when working under direction at other workplace.
7. The Safety Lead is responsible to assist the PI in establishing management and implementing Safety and Health Management System (SHMS) and to communicate the In-House Safety Rules and Regulations to all visitors and users.
8. The DSHC is responsible for monitoring the implementation of the Safety and Health rules and regulations and will review and revise periodically.
9. Everyone can play a part in improving Safety and Health by:
    1. Informed others of surrounding situations and conditions that may jeopardize safety.
    2. Be competent to carry out work safely by participating in risk assessments and trainings.
    3. Report any new or existing hazards that are not mitigated, near misses and incidents or accidents.
    4. Communicating relevant information through posters or other forms of media to others so that they are aware of their surroundings.

1.4 Definitions

Authorised User – Anyone who are authorized to enter the laboratory to carry out any form of work, with or without the use of equipment.

Card Access – Secured area that can only be accessed through the use of a staff identity card.

Collaborator

- If the collaborator does not conduct any lab work in the lab, "Visitor" level safety is applicable.
- If the collaborator does lab work in the lab, "User" level safety is applicable.

Contractor – External parties engaged by laboratory / department / faculty to perform any form of services.

Department – The Department of Orthopaedic Surgery, National University of Singapore.

Department Safety & Health Committee (DSHC) – The DSHC will provide advice to Research Director and Head of Department on matters concerning safety. They will:

1. Proactively identify, evaluate and assist in correcting safety and health hazards and implement the department's Safety & Health Management System;
2. Facilitate the implementation of department-wide Safety and Health programs;
3. Promote safety awareness in the department;
4. Facilitate and organize emergency plans and drills;
5. Plan, facilitate and participate in safety audits at departmental, faculty and university-level;
6. Act in general as the resource point, for staff and students on all occupational safety and health matters.

Equipment Owner – Staff designated to have operational oversight of an equipment. They should be well-trained with the use of the equipment and be competent to train others. He is responsible to conduct risk assessment with the new users using the equipment and ensure that the new users have read the Standard Operating Procedure (SOP).

External Parties – People who are not staff or students of the department. Examples include collaborators, contractors, visitors, etc.

Hazard – Source, situation or act with a potential for harm in terms of human injury or ill health, or combination of these.

Hazard Identification – Process of recognizing that a hazard exists and defining its characteristics.

Head of Department (HOD) – Person appointed by the senior management of the University to assume overall responsibility of the Department.

Incident – An event(s) which an injury or ill health (regardless of severity) or fatality occurred, or could have occurred.

1. Note 1: An accident is an incident which has given rise to injury, ill health or fatality.
2. Note 2: An incident where no injury, ill health or fatality occurs may be referred as a "near-miss", "near-hit" or close call.
3. Note 3: A dangerous occurrence is an incident which is specified in the First Schedule of the Workplace Safety and Health Act. This is a dangerous occurrence which needs to be reported to the Ministry of Manpower (MOM) through ORMC.

Interested Party – Person or group of people who are concerned with or affected by the Safety and Health performance of a department (e.g. ORMC, regulators, contractors, visitors, collaborators, tenants, staff and students).

Laboratory – A workplace managed by PI that provides a controlled environment where the purpose of scientific research, experiments and measurement occur. This includes, but is not limited to, all workplaces where chemicals, biological and radioactive materials, lab animals, equipment and machineries are used or installed.

Licensed Operator – Staff or student who are trained to use specific equipment with the corresponding license from a regulatory body.

Management of Change – Any change that can affect or impacts safety and health hazards and risk. This includes changes to the organisational structure, personnel, management system, processes, activities, use of materials, workplace locations, etc.

Non-compliance – Failure to comply, as with a law, regulation or requirement that is applicable to the department's operations and risks.

Non-conformance – Failure to comply with a requirement, standard or procedure.

Non-routine activities – Activities conducted only periodically or on an ad-hoc basis.

Observer – Refer to definition for "**Visitor**".

Officer-in-charge – Designated staff responsible for the item / equipment / facilities / laboratory.

Office of Risk Management & Compliance (ORMC) – ORMC is the corporate office in charge of occupational safety & health matters, environmental compliance and emergency management in the University.

Principal Investigator (PI) – Faculty member in charge of a fund or who directs a project / programme or faculty who is responsible for their assigned space where research activities are performed.

1. Note: PI may share and / or in charge of more than one laboratory unit.

Public Transportation – Any form of transport which members of the public may use (e.g. taxis, shuttle bus, etc).

Research Administration Meeting – A quarterly meeting held by the Department for research related administration including safety matters.

Research Director (RD) – Faculty appointed by the Head of Department to oversee matters concerning research in the department.

Risk – A combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that may be caused by the event of exposure.

Risk Assessment (RA)- A process of evaluating the risk(s), taking into account the adequacy of any existing controls and deciding whether or not the risk(s) is acceptable.

Safety Lead – Person assisting the PI on matters concerning safety and has supervisory responsibilities over matters concerning safety.

Safety & Health Management System (SHMS) – A systematic and comprehensive management system, where a set of interrelated elements used to establish policy, safety and health management objectives and achieve it.

