Consider ergonomics when onboarding new workers

New workers come in all shapes and sizes, and each deserves a close look at the ergonomics of his new job. Musculoskeletal disorders (MSDs) often involve the back, wrist, elbow, and/or shoulder, and occur when workers are exposed over time to MSD risk factors, such as awkward postures, forceful exertions, or repetitive motions.

Neutral vs. awkward postures

A neutral posture is achieved when the muscles are at their resting length and the joint is naturally aligned. Neutral postures also minimize the stress applied to muscles, tendons, nerves, and bones. A posture is considered "awkward" when it moves away from the neutral posture toward the extremes in range of motion.

For the most part, a worker is capable of producing his or her highest amount of force when a joint is in its neutral posture. Thus, in order for a worker to produce the same force in an awkward posture as he does in the neutral posture, the worker's muscles must work harder and expend more energy. Working in an awkward posture, therefore, is a MSD risk factor that should be avoided.

Some joint motion must occur because remaining in a static posture for too long can have negative consequences. When a worker remains in a static posture, the prolonged application of a load by the muscles can result in fatigue. Also, not moving muscles for a time impedes blood flow.

With this in mind, workstations, tasks, and hand tools should be designed to enable workers to use primarily neutral postures. Care should be taken to ensure that awkward postures aren't frequent and that high forces aren't required while in awkward postures.

Grip type

In general, an object can be grasped using one of two methods: a pinch grip or a power grip. A power grip curls the fingers toward the palm; a pinch grip presses the thumb against the fingers of the hand or an object and doesn't involve the palm.

The amount of force that can be generated depends on the type of grip and the width of the grip:

- Force generated with a pinch grip is about 15%–25% of force generated with a power grip;

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- Use a power grip when higher forces are required;
- Use a pinch grip when precise movements are needed and the force required is low (< 2 lbs.); and
- Research shows the design width of power grips should be 1.75 to 3.75 inches.

A pinch grip provides more control because the thumb joint is highly movable and precise. In contrast, minimal control is associated with the power grip as the fingers move as one entity and only in one direction (flexion). For these reasons, pinch grips are typically used for short-duration, low-force, and precision tasks because they require minimal force exertion but high control. In general, tasks that are done repeatedly and require two lbs. or more of force should not involve pinch grips. For example, tasks that require using a power drill are ideally suited to the use of a power grip because the neutral posture for the fingers is a slightly flexed position.

**Hand tools**
Hand-tool design can play an important role in the reduction of MSDs. A tool that is designed with consideration for the worker's tasks can greatly reduce the worker's exposure to risk factors for MSDs. However, using a poorly designed or inappropriate tool negatively impacts the entire body by dictating the postures assumed by the worker to complete the task and increasing the resulting forces exerted by the worker. Such tools can also directly apply unwanted forces or vibrations to other body parts. Several factors should be considered when purchasing or selecting a hand tool:
- Select tools that allow neutral postures to be used;
- Use tools with handles designed for a power grip;
- Use tools with handles that are appropriately sized and shaped for the user's hand;
- Use tools with built-in features (e.g., springs that open tool handles) that minimize forceful exertions required to use the tool; and
- When operating heavy tools, ensure they accommodate using both hands to support the tool's weight.

**Fatigue failure, back pain**
There is a disc between each bone of the spine. The discs provide cushioning and allow the spine to move comfortably. Discs get their nutrition directly from the vertebrae at the interface between the bone (vertebral endplates) and the disc. These endplates can fracture from excessive force or repeated loading from contractions in back muscles (fatigue failure). Disc degeneration, and back pain, is the result.

Workers should understand that:
- Repeated lifting, even at submaximal levels, may eventually lead to damage of the spine (fatigue failure); and
- Substantially reducing loads placed on the spine can greatly minimize the risk of fatigue failure.

When lifting:
- Reduce the weight of the object being lifted; and
- Keep loads close to the body.

The best way to prevent low-back pain is to prevent the initial fatigue failure of the vertebral endplates. In general, for a given task, if the forces exerted by back muscles are high (e.g., in heavy lifting), fatigue failure will occur more quickly. Forces produced by the lower back muscles can be reduced by minimizing the weight being lifted or carried. However, those forces can also be reduced by minimizing twisting and the horizontal distance between the object and the person.

The size and shape of the object and the handholds on the object affect the worker’s lifting style. Also, the existence of physical barriers that separate the worker from the object to be lifted plays a role in the forces exerted in lifting the object because barriers force a worker to hold an object farther away from his or her body while the worker moves the object over the barrier. A barrier often requires the worker to lift or hold an object incorrectly. The distribution of the weight across the object itself is also a consideration because an awkward weight distribution can cause the worker to lift and carry the object incorrectly.

