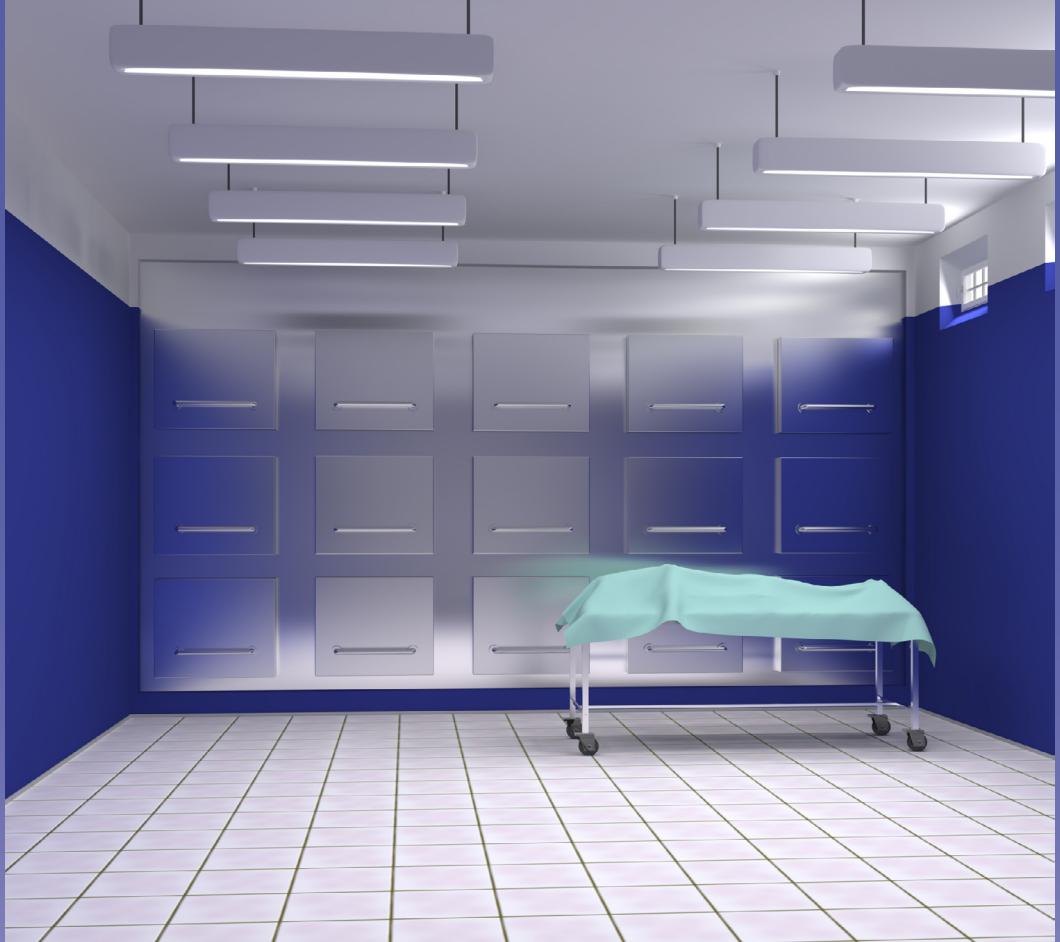


Occupational safety for the death care industry



A Division of the
Department of Consumer
and Business Services

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This publication was developed with the Oregon Mortuary and Cemetery Board to emphasize industry hazards, provide recommendations, and highlight related Oregon OSHA standards.



Handling, lifting, and transporting bodies

Challenges – Injuries from manual tasks in the funeral industry result from ongoing wear and tear to joints, ligaments, tendons, muscles, and discs. Lifting bodies that are in an awkward position can strain muscles. The position of the deceased is not predictable and may not fit ideal conditions for lifting, moving, or transferring to a gurney. Lifting human remains into a cremation chamber also presents unique musculoskeletal hazards.



Cold storage (holding) and handling of a body presents challenges for workers to safely move the body from the gurney to the shelving. Placing bodies in cold storage on lower and higher shelves can present ergonomic issues and potential for overexertion due to the limited space and awkward postures needed to move the bodies.

