Ergonomics Guidelines for Materials Handling (Proper Lifting)

The human back is composed of three natural curves that form an S-shape. When the three natural curves are properly aligned, ears, shoulders, and hips are in the same plane. When the curves are misaligned, this is considered poor posture, which in turn, may lead to pain and serious injury while working. Improperly handling materials or lifting may contribute to such injury as well. Improper handling or lifting may refer to lifting a load in a hazardous way or lifting a load that is too heavy or awkward for your body to support. Injuries can arise in muscles, ligaments, tendons, vertebrae, and discs, either individually or in combination.

Preventing back injuries is a primary objective in proper lifting. According to the Bureau of Labor Statistics (BLS), more than one million workers suffer back injuries each year, and back injuries account for one of every five workplace injuries or illnesses. It is the most common workplace injury in Maryland. Work-related factors contributing to back disorders include, but are not limited to the following: poor posture in standing/sitting; maintaining bent posture; bending, twisting, and reaching while lifting; heavy lifting; poor technique in load lifting, carrying, lowering, pushing, or pulling; poor design of workstation; repetitive lifting; sedentary lifestyle; lifting with forceful movement; poor footing on unstable or slippery surface; vibration from machinery; and fatigue.

Other contributing factors to back injury include congenital defects of the spine, increases in static standing or sitting tasks, and/or decreases in physical conditioning and exercise. Signs and symptoms of back injuries include pain when attempting to assume normal posture, decreased mobility, and pain when standing or rising from a seated position. Aside from the back, other musculoskeletal disorders may develop from improperly lifting that involve the shoulders, arms, hands, wrists, legs, and torso. Disorders may occur from a single event or gradually over time from repetitive activities. Pain, use of mobility aids, loss of productivity, and other long-term consequences may result from such injuries and disorders.

General Guidelines

Lift Planning and Controls

Analyze the load and requirements for its movement. Consider lifting a heavy load in four stages: preparation, lifting, carrying, and lowering/setting down. Then ask yourself these questions:

- Can the item(s) be safely lifted and carried by myself?
- Is/Are the item(s) awkwardly-shaped, heavy, non-rigid, difficult to grip/hold, or unbalanced? Obstructions which prevent an employee's body contact with the item being lifted also generally increase the risk of injury.
- Will the item(s) obstruct my view at any stage?

- Can equipment assist in the lift or movement of the item(s)?
- Is a coordinated team lift (involving two or more employees) more appropriate for the item(s) to be moved? Consider this option if the item is > 50 lb.
- Consider your posture and lifting technique. Will you need to bend and twist your body?

Employees should determine the following when planning to lift loads:

- The distance from your body the item must be in order to be held comfortably.
- The frequency and duration of the lifting task.
- The height of both the origin and the destination for the load to be lifted.
- The path for moving the item to its destination.
- The right tools and methods for the complete handling/lifting task.
- The weight of the item to be lifted prior to lifting.

In addition, employees should maintain good housekeeping to avoid slip, trip, and fall hazards that may contribute to injuries from lifting or carrying a load. Clear the planned path of obstacles or obstructions, by making sure that the floor is dry, free from debris, and is in good condition (no crack/holes), by ensuring that the working surface (for travel and lifting) is flat, and by moving any unrelated equipment or items from the area or planned path.

Personal protective equipment (PPE) may be used to protect employees when appropriate. PPE may include head protection such as a hard hat and safety glasses for impact hazards, particularly from heavy items that will be lifted to an elevated shelf or platform. Other PPE includes non-slip, steel-toed work boots, which may prevent injury to the foot from a falling load and provide traction to reduce the instance of slipping; durable work gloves, which can assist in protection against abrasion or debris such as splinters, provide grip control and comfort, and can reduce fatigue and strain; and safety vests for promoting high visibility or in connection with use of lifting equipment.

Proper Lifting Techniques

Warm-up Prior to Lift

- Perform rotation stretch for wrist by stretching arms in front of you, gently rolling wrists and stretching fingers. Roll them in the opposite direction.
- Perform rotation stretch for waist with hands at hips, gently rolling the body along the waist and upper body, while keeping the legs in place, several times. Roll the body in the opposite direction in the same manner. This is helpful to the back and other muscles.
- Stretch the legs by positioning the body with one leg forward with toes on that foot raised. Keep back straight while bending forward at the waist. Then shift weight onto your forward leg and bend the knee. Keep the back leg straight and heel on the floor. Hold each stretch for 20 seconds and perform stretch twice for each leg. This is helpful for the legs (Achilles tendon and hamstring, in particular).