**More information**
Safety Focus: Yard Work and Raking Safety

Yard work can mean trouble if you don't take proper precautions. Injuries often occur because of improper use, improper safety apparel, failure to heed safety instructions and owners' manuals, inadequate maintenance of tools, and mechanical problems. Often, the victims of these accidents are children who are unaware of any danger and are playing in the area where power equipment is being used.

Here are some safety tips to follow:

- Dress appropriately for the work environment:
  - Wear long pants and long-sleeved shirts to provide some protection from thrown objects;
  - Wear close-fitting clothes and don't wear anything that could get caught in moving parts;
  - Wear sturdy shoes with slip-resistant rubber soles; and
  - Wear the proper personal protective equipment (PPE) such as eye protection, heavy gloves, and hearing protection when using motor-driven equipment.

- Walk around the area in which you will be working before starting lawn and garden work, and remove any objects that could damage equipment or cause injury or property damage. Objects such as sticks and stones, metal, glass, and wire can break bones and cause other severe injuries when thrown from lawnmowers and other equipment.

- Keep an eye on your children. Many children are injured by lawn-care tools every year. Do not allow children younger than 12 to operate a push mower and children under the age of 16 to operate a riding lawn mower. Never allow double riders on a riding mower. Injuries could occur if the mower were to tip or stop suddenly.

Another fall chore is raking. Raking is often more physically demanding than people realize, and the American Academy of Orthopaedic Surgeons (AAOS) recommends the following precautions:

- As with any physical activity, it’s important to warm up your muscles for at least 10 minutes with light exercise and stretching, especially when it’s cold outside. You should also stretch your muscles after raking to relieve tension and prevent soreness.

- Use a rake that feels comfortable for your height and strength.
- Wear gloves or use rakes with padded handles to help prevent blisters.
- Avoid using old rakes that are rusty or have loose or broken parts.
- Watch out for large rocks, low branches, tree stumps, and uneven surfaces. Don't let a hat or scarf block your vision.

Aside from these AAOS recommendations, follow these tips:

- Keep rakes and other garden tools out of walkways or other areas where they can be a tripping hazard.
- Use carts or wagons to transport full bags of leaves.
- If you plan to burn leaves, make sure the fire is safely controlled and legal. Many municipalities prohibit leaf burning altogether, or they require a permit for any burning. Wait until the wind is calm and other conditions are safe for a fire. Use an outdoor fireplace or other type of enclosure designed to safely contain outdoor fires when burning branches, sticks, twigs, or leaves. Never leave a fire unattended, and douse the ashes with water to be sure the fire is completely out.

- Share some apple cider or hot chocolate when the job is done.
There’s no getting away from microbes. Microscopic organisms take up residence everywhere – in our home, in the air, and all over our body.

While this might be an unsettling thought, there’s no reason to wish for a microbe-free world. Some microbes — the ones we call germs — do cause disease, but others are essential to a healthy life.

Four major groups of microbes play a complex role in our health:

**Bacteria:** Beneficial bacteria help us digest food and destroy germs. Some, however, produce toxins. Botulism, a severe form of food poisoning, is caused by toxins from bacteria.

**Viruses:** Viruses cause disease when they invade normal cells. They can bring on a cold, flu, or more serious diseases such as polio.

**Fungi:** Some fungi are helpful, such as those used to make antibiotics. Others, however, bring on fungal diseases such as athlete’s foot, thrush, and ringworm.

**Protozoa:** These one-celled organisms, which live in water or a moist environment, can cause diseases such as malaria.

We pick up microbes, including germs, when they pass through the air or when we touch infected material. Our immune system does its best to fight infection, but sometimes it’s overwhelmed by a germ invasion.

See your health care provider if you have symptoms such as swelling, a rash, blurred vision, a rapid heartbeat, or a cough lasting longer than a week. These and other severe symptoms could indicate that it’s time to call in some reinforcements in your fight against germs.

**Be aware of germ hotspots**

While many microbes are beneficial, you still need to be aware of where germs may thrive at the office and at home.

Your desktop, keyboard, and mouse, along with your cell phone, are likely to be germ-friendly according to studies by Dr. Charles Gerba and others.

Things aren’t much cleaner in the office kitchenette or break room. A study conducted by Kimberly-Clark Professional revealed that the dirtiest items in the work place include:

- Sink faucet handles;
- Microwave door handles;
- Refrigerator door handles;
- Water fountain buttons; and
- Vending machine buttons.

At home, watch for germs that are hiding on doorknobs, refrigerator door handles, salt and pepper shakers, television remotes, and bathroom faucets.

“Before you embark on a journey of revenge, dig two graves.”

Confucius
(551 BC - 479 BC)