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Stretching and Strengthening in the Workplace
Introduction: Let the fun begin

Most safety professionals have either presented or observed the infamous “Stretch & Flex” talk. While preparing yourself to dazzle the crowd with your well prepared and educational training, a few participants walk confidential to the front row. Each of these individuals are smiling, in observably good physical condition and engage you with positive comments such as “looking forward to hearing how you can help me in the gym” or “do we get lunch during this talk”? For the remainder of the majority, as the participants stroll into the room, murmurs of “I don’t need to stretch”, “can’t wait till this is over”, “they can’t make me do this” or “what a waste of time” can be heard. This group tends to look forward to what their lively comments will add to the presentations and precede to not only sit in the last row, but to move the chairs as fair away from the front of the room as physically possible. A few will talk amongst themselves, read a paper or simply pull their highly tinted safety glasses down over their eyes to try to catch a few minutes of rest, relaxation and reading the backs of their eyelids. So, what do you do? Present the information as quickly as possible, handing out any literature there is and say thanks for coming.

As a presenter, this is not an easy task and may not be one most safety professionals look forward to. But when presenting to a group, what are the keys to engagement and adherence to the material presented – two simple principles.

1. Remember this simple phrase “No one cares how much you know, until they know how much you care” — Theodore Roosevelt

2. People will participate in health initiatives only when they understand what it will do for them.

In this discussion, you will be provided the tools, knowledge and understanding of the principles needed to not only present information, but to drive the message home to your audience, that the human body is the most complex and amazing machine on the planet and that physical conditioning is the key to making it perform at its highest levels, with the least amount of discomfort and for the longest time possible.

Where to Begin?

The SWOT Analysis

SWOT: Strengths, Weaknesses, Opportunities and Threats.

So why would a business principle be dragged into a discussion about stretching and strengthening? Because when developing any program that is implemented into an organization, a thorough understand of that organization, as well as potential programs, need to be assessed.

The SWOT analysis is a simple, yet effective, tool for a team to understand what the organization is performing well at and where trouble may be lurking. This information can then be used to guide the direction of the organization, help set goals and objectives, the assigning of tasks and ultimately lay the path for success by capitalizing on what is good and fixing what is

not. When conducting a SWOT analysis, a team looks at the item being assessed in terms of the following.

1. **Strengths:** What are the current strengths of the organization, department, program or initiative and how the team can work from a position of strength?

2. **Weaknesses:** What weaknesses can be identified, either in the organization or the program that may negatively affect the strategic plan and health of the organization?

3. **Opportunities:** Identify opportunities that can be used, whether through people, resources or programs, to achieve success and address identified weaknesses or potential threats to the organization.

4. **Threats:** Immediate or future problems that will affect the health and operations of the organization and must be addressed through concerted efforts.

When using the SWOT method, a team brainstorms ideas, issues and topics that fall within the 4 areas points. After all points have been written down, the team decides which 5-10 items under each point need to be addressed and begin working on developing goals, objectives and tasks to steer the organization towards success. An example of a common SWOT analysis session for the determination of a safety initiative may look like this.

Strengths

1. Strong safety leadership team

2. Full support and buy-in of upper management

3. Workforce is familiar with a “Stretching” program

Weaknesses

1. 3 shifts, leading to logistical challenges for training

2. Lack supervisor / low level management support

3. Past struggles with employee support of a stretching program

Opportunities

1. Aging workforce, with increasing reports of early discomfort

2. Organizations vision statement of “Zero Injuries”

3. Energized and effective site safety team

Threats

1. Aging workforce with increasing injury record

2. Employee impressions of stretching and past stretching initiatives not lasting

3. Negative union environments

Once the SWOT has been completed, the team then has the groundwork for setting goals and objectives as to what will positively affect the organization. In the example above, the team would pull from the strengths of a strong safety team and upper management support as well as the fact that the workforce is experiencing increasing amounts of discomfort, whether due to work or non-work related conditions, and work to couple this with the organizations message of "Zero Injuries". A program would be built that takes the aging worker in consideration and develops a message that not only addresses current health needs but needs into their retirement age. Once developed, the safety team would meet with union leaders to share their objective and message, to gain their support and lessen any negative impressions that may occur from a program implemented in partnership with upper management. Once cleared by the union leadership, the program would be delivered with an emphasis on gaining support of the sites peer leaders, in an effective and engaging manor.