Recommendations

- Train workers to determine the number of people needed to help move the body before removal. Ensure there is adequate staffing for any team handling requirements. Gurneys may not be an option because of access to the deceased, stairwell configurations, or the deceased position limitations.
- Provide proper equipment, such as an adjustable, ergonomically designed gurney or a bariatric gurney.
- Train workers in the types of physical, musculoskeletal, and health hazards of body handling. Provide proper methods of lifting and handling so workers can protect themselves against strains and sprains.
- Teach pallbearers how to safely handle the casket, including how to hold the casket and use team lifting techniques.

Embalming operations

Challenges – Embalming operations have biological, chemical, and musculoskeletal hazards.

Embalming operations biological exposure: The embalming procedure requires work with large amounts of blood, which is potentially infectious. Blood can enter the body through contact with broken skin; by inhalation of aerosols; and by splashing into the eyes, nose, or mouth. Embalming procedures create risk of exposure to the causative viruses for AIDS (HIV), hepatitis B (HBV), hepatitis C, and other bloodborne pathogens. If the deceased person had tuberculosis (TB) in his or her lungs at death, TB could spread to workers when they handle the body, particularly if they open or compress the chest cavity.

The *Clinical Anatomy Journal* reported that lung tissue was sampled before embalming from 20 cadavers whose death certificate indicated *Mycobacterium tuberculosis* (MTB) as cause of death. The cadavers tested positive up to 36 days after death, thus, MTB can remain viable for up to 36 days. Although TB is usually in the lungs, it can also be in other parts of the body.

A number of factors in embalming procedures pose an increased risk for exposure to infectious diseases, blood, infected body parts, and forceful expulsion of air:

- Unprotected skin contact with an infectious agent, such as Methicillin-resistant *Staphylococcus aureus* (MRSA).
- Blood accumulations on embalming tables and in body cavities, increasing the potential for splashes.
- Needle sticks during suturing.
- Cuts or scrapes to hands and forearms due to exposed ribs in autopsied bodies.
- Aerosols generated by improperly placed aspirator discharge nozzles.
- Excessive embalming pump pressures or sudden pressure releases, causing sprays.
- Variations in personal techniques and work practices while handling organs.

Workers may also be exposed to blood or other potentially infectious materials when they retrieve remains, depending on the state of the deceased person.

Recommendations

- Provide workers with information and training on infectious disease risks, infection control practices, and use of personal protective equipment.
- Prevent unauthorized access to the embalming room.
- Contain sharps in a receptacle during body preparation activities. Position sharps containers close to the point of use.



- Implement procedures for storage, disposal, and transportation of clinical and related waste, including sharps.
- Provide adequate hand washing and drying facilities. Provide hand antiseptic where hand washing facilities are not readily available.
- Prohibit eating, drinking, and smoking in the preparation room.
- Provide a spill kit to clean up spills of blood, body fluids, and clinical waste. Provide portable spill kits in transfer vehicles.
- Ensure workers avoid actions that may result in forceful expulsion of air from the body.
- Provide emergency eyewash and shower facilities to manage accidental blood and body fluid exposures.

Embalming operations chemical exposure: Usually two sorts of chemicals are used – embalming chemicals and disinfectant and sanitizer chemicals. The chemicals used in the embalming process may include formaldehyde, phenol, glycerol, alcohols, glutaraldehyde, and coloring agents that can cause respiratory irritation and sensitization.

Formaldehyde is a sensitizing agent that can cause an immune system response upon initial exposure. The health effects of formaldehyde exposure are respiratory irritation, eye irritation, skin irritation, dermatitis, respiratory sensitization (possibly leading to occupational asthma), and cancer.



Several studies at funeral homes have shown that the exposure limits can be exceeded during body preparation procedures. The degree of formaldehyde exposure depends on a number of factors, such as:

- Formaldehyde concentration in the embalming solution.
- Type of embalming procedure and if it is performed on an autopsied body.
- Variations in personal technique and work practices.
- Use of local exhaust ventilation, such as downdraft tables, versus general room ventilation.
- Worker position in relation to air flow in an embalming room equipped with general ventilation.
- Effective use of personal protective equipment (PPE) and appropriate respiratory protective equipment.