Safety Management System (SMS) – Refer to definition for "**Safety & Health Management System (SHMS)**"

Safety & Health objectives – Safety & Health goals in terms of performance that the department sets out to achieve.

Safety & Health performance – These are measurable results to the management of safety & health risks.

Specimen – Any biological specimen either cadaveric animal or human in origin, or non-biological material used for research activity.

Staff – Anyone employed (either full / part time) by the University.

Standard Operating Procedure (SOP) – A document, clearly written description, of how a particular task should be performed in a correct manner.

Student – These are people who are not registered students with the University. They can be from other tertiary institutions, polytechnics or secondary schools).

Supervisor – Person or faculty member who is in charge of a workplace and has authority over certain staff, students, contractors or visitors.

Undergraduate Student – Registered students with the University. This include students under the Undergraduate Research Opportunities Program (UROP).

University – National University of Singapore.

User – Anyone (staff / student) who intends to use the equipment for academic / research purposes.

Visitor – Someone who has gain approval from the management to visit the laboratory. However, they are not allowed to carry out any lab work inside the lab.

Workplace – Any physical location in which work activities are performed (such as research laboratories, office, storage area for chemical / gas, etc)

- NOTE: When giving consideration to what constitutes a workplace, the department should take into account the Safety and Health effects on personnel who are, for example, travelling or in transit (e.g. driving, on boats or trains), working at the premises of a collaborator, working at home or conducting field work.

SECTION 2: Authorisation and Access to Laboratories

(OSHE Directive No. 0702 & 0705)

1. Classification, authorisation and access to laboratories should be according to the purpose and roles in the laboratory and not according to the institution / company they are from.
2. Authorised users are individuals who have acquired, demonstrated and documented the necessary levels of competency to work safely in the laboratory.
    1. Only authorised person will be issued with one key / card access.
    2. The authorised person shall not replicate the key or card and distribute to other people without prior approval from the PI.
    3. Authorisation is laboratory and equipment specific.
    4. Anyone below the age of 16 years old shall not be allowed to enter the laboratory except with the official approval from PI. If the person is related to the PI, official approval should be sought from the Research Director.
3. For Department staff and students who are required to work in the laboratory:
    1. All new users are required to complete
        1. Basic laboratory induction that includes Safety & Health procedures/
        2. Laboratory specific training as determined by work requirements.
    2. The appropriate training matrix and plan should then be documented and implemented in the Laboratory Safety & Health Management System.
    3. All staff and students are required to take and pass the Department Safety Induction Quiz during the Research Administration Meeting. The passing mark is 80%. For those who score below 80%, the Safety Lead / Officer-in-charge will provide additional safety training according to the Lab Safety Induction. The staff / student will then require to retake the Quiz again within the next three months after the last Research Administration Meeting was held.
4. For non-departmental staff and students working in the Laboratory within the department:
    1. The application procedure for the access and authorisation to work in the laboratory for non-departmental staff and students are the same as departmental staff and students through their respective PI.
    2. Users are required to fill up the Laboratory Access Request Form.
    3. The end date of the authorisation and access should correspond to the project or collaboration end date.
    4. Extension of authorisation and access can be requested by filling up the Laboratory Access Request Form and submit to the PI for review and endorse.
5. For Visitors and Contractors:
    1. All visitors and contractors must declare their purpose of visit before entry can be granted. Their movements shall be overseen by departmental staff.

2. For visitors, they are only allowed to be present to observe work done in the laboratory.
3. For contractors, they should adhere to the contractor risk management checklist with all necessary documents such as completed risk assessment form provided to the laboratory staff before commencing work.

6. Termination of Card Access:
    1. When PIs are notified that the staff or student has stopped working in his laboratory, they shall inform the relevant card access authority so that access can be revoked.

SECTION 3: Authorisation and Access to Laboratories not under PI's jurisdiction

(OSHE Directive No. 0704)

1. PIs and members of his group should follow OSHE Directive 0704 on "NUS Staff and Student Working in Non-NUS Organisations" when working in non-NUS Organisations.
2. PIs and members of his group can also apply OSHE Directive 0704 when working at a workplace in NUS not under the PI's supervision.
3. Summary of OSHE Directive 0704:
    1. Ensure that adequate supervision and training is provided in the other workplace.
    2. Ensure that risk assessments have been reviewed and approved by the relevant authority of the other workplace. Risk assessment forms from the other workplace may be used.
    3. Any accident or incident should be reported to the PI and OSHE, as soon as possible, and in any case within 24 hours.

SECTION 4: Competency, Training and Supervision

1. All users must undergo the required NUS Safety programs.
2. The PI and Safety Lead will conduct a needs-based training analysis and monitor the competency of the user before working unsupervised; these may include but are not limited to equipment use and specific SOPs.
3. Non-routine work training should also be provided and monitored if required.
4. All trainings should be documented after assessment of competency in a safety induction checklist.
5. Training status of all users will be documented in the respective Lab Safety & Health Management System.
6. When storing users' documents, either in soft or hard copy form, store the users' information according to the NUS Data Management Policy.