Common Lifting Recommendations

- Avoid pinching your fingers or toes with the item.

- Change direction (or pivot) with your feet, taking slow, small steps, to avoid twisting your full body (torso at the waist); keep your shoulders in line with your hips.
- Do not hold your breath while lifting, carrying, or lowering loads.
- Do not lift suddenly or jerk/twist your wrists.
- Do not obstruct your view while walking with the item.
- Do not twist at the waist.
- Never lift heavy items above the shoulders or bend the back to lift. Lifting which occurs below knee height or above shoulder height is more strenuous.
- Test the item weight before a full lift.
- Use a full grip with the hands, not partial.
- Use a wide stance for the legs.
- Use the legs to lift.
- Rotate duties with others.
- Take breaks.
- Vary activities.

Basic Lift (Diagonal Lift Technique) – for use with small objects, where the load can be straddled and the use of wide stance can be safely employed

- Get close to the item.
- Stand with a wide stance by putting one foot forward and to the side of the object.
- Keep your back straight, push your posterior out, and use your legs and hips to lower yourself to the item. This maintains good posture.
- Move the load as close to you as possible. Slide it, if necessary.
- Put the hand on the side of the object furthest from you (same side of your body as the forward foot). Feet should be shoulder width apart.
- Put the other hand on the side of the object closest to you. Your hands should be on opposite corners.
- Grasp the object firmly with both hands.
- Prepare for the lift by tightening your abdominal muscles, look forward and upward, and keep a straight back.
- Lift slowly and follow your head and shoulders. Hold the load close to your body and lift by extending your legs with your back straight, and breathing out as you lift.

Lowering Technique

Setting down a heavy object may be as hazardous as lifting it. If the item is not being placed on a shelf or at a height parallel to the elbows or higher, the lowering technique may be useful. Reverse the lifting process by following the same ergonomic lifting principles:

- Keep the load close to your body and your back straight.
- Squat down, bending only at the knees and hips, with posterior out.
- Tighten your stomach muscles (engage your core) as you lower yourself
- Kneel on one knee, if necessary
- Set the item down.
- Slowly rise after setting the item(s) down.

Lift Assisted By Equipment

- Mechanical equipment may be helpful. Equipment includes, but is not limited to the following: Conveyor, dolly, forklift, lift table, pallet jack, pneumatic lift, utility cart, etc.
- Do not overload, check equipment capacity.
- Do not pull a load that can be pushed.
- Follow the guidance for equipment use (operator manual and TU policy/procedures).
- Go slow.
- Keep the load balanced.
- Make sure equipment is well-maintained prior to use.
- Monitor the area for pedestrians.
- Use the equipment in a safe manner.

Team Lift

- Communicate actions as you proceed and any issues with load.
- Determine direction of movement prior to lift.
- Use Basic Lift Techniques where feasible.
- Lift the load together at the same time and keep the load balanced/level.
- Look in the direction of the lifting path and go slow.
- Lower the load into place together at the same time.

Suggested Techniques for Materials Handling

- Adjust the height of a pallet or shelf where the item currently sits or will be placed to reducing hazards from reaching.
- Have materials delivered closest to where they will be used to reduce lifting/carrying requirements.
- Material handling equipment should be easy to move, with handles that can be easily grasped in an upright position. Equipment such as carts or conveyors should be used for horizontal motion whenever possible.
- Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.
- Reduce the size and/or weight of the item(s) lifted. Follow any maximum allowable weights for a given set of task requirements, checking the compactness of a package, the presence of handles, and the stability of the package being handled.
- Work methods and stations should be designed to minimize the distance between the person and the object being handled.

Resources

For questions involving the ergonomics of your workspace or proper lifting, contact EHS at (410) 704-2949 or safety@towson.edu. You may also browse the hyperlinks below.

https://www.osha.gov/otm/section-7-ergonomics/chapter-1