Recommendations

- Replace a product with an alternative one containing a less hazardous substance. Health information found in a safety data sheet (SDS) may help in selecting a less hazardous substance.
- Ensure the safety data sheets (SDSs) are available to workers for all hazardous substances.
- Provide workers with information and training on the safe use of hazardous substances. Train workers to follow label instructions for disinfectants and sanitizing agents. They may be classified by the EPA as biocides (pesticides).
- Allow only authorized personnel to access hazardous substances.
- Provide emergency eyewash and shower facilities for people exposed to hazardous substances.
- Ensure all connections are tight on the gravity feeding equipment while filling the body cavity.
- Reduce the concentration of formaldehyde and glutaraldehyde to the lowest concentration possible by diluting the embalming fluid concentrate.
- Have procedures in place for cleaning up spills.
- Purchase chemical products in ready-to use packages rather than transferring from large containers.
- Prohibit eating, drinking, or smoking in areas that contain chemicals.
- Sample for formaldehyde exposure during an embalming procedure.
- Provide adequate mechanical ventilation as needed.
- Use downdraft tables.

Embalming operations musculoskeletal hazards: Preparing human remains and manipulating the body's limbs to relieve rigor mortis can cause strains and sprains. Awkward postures, sustained postures, repetitive movement, and exposure to vibration from equipment are all hazards of the embalming process. Overexertion if the remains are large can contribute to musculoskeletal damage.

Recommendations

- Train workers to perform particular tasks such as recovering bodies from awkward spaces; using tools, mechanical devices, and handling methods, such as team lifting.
- Encourage workers to take regular breaks from tasks, either by alternating with other tasks that use different muscles or by taking fixed breaks.
- Plan work processes to minimize double handling and lifting.
- Adjust work benches to a comfortable height for the worker to promote an upright posture of the back and neck.
- Create enough room for easy movement around furniture and work areas.
- Provide the appropriate lifting device for storing the deceased person on a shelf.
- Ensure adequate storage space to store heavy items (including deceased people) at approximately waist height of workers.
- Provide adequate lighting for the task to reduce bending the neck.
- Place frequently required work items within easy reach and close to waist height.

Embalming room ventilation and maintenance

Challenges – Effective ventilation is considered the most critical factor in reducing formaldehyde exposure.

Recommendations

The embalming room should be designed to use incoming supplied fresh air to dilute both chemical and biological air contaminants and draw the contaminants out through an exhaust vent using negative pressure from a mechanical fan.



It is essential that the air flow is designed so that any vapors are pulled away from the worker's breathing zone. Having adequate exhaust air capacity below the work surface is critical to reducing exposures to formaldehyde. If modifications are made to the ventilation system within the preparation room, test the system to ensure that there is adequate air velocity and direction when the system is operating.

Maintenance of the ventilation system needs to follow proper ventilation practices.

- Make sure the embalming room is supplied with fresh air. The best position for supplied air is above the head of the worker, coming down, and exhausting through the floor or near the floor. The next best option is for supplied air to come from the head of the embalming table (adding a fan may increase efficiency) and the exhaust to be at the foot of the table.
- Install local exhaust ventilation over the mortuary table for tasks involving the use of embalming fluids.
- Install local exhaust ventilation over mortuary instrument-soaking containers if using glutaraldehyde products for disinfecting mortuary instruments.
- Install extraction ventilation over the sluice where run off collects from the embalming table.
- Do not recirculate exhaust or extraction ventilation, and make sure your building air intakes and exhaust vents are situated so exhaust air cannot inadvertently re-enter the building.
- Replace pressurized aerosol container products with pump sprays to reduce aerosols. Pump sprays should not be used for dispensing cleaning products because of the potential for bacterial growth.

Cremation

Challenges – Cremation can present some unique hazards – potential for thermal, noise, and silica exposure. Lifting human remains into a cremation chamber also presents unique musculoskeletal hazards. See Page 4 for recommendations.