SECTION 5: Working in the Laboratory

Only users who are authorised and have undergone the necessary training as outlined in:

1. SECTION 4: Competency, Training and Supervision are allowed entry and use the laboratories' equipment and facilities.
2. Authorisation is laboratory and equipment specific.
3. Users who wish to conduct research activities in the laboratory are required to
    1. Read the laboratory specific documentations.
    2. Record, agree and acknowledge their consent and understanding of the work to be carried out in the laboratory.
    3. This is to ensure that the users working in the laboratory are familiar with the safety and standard operating procedures.
4. No one should work alone outside office hours (working hour from 8.30am to 6pm)
5. If working in the laboratory outside office hours is required, refer to SECTION 10: Working in another location and SECTION 6: Working in the Laboratory Outside Office Hours.

SECTION 6: Working in the Laboratory Outside Office Hours

1. Staff can only work outside office hours if given authorisation by the Officer-in-charge. When required, the "Work Sessions Lab Charges" form must be signed by the PI / Supervisor beforehand and this form will serve as the authorisation form to work outside office hours.
2. In such cases, at least one other user or staff must be in the laboratory to be a buddy. If no buddy system is available, "SMS" practice must be applied.
3. In "SMS" practice,
    1. Prior permission must be obtained to work outside office hours by the user from the Safety Lead with the following information:
        1. Type of work to be carried out
        2. Contact person
        3. Agreed time to end work and leave the laboratory
    2. Safety Lead verifies with Contact Person that he / she has agree to be the contact person for the user to work outside office hours. This is recorded in the "Outside Office Hour Form" in Appendix T.: Sample Working Outside Office Hours Form.
    3. The user working outside office hour must inform the Safety Lead and Contact Person through SMS and / or verbally the work to be carried out during the duration of work. The user can only proceed with their work upon receiving acknowledgement reply from the Safety Lead and / or Contact Person. Upon leaving the laboratory, the user must SMS and / or verbally inform both Safety Lead and Contact Person that he / she has safely completed his / her work and has left the laboratory.

    4. The Contact Person must ensure that the user leaves the laboratory once the agreed time is up. If there is no reporting made by the user after the agreed time is up, the contact person has to call the user to ensure of their safety.
    5. In the event that the user cannot be reached, the contact person will need to make a trip down to the laboratory to check on the safety of the user. Alternatively, Building / Campus Security can be asked to check on the user in the laboratory.

4. A Risk Assessment & SOP for work after office hour as well as unattended work is to be implemented and endorsed by respective PI of the group.
    1. Adhere to the requirements set out in "NUS GENERAL LABORATORY SAFETY AND HEALTH MANUAL (NUS/OSHE/M/06) Section 8.9 GUIDANCE ON WORKING ALONE AND FOR UNATTENDED EXPERIMENTS".

SECTION 7: Personal Care

1. If you are feeling unwell, e.g. experience drowsiness, giddiness, shortage of breath etc, you should stop work immediately and inform your supervisor.
2. Any existing abrasion, cut or open wound should be covered with adhesive plaster before commencing any laboratory work.
3. Eating, drinking, smoking, applying of cosmetics or listening to music is not allowed in the laboratory.
4. Anyone under the influence of alcohol shall not be allowed to work in any workplace.
5. All personal belongs are to be kept inside locker, preferably under lock-and-key.
6. Do not clutter the laboratory with your personal belongings.
7. Do not leave any materials in aisles, walkways, stairways, doorways, etc.
8. Decontaminate all biological materials.
9. Decontaminate and clear up any chemical spills.
10. Unsafe conditions / acts encountered shall be corrected and reported to the respective Supervisor and / or to the Department Safety & Health Committee member.

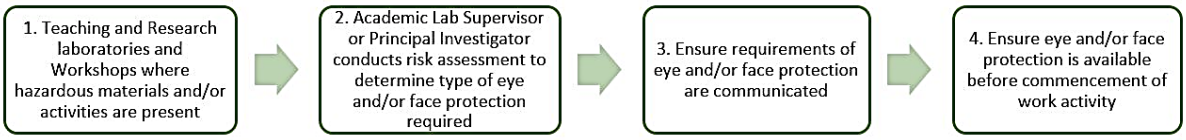
SECTION 8: Working attire, Eye Protection, Safe Working Operations

1. You must be in appropriate attire such as long pants / jeans, lab coat and covered footwear when doing laboratory work. Shorts or Bermuda is NOT allowed during laboratory work.
2. Wearing of fashion accessories such as Ring, Necklace etc are to be removed before commencing any laboratory work. Personnel with long hair are to put on hair caps during laboratory work to prevent any contamination or entanglement in between moving machine equipment.
3. Do not operate any machinery or equipment if it is known to be unsafe. All damaged equipment or missing machine guards / accessories must be reported to the Supervisor immediately for repair and maintenance.
4. Proper Personal Protective Equipment (PPE) as per required based on different lab requirement as shown in the lab notice must be put on before commencing work.
5. If you are having discussion with someone who is carrying out laboratory work, you should also put on the required Personal Protective Equipment (PPE) for protection in the event an accident / incident occurs.
6. Gloves, preferably double layered gloved, must be worn at all time during laboratory work or when handling hazardous materials.
7. Once laboratory work or handling of hazardous materials is done, immediately remove the Gloves for disposal.
8. Remove contaminated gloves before answering phone calls or opening doors. Dispose your gloves in the appropriate waste bin and wash your hands thoroughly before leaving the laboratory.
9. Unless exempted officially by the University, the minimum mandatory eye & face protection are safety glasses. Follow the NUS GENERAL LABORATORY SAFETY AND HEALTH MANUAL (NUS/OSHE/M/06) Section 7.4 PERSONAL PROTECTIVE EQUIPMENT (PPE) & Mandatory eye protection policy for research laboratories (Ref: OSHE/44/05/012015)
10. The Laboratory Supervisor or Principal Investigator shall assess the risk of injuries to the eye and determine the type of eye protection required.

	Safety Glasses	Safety Goggles (Medium Risk Activities)	Face Shield + Safety glasses/goggles (High Risk Activities)
1	The minimum requirement when in teaching and research laboratories and workshops where hazardous materials and/or activities are present.	Required when: Working with materials that have a medium hazard rating[2] (corrosive, injurious[1], infectious etc.) and a ***moderate*** splash probability exists. Examples of activities where safety googles are required : • Mixing or pouring of corrosive/injurious materials out from stock bottle on the benchtop	Required when: Working with materials that have a medium or high hazard rating (corrosive, injurious, infectious etc.) and a ***high*** splash probability exists. Examples of activities where face shield is needed together with safety glasses/googles: • Conducting a reaction involving corrosive/injurious/infectious materials under pressure • Mixing or pouring of cryogenics
2	**Information on Safety Glasses**  Safety glasses are similar to normal glasses but have lens that are impact resistant and frames that are much stronger. However, they do not provide adequate protection from significant chemical splashes.	**Information on Safety Goggles**  Like safety glasses, goggles are impact resistant. Safety goggles offer greater protection to the eye than safety glasses against chemical splashes. Safety goggles with indirect ventilation will prevent substances from draining into the eye. Some may be worn over prescription glasses. They are suitable when working with corrosive or injurious materials and a splash probability exists.	**Information on Face Shield**  Face shields provide splash protection to the wearer's entire face. They are suitable when working with corrosive or injurious materials and a high splash probability exists. Face shield shall be worn with safety goggles or safety glasses.

[1] Injurious materials include physical hazards such as projectiles.
[2] Refer to the relevant SDS for information on the hazard(s) posed by the material being handled.

Summary of eye and face protection requirements:



11. Laboratory coat and other Personal Protective Equipment shall not be worn outside laboratory.

SECTION 9: Working in PI's Certified workplace

1. Once authorised to work in the laboratory, evaluate if the activity carried out comes under the purview of the Occupational Health Program. This provides a baseline health check.
2. The occupational health clinic may make recommendations for safer work environment.
3. Familiarise yourself with the Exits, First Aid boxes, Emergency Contact, Safe Work Procedures, Risks Assessments and Safety Data Sheets of the laboratory you are working in.
4. Never horseplay, play practical jokes, fight or distract others while working.
5. Report all unsafe and potentially unsafe conditions to the laboratory safety lead.
6. Do not remove equipment from the laboratory.
7. Only authorised users who are trained to operate the specific equipment / experimental setup use the equipment / experimental setup.

8. Always follow operating instructions, do not take “short cuts”.

WARNINGS

DO NOT take “short cuts” your life or limb may be cut short.

9. Maintain good housekeeping. Do not litter.
10. Report all accidents or near-miss incidents to the laboratory officer-in-charge.
11. Do not attempt to repair, modify any equipment or experimental setup if you are not authorized to do so by the Principal Investigator or Safety Lead of the laboratory.
12. In the event of an emergency, please follow the NUS or NUS Medicine Evacuation Procedures.

SECTION 10: Working in another location

1. If you are authorised to work in a workplace not under one’s PI jurisdiction, do approach the PI/Supervisor/Safety Lead who are in charge of that workplace and get appropriate
    a. Training
    b. Operating Instructions
    c. Risk Assessment
    d. Standard Operating Procedures
2. If the above items are not available, seek the appropriate advice from relevant people such as equipment owner or laboratory technologist.
3. Risk Assessment is a legislated requirement and should therefore be conducted in the appropriate manner and documented in the PI’s SHMS.