Thermal exposure

Cremation is the use of high-temperature burning, vaporization, and oxidation to reduce human bodies to basic chemical compounds, such as gases and mineral fragments retaining the appearance of dry bone. A cremation chamber is a piece of equipment in which cremation takes place. A unit may contain a primary and secondary combustion chamber. These chambers are usually lined with refractory ceramic brick designed to withstand the high temperatures. Higher temperatures speed cremation, but consume more energy and accelerate spalling of the furnace's refractory lining. The design, type, and age of the furnace can create thermal exposures upon contact with or removal of cremation remains.

Noise exposure

Cremated remains are not ashes in the usual sense. After incineration, the dry bone fragments are swept out of the furnace and may be pulverized by a machine called a cremulator – essentially a high-capacity, high-speed blender – to process them into cremated remains. Pulverization may also be performed by hand. There are various types of cremulators, including rotating devices, grinders, and older models using heavy metal balls (ball mills). Noise exposure levels depend on the type of machine used, frequency and duration of the noise, and how the machine is maintained. Consider noise levels when purchasing machinery and tools.



Silica exposure

Cremation presents a concern for worker exposure to fine ash and particulate when refractory material is scraped as the deceased person's ashes are collected from the cremation chamber or during maintenance activities. The risk of exposure to airborne refractory material depends on the type of refractory material, ash collection methods, and maintenance practices. It is especially dangerous when using refractory material that contains silica. Typically, high-grade refractory brick contains high amounts of silica. When silica dust becomes airborne, there is the potential for worker exposure. This exposure can result in a long-term, slowly debilitating lung disease known as silicosis. Cremation chamber maintenance may also present a silica hazard when ceramic material is replaced. Because silicosis is not treatable, you must prevent silica dust from becoming airborne.



Recommendations

- Use a vacuum with a high-efficiency particulate absorption (HEPA) filter anytime you suspect airborne silica exposure from dry sweeping or cleaning with a broom.
- Use wet work practices when cleaning up dust particulates.
- Evaluate your need for a confined space program and lockout procedures (several sources of energy such as electrical or natural gas may exist) when maintaining cremation chambers.
- Evaluate the need for protective equipment to protect workers from burns and provide respirators for overexposures to nuisance dust or silica due to the heat and soot produced by cremation chambers.
- Sample for noise and exposures to silica and nuisance dust.

Standards

Oregon OSHA's Hazard Communication Standard (1910.1200) provides for safe handling of hazardous substances. The intent of hazard communication is to ensure that all employees know about the chemical hazards present at their workplace and how to protect themselves.

OSHA's Formaldehyde Standard (1910.1048) addresses many aspects of formaldehyde use in an occupational setting, including air monitoring, medical surveillance, proper ventilation and safe work practices, personal protective clothing and equipment, shower and eyewash facilities, housekeeping and spill cleanup, and a hazard communication program.

OSHA's Respiratory Protection Standard (1910.134) requires employers to write a respiratory protection program and establish when respirators are used. Respiratory protective equipment may be required to control exposures to formaldehyde during times when other methods such as engineering, work practice, and administrative controls are not in place, or are not sufficient to reduce exposures below limits. Respiratory protective devices should not be used as a substitute for other controls.

OSHA's Bloodborne Pathogens Standard (1910.1030) covers employees who are likely to be exposed to human blood or other potentially infectious materials. The standard requires employers to develop and implement a bloodborne pathogens exposure control plan.

Oregon OSHA's Personal Protective Equipment Standard (OAR 437-002-0134) requires employers to assess the workplace to determine if PPE is necessary and document their assessment. Employers must provide appropriate PPE to employees, and train those employees required to use PPE.

Oregon OSHA's Confined Space Standard (OAR 437-002-0146) protects general industry and construction industry employees who enter confined spaces that have serious or life-threatening hazards. A cremation chamber may meet the definition of confined space; therefore, employers may need to comply with this standard.

Standards

OSHA's Control of Hazardous Energy (Lockout/Tagout) Standard (1910.147)

protects employees who could be injured as a result of the unexpected release of hazardous energy. The requirements apply when an employee doing service or maintenance work on a machine or equipment could be injured by the unexpected start-up or release of hazardous energy. Lockout and tagout are the primary methods of controlling hazardous energy.