SECTION 11: Risk Assessments and Standard Operating Procedures

1. Risk assessment (RA) and Standard Operating Procedure (SOP) are to be conducted before commencing any form of work.
2. The risk assessment should be conducted by a group of competent users.
3. The risk assessment should be reviewed and endorsed by the PI.
4. RAs and SOPs should cover not just the actual experiment but also take into consideration from the risks and operations in procurement, importation, licensing, equipment setup, handling, storage, specimen characteristics etc to the cleaning and clearing up, disposal and storage of waste.
5. Consideration of risk that arises from intermediate or by-products of the procedures arising from the use, manipulation, formation or release should be part of the assessment of risks.
6. From the risk assessments, a written protocol / safe work practice should be drawn up, describing how the work can be done in a safe manner. This should include the details and technical specifications of the control measures which are to be used and the means whereby these measures will be maintained. Operating parameters such as level of sound, presence of other specimens, absence of equipment parts, etc should be covered.
7. Emergency procedures must be established by assessment and arrangements put in place.
8. The hierarchy of risk controls should always be considered when evaluating a work activity.
9. The RAs and SOPs must be evaluated and reviewed annually or when there is a change in the activity to ensure it remains relevant and effective. Change in activity will include but is not limited to new procedures, substances, machinery/equipment, or if there are changes in legislation.
10. SOPs should be clearly stated and realistic in scope.
11. RAs and SOPs should be discussed and implemented in groups of at least 2 members.
12. If there are changes to the RA after an assessment, the SOP should also be reviewed for any relevant changes to be made.
13. After an assessment, both RA and SOP should have their review date updated even if nothing has changed.

SECTION 12: Work Area, Chemicals, Equipment & Samples/Specimens

1. Do a quick check on the condition of the equipment and laboratory facilities prior to usage. STOP any operation and ASK for help if uncertain.
2. You should carry out all work in the appropriate work area e.g. Biosafety Cabinet, Fume Cupboard, etc.
3. Clean the area of work immediately after use.
4. Label all chemicals correctly and store in the appropriate containment as per chemical safety.
5. Label all samples and specimens correctly and store in the appropriate containment as per biological safety.
6. Collect waste material at the end of the session and dispose in an appropriate safe manner.
7. If waste material has to be stored first before disposal, waste material should be stored in the appropriate safe manner.
8. Switch off all electrical equipment (except those that are supposed to be running continuously) before you leave the laboratory.
9. Wear suitable hand gloves and eye goggles when handling liquid nitrogen.
10. Dispose all sharp objects such as needles, scalpel blades & broken glasses into the sharps bin.
11. Do not use glassware and utensils in the laboratory to contain food.
12. Do nor store food or drinks in the freezers and refrigerators in the laboratory.
13. Do not transport specimens without proper containment and permission from the laboratory officer-in-charge.
14. Follow NUS Laboratory Chemical Safety Manual CHAPTER 7.5 Chemical Transport and Transfer & NUS Laboratory Biorisk Management Manual (NUS/OSHE/M/01) Chapter 8 Transport of biohazardous materials.
15. If you sustain injury e.g. cuts and scratches, wash thoroughly and seek treatment immediately. Inform the relevant authorities in the contact listing, so that appropriate care can be rendered to you.

SECTION 13: Packing and Transportation of Samples/Specimens

1. For Packing & Transport of regulated materials

   Refer to NUS Laboratory Biorisk Management Manual (NUS/OSHE/M/01 Version No.: 6.1)

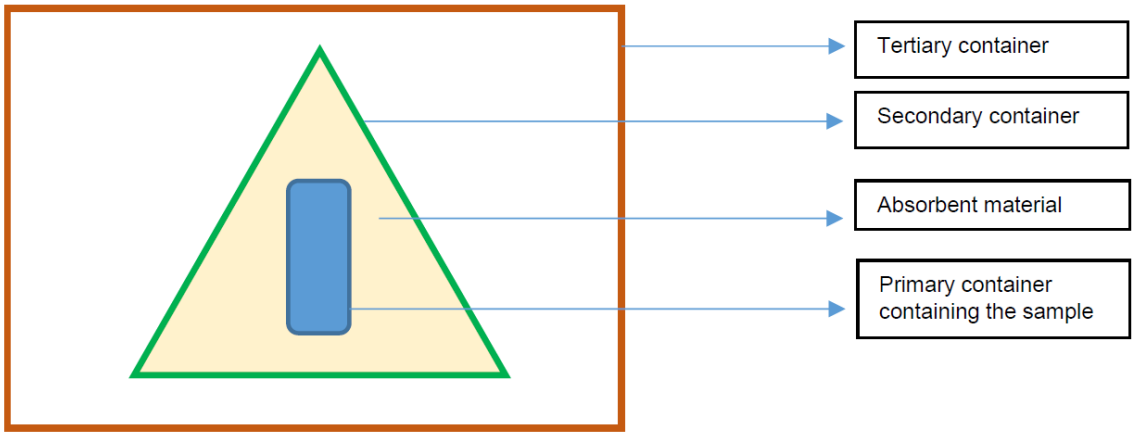
   Chapter 8.1 Transport of regulated biohazardous materials.

2. Packing/Packaging non-regulated biohazardous materials

   Refer to NUS Laboratory Biorisk Management Manual (NUS/OSHE/M/01 Version No.: 6.1)

   Chapter 8.3 Transport of non-regulated biohazardous materials 17 & 8.3.1 Procedure for packaging of non-regulated materials.

3. Ensure that specimens are packed according to Safe Work Procedures appropriate for the



   sample/specimens.

4. The external surface of the container should be clean to be handled with bare hands.

NOTE

If you need to wear gloves to handle the container - it's not properly packed and contained.

5. The primary container containing the sample shall be placed in a secondary container. Absorbent material shall be placed in between the primary and secondary container. The amount of absorbent material shall be sufficient to absorb the entire contents in case of breakage or leakage in the primary container.

6. If it is required that the material be transported outside the building, the secondary

   Container shall be placed in a tertiary container (SCHEMATIC DESCRIPTION OF A PACKAGING SETUP FOR TRIPLE PACKAGING).

7. All containers shall be leak-proof.

8. In addition, tertiary container shall be rigid and sturdy with a sealable lid.

9. External surfaces of every container shall be decontaminated during the assembly of the package, including the tertiary container.

10. Information including quantity and type of biological material and particulars of the transferor and transferee (including emergency contact numbers) shall be available.

11. Transport of non-regulated biohazardous materials:

    1. Biological materials shall not be transported via public buses and trains including NUS internal shuttle bus. Examples of acceptable modes of transport include walking, personal vehicles, commercial carriers (i.e. courier services, taxi).
    2. The package shall be taken directly to its intended location without unnecessary stops along the way and shall not be opened during transport.
    3. A spill kit should be carried / nearest available location of a spill kit should be known when transferring between NUS laboratories (i.e. within the same building or across buildings).
    4. A spill kit shall be carried for transport between NUS laboratories and laboratories of other research institutions / universities.
    5. Any spill clean-up shall not be attempted without appropriate spill response material.
    6. Access shall be restricted around the spill.

NOTE

Familiarize yourself with spills procedures and spill kits when transporting biohazardous materials: (a) between NUS laboratories (i.e. within the same building or across buildings) and (b) Between NUS laboratories and laboratories of other research institutions/ universities (i.e. both local and overseas).

SECTION 14: Emergency / Crisis Management

1. The following Alert Levels correspond to the University's Corporate Emergency Levels:
    1. Level 1 Emergency: Minor Incident
        1. Localized event with limited impact.
        2. Routine response to a routine and contained event (e.g. chemical spills, localised power failure, trips and falls, minor injuries, staff/student on health incident, etc).
        3. Crisis Management Plan is not activated.
        4. Response is internal within department with external assistance from Campus Security, if deemed necessary.
        5. Little or no impact on personnel or property or normal operations within or outside the locally affected area. E.g. Localised chemical spill.
        6. If Level 1 is not stabilised by 6 hours from incident report, it becomes a Level 2 Emergency.
    2. Level 2: Emergencies
        1. Level 2 Emergency is a serious event that disrupts one or more operations.
        2. Level 2 Emergencies may escalate quickly and have serious consequences for mission-critical functions, or may threaten life safety (e.g. structural fire, attempted suicide, or incident may pose a threat to the reputation of the department).
        3. Level 2 Emergencies have a moderate to high impact on personnel or property. Response requires two or more departments above a routine capacity, and/or outside agencies to render assistance.
        4. Crisis Management Plan is activated to the extent as deemed necessary.
        5. Principal Investigator to be notified immediately followed by Head of Department and University Level Units.
        6. Emergency Response is coordinated by the University Crisis & Emergency Management Team.
        7. If Level 2 is not stabilised by 48 hours from incident report, it becomes a Level 3 Emergency.
    3. Level 3: Crises
        1. A Crisis is defined as a very serious event that seriously impairs or halts the operations of the University and/or has an impact on the surround community. It is typically a situation that is presently or soon to be going out of control. Normal university operations are suspended.
        2. Level 3 Crises have high impact on personnel or property with potential to negatively affect the reputation or credibility of the University (e.g. multi-

structural fire, major explosion, major hazardous material release, multiple deaths or injuries, disease/epidemics, any national level disasters.

3. A timely resolution of crisis conditions requires University-wide cooperation and extensive coordination with external jurisdictions. The University Crisis Management Plan is automatically activated.

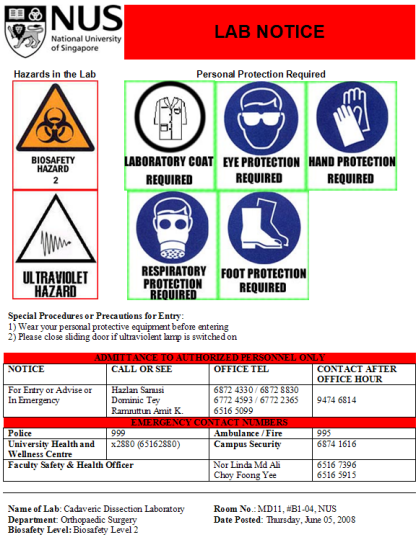
2. All communications/enquires from the public or media must follow the guidelines in SECTION 16: Media Communications.
3. Assess the Business Impact on work activities and follow the relevant Business Continuity Plan as appropriate.
4. A Business Continuity Plan review should be carried out to document what appropriate steps and resources are required during an emergency/incident.