OSHA's Access to Employee Exposure and Medical Records Standard, (1910.1020)

(1910.1020) gives employees the right to access relevant workplace exposure records and employee medical records if they are subjected to toxic substances in the course of employment. Medical records for each employee must be maintained for at least the duration of employment plus thirty years,

Oregon OSHA's Air Contaminants Standards (437-002-0382) sets exposure limits for a variety of substances, such as silica. Air monitoring is used to assess employer exposure.

OSHA's Occupational Noise Exposure 1910.95 establishes limits to how much noise an employee can be exposed to in the workplace. If you must raise your voice or shout to be heard above the noise, this rule may apply.

Environmental Protection Agency regulates the management and disposal of hazardous wastes per Title 40 of the United States Code of Federal Regulations. In part, it describes the standard for the management of specific hazardous wastes, including post-cremation heavy metals. All materials that contain precious metals must be sent to an EPA-licensed recycling and refining facility. There's more information on **Title 40** and links to licensed facilities. There is also an article in the March 2014 edition of Mortuary Magazine for general information.

References

J.C. Correia, J.L. Steyl, and H.C. De Villiers (2013). Assessing the survival of *Mycobacterium tuberculosis* in unembalmed and embalmed human remains. *The Clinical Anatomy Journal*, **Volume 27, Issue 3**, pages 304–307, DOI: 10.1002/ca.22355.

OregonOSHA Services

Oregon OSHA offers a wide variety of safety and health services to employers and employees:

Consultative Services

- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

Enforcement

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.

Appeals, Informal Conferences

- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

Standards and Technical Resources

- Develops, interprets, and provides technical advice on safety and health standards.
- Provides copies of all Oregon OSHA occupational safety and health standards.
- Publishes booklets, pamphlets, and other materials to assist in the implementation of safety and health standards and programs.
- Operates a Resource Center with a video lending library, books, technical periodicals, and consensus standards.

Public Education and Conferences

- Conducts conferences, seminars, workshops, and rule forums.
- Coordinates and provides technical training on topics such as confined space, ergonomics, lockout/tagout, and excavations.
- Provides workshops covering management of basic safety and health programs, safety committees, accident investigation, and job safety analysis.
- Manages the Safety and Health Education and Training Grant Program, which awards grants to industrial and labor groups to develop training materials in occupational safety and health for Oregon workers.

For more information, call the Oregon OSHA office nearest you.

Salem Central Office

350 Winter St. NE, Room 430
Salem, OR 97301-3882

Phone: 503-378-3272

Toll-free: 800-922-2689

Fax: 503-947-7461

en Español: 800-843-8086

Web site: www.orosha.org

Portland

1750 NW Naito Parkway, Suite 112
Portland, OR 97209-2533
503-229-5910
Consultation: 503-229-6193

Salem

1340 Tandem Ave. NE, Suite 160
Salem, OR 97303
503-378-3274
Consultation: 503-373-7819

Eugene

1140 Willagillespie, Suite 42
Eugene, OR 97401-2101
541-686-7562
Consultation: 541-686-7913

Bend

Red Oaks Square
1230 NE Third St., Suite A-115
Bend, OR 97701-4374
541-388-6066
Consultation: 541-388-6068

Medford

1840 Barnett Road, Suite D
Medford, OR 97504-8250
541-776-6030
Consultation: 541-776-6016

Pendleton

200 SE Hailey Ave.
Pendleton, OR 97801-3056
541-276-9175
Consultation: 541-276-2353

Other contacts

Oregon Mortuary & Cemetery Board

800 NE Oregon St. Suite 430
Portland, OR 97232
971-673-1500

Oregon Health Authority

Public Health Division

Acute and Communicable Disease Prevention

800 NE Oregon St., Suite 772
Portland, OR 97232
971-673-1111

Oregon Health Authority

Public Health Division

HIV/STD/Tuberculosis Program

800 NE Oregon, Suite 1105
Portland, OR 97232
971-673-0153



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