SECTION 15: Emergency Contact Information

1. Sample Laboratory Notice giving Emergency Contacts follows:

NOTES

All emergency contact number listing can be found above the phone for emergency usage



NUS National University of Singapore

LAB NOTICE

Hazards in the Lab

BIOSAFETY HAZARD 2

ULTRAVIOLET HAZARD

Personal Protection Required

LABORATORY COAT REQUIRED

EYE PROTECTION REQUIRED

HAND PROTECTION REQUIRED

RESPIRATORY PROTECTION REQUIRED

FOOT PROTECTION REQUIRED

Special Procedures or Precautions for Entry:
1) Wear your personal protective equipment before entering
2) Please close sliding door if ultraviolent lamp is switched on

ADMITTANCE TO AUTHORIZED PERSONNEL ONLY

NOTICE	CALL OR SEE	OFFICE TEL	CONTACT AFTER OFFICE HOUR
For Entry or Advise or In Emergency	Hazlan Samsi Dominic Tey Ramruttun Amit K.	6872 4330 / 6872 8830 6772 4593 / 6772 2365 6516 5099	9474 6814

EMERGENCY CONTACT NUMBERS

Police	999	**Ambulance / Fire**	995
University Health and Wellness Centre	x2880 (65162880)	**Campus Security**	6874 1616
Faculty Safety & Health Officer		Nor Linda Md Ali Choy Foong Yee	6516 7396 6516 5915

Name of Lab: Cadaveric Dissection Laboratory
Department: Orthopaedic Surgery
Biosafety Level: Biosafety Level 2

Room No.: MD11, #B1-04, NUS
Date Posted: Thursday, June 05, 2008

Sample Emergency Contact Information

In case of Emergency, Contact

Principal Investigator	*Depends on Project*	Tel: *Depends on PI*
Full Name of Principal Investigator	*Safety Lead*	Tel: *Office Number* *Hand Phone if available*

If the PI or Safety Lead is not available, please contact:

Manager	Mr Dominic Tey	Tel: 6772 3311 / 9768 4305
Department Safety Coordinator	Mr Ramruttun Amit	Tel: 6516 5182 / 92989130

SECTION 16: Media Communications

1. Staff and students should not deal directly with the media at all times. Any enquiry should be referred to the Principal Investigator.
2. In cases of Emergency, all enquiries from the media should be referred to the Official Spokespersons.
3. All statements and briefings to media are to be released through the Office of Corporate Relations. It is the responsibility of the Unit to inform staff and students not to deal directly with the media at all times. A designated staff of the affected Unit shall provide facts and relevant information to Office of Corporate Relations, who would then draft statements to the media. The official spokesperson will depend on the nature of the crisis and must be cleared with NUS President or his designate.

APPENDIX A: List of Principal Investigator, Safety Lead, Laboratory/Office

1. Principal Investigator

Principal Investigator	Safety Lead	Laboratory
Assoc. Prof. Wilson Wang	Dr. Bryan Koh	MD11 Basement 1 & NUSTEP Lab
Professor Lee Eng Hin	Ms. Antony Dhasan Josphin Denslin	NUSTEP Lab 1A
Professor James Hui Hoi Po	Afizah Binte Mohd Hassan	NUSTEP Lab 1B
Professor Wong Hee Kit	Dr. Raymond Lam Wing Moon	NUSTEP Lab 2A

2. Department Core Facilities

Principal Investigator	Safety Lead	Laboratory/Office
Assistant Prof Dennis Hey (Research Director)	Grace Lee Siok Moi Yong Soon Chiong Ramruttun Amit Kumarsing Jennifer Chong Sue Wee Julee Chan Wai Kam Tan Sze Yee Chua Li Ping	Motion Analysis Lab Cadaveric Dissection Lab Biomechanics Lab Cell Culture Lab Histology Lab Bone Mineral Densitometry (BMD) Lab NUHS Tower Block Office

APPENDIX B: Sample In-House Rules and Regulations Checklist

		Date of Completion / Not Applicable (NA)	Personnel In charge Signature	User's Signature
	Authorisation and Access to Laboratory			
	Laboratory induction			
	Laboratory Specific Training			
	Training Matrix			
	Department Safety Induction Quiz			
	Student details lodge with Department Student Database			
	Key issue			
	Card Access approved			
	Number lock informed			
	Laboratory Access Request Form 1. PI signed 2. Start Date 3. End Date			
	NUS Risk Acknowledgement and Consent Form For Access To Facility (for Non-NUS personnel)			
	Visitor Log Book			
	Contractor Risk Management Checklist			

APPENDIX C: OSHE Directives

Directive 0701	Access to and Supervision of Undergraduates in Laboratories for Project or Research Work	15 May 2008 Revision No: 0
Directive 0702	Authorized Access to Laboratories	17 October 2011 Revision No: 01
Directive 0704	NUS Staff and Students Working In Non NUS Organizations	17 January 2012 Revision No: 01
Directive 0705	Supervisory & Training Responsibilities for New Users of Laboratories Managed by Academic Staff (Principal Investigators & Laboratory Supervisors)	18 October 2010 Revision No: 00

APPENDIX D: Card Access Authority

Orthopaedic Diagnostic Centre	Grace Lee Siok Moi Tel: 6772 2324 Email: dosleesm@nus.edu.sg	Orthopaedic Diagnostic Centre Main Building Level 3, 5 Lower Kent Ridge Road, Singapore 119074
NUSTEP	Tan Chuen Hong Tel: 6516 5301 Email: lsitch@nus.edu.sg	NUS Tissue Engineering Programme (NUSTEP) DSO (Kent Ridge) Building 27 Medical Drive #04-01 Singapore 117510
MD11	Chong Sue Wee Tel: 6516 5099 Email: doscsw@nus.edu.sg	MD11, #B1-02 10 medical Drive, Singapore 117597
1) Contact RFM team at medbox50@nus.edu.sg 2) SharePoint link: https://nusu.sharepoint.com/sites/med/staff/SitePages/Research-Facilities-Management.aspx		MD11, #03-13 10 medical Drive, Singapore 117597

APPENDIX E: Sample Working Outside Office Hours Form

Yong Loo Lin School of Medicine, **Department of Orthopaedic Surgery**	Procedure No:	-
Title: **Outside Office Hours Work**	Rev No: Issue Date:	001
	Page:	26 of 28
Prepared by:	Approved by:	Review Date:

Working Outside Office Hours (Month/Year:)

Date	Name of user/Sign	Activities	Time Out	Contact Person

Endorsed by PI : _____ (Name/Signature)

Date : _____

APENDIX F: SS ISO 45001:2018 Occupational health vs safety management systems and NUSSHA Correspondence

No.	Clause	ISO 45001 Element	Clause	NUSSHA Requirement
1	5.2	OH&S Policy	4.2	Safety & health policy
2	6.1.2	Hazard identification and assessment of risks and opportunities	4.3.1	Hazard Identification and risk assessment
3	6.1.3	Determination of legal requirements And other requirements	4.3.2	Legal and other requirements
4	6.2.1	OH&S objectives and planning to achieve them	4.3.3	Objectives and programme(s)
5	7.1 5.1 5.3	Resources Leadership and commitment Organisational roles, responsibilities and authorities	4.4.1	Resources, roles, responsibilities, accountability and authority
6	7.2 7.3	Competence Awareness	4.4.2	Training, awareness and compliance
7	5.4 7.4	Consultation and participation of workers Communication	4.4.3	Consultation and Communication
9	7.5	Documented information	4.4.4	Documentation and document controls
11	8.1	Operational planning and control	4.4.5	Operational controls
12	8.2	Emergency preparedness & response	4.4.6	Emergency preparedness & response
13	9.1	Monitoring, Measurement, Analysis And Performance evaluation	4.5.1	Performance, measurement & monitoring, evaluation of compliance
15	10.2	Incident, non-conformity and corrective action	4.5.2	Incident investigation, non-conformity, corrective and preventive action
18	9.2	Internal Audit	4.5.3	Internal audit
19	9.3	Management Review	4.5.4	Management review

REFERENCES

- OSHE Directive No. 0701 Access to and Supervision of Undergraduates in Laboratories for Project or Research Work
  (Revision No. 0, Issue Date 15 May 2008)
- OSHE Directive No. 0702 Authorized Access to Laboratories
  (Revision No. 01, Revision Date 17 October 2011)
- OSHE Directive No. 0704 NUS Staff and Students Working in Non NUS Organisations
  (Revision No. 01, Revision Date 17 January 2012)
- OSHE Directive No. 0705 Supervisory & Training Responsibilities for New Users of Laboratories Managed by Academic Staff (Principal Investigators & Laboratory Supervisors)
  (Revision No. 00, Issue Date 18 October 2010)
- NUS General Laboratory Safety and Health Manual (NUS/OSHE/M/06) Section 7.4 Personal Protective Equipment (PPE) & Mandatory Eye Protection Policy for Research Laboratories
  (Ref: OSHE/44/05/012015)
- NUS General Laboratory Safety and Health Manual (NUS/OSHE/M/06) Section 8.9 Guidance On Working Alone and for Unattended Experiments
- NUS Laboratory Chemical Safety Manual Chapter 7.5 Chemical Transport and Transfer
- NUS Laboratory Biorisk Management Manual (NUS/OSHE/M/01) Chapter 8 Transport of biohazardous materials
- NUS Laboratory Biorisk Management Manual (NUS/OSHE/M/01 Version No.: 6.1) Chapter 8.2 Transport of regulated biohazardous materials
- NUS Laboratory Biorisk Management Manual (NUS/OSHE/M/01 Version No.: 6.1) Chapter 8.3 Transport of non-regulated biohazardous materials 17 & 8.3.1 Procedure for packaging of non-regulated materials
- NUS Safety & Health (S&H) Management System Standard for Departments – Part B: Guidance Notes
  (Version No.: 3.0, Revision Date 12 July 2019)
- SS ISO 45001:2018 Occupational Health and Safety Management System – Requirements with guidance for use.