Though this seems easy to describe in a hypothetical manor, as with any initiative, challenges will always arise. But, if the team can gain an in-depth working knowledge of the organization and environment, a plan can be developed that will lay a pathway to success while working within the organizations strategic plan.

Winning Over the Crowd

As described at the beginning of this discussion, the two principles most important to engaging the workforce to participate in a physical conditioning program are to:

1. Show them that you care about their health, safety and well-being and

2. Provide thorough education as to why this is going personally help them in their day-to-day lives.

This is not always a simple task, but when performed well, can be the difference between program success and "just another corporate thing they have to sit through". To show them that you truly care about their health, physical conditioning programs cannot be mandatory. Just as you cannot effectively force an individual to take personal responsibility for other health related practices such as losing weight, getting a physical or stop smoking, making someone stretch or perform a strengthening exercise just won't stick. The first principle to show them you care is accomplished by simply laying out the fact that they are not required to participate, but that if they do they will simply feel better. Not only does the presenter need to state this, they need to have the participants demonstrate the exercises at the time of the talk. Given the right amount of pressure, most individuals will join in when asked. As you begin taking them through the exercises, make sure you engage the group in a fun, yet professional manor. This can be done by relating a stretch to a specific injury that is common to the group or correlating a strength exercise to a certain sport they may be familiar with. The presenter should try engaging the group by focusing on making it personal for each individual and relating a message in a manner that is seeking partnership rather than hieratical demand, participants will begin forming the impression that you are there to help.

Along with showing them you care, people will participate in health initiatives only when they understand what it will do for them. Information being presented needs to be informative, relevant to the listener and relatable to their lives. This is accomplished in a few different ways. One simple way is to become familiar with the activities the participants perform at work. When

a presenter is able to correlate a specific work task, explain how and why it is a risk and how and why an exercise will reduce discomfort or injury, participants will connect the dots. A second piece is to provide education as to the anatomy and physiology of the body and what happens during an injury. If an individual can understand how something works, they will be more receptive to hearing ways to make it better. The next section can be used as a basic starting point to work off.

How the Body Works

The Machine

When discussing how the body functions, one of the best comparisons that can be made is that of a machine. Though most people in an industrial setting have a basic understanding of how machinery works, few truly have a strong working knowledge of the human body. For this, the comparison of the human body and a machine with a combustible engine works very well.

The comparison starts with the fact that the human body is designed for high performance and that all high performance machines need maintenance. When the functions of the body are assessed, three main aspects are relevant, with the first being strength. The human body has remarkable strength and can achieve even greater force output when undergoing a physical conditioning program, or what is commonly known as strength training. Strength training not only increases the overall ability to lift, push and pull heavier weights, it also improves the efficiency of muscle contraction through learning, known as muscle memory. As the body repeats specific movement patterns, a memory of that pattern is formed between the muscle and brain, thus strengthening neuro-pathways and developing quicker response to stimuli.

Along with strength, endurance of the human body is critical to our survival and success. Endurance can be assessed by the measurement of the length of time one is capable of performing a single muscle contraction, a repetitive motion or over an extensive period of time such as a career. Our bodies are designed to work, not sit as many of us are now forced to do. The third aspect to function is accuracy. The coordination between brain, nerve and muscle is unmatched in the natural world. Not only can the human body perform amazing physical feats of athletic activities, such as hitting a pitch thrown at over 100 mph, but use similar coordination to create art such as The Mona Lisa, Sistine Chapel and Mozart's 5th Concerto. This accuracy and high level brain function is what makes the amazing human body thrive. But to achieve this great level of performance, the machine needs to be maintained and that's where we struggle. According the Department of Labor, Bureau of Labor Statistics the average American male works 8.3 hours per day and the average American female 7.7 hours per day, while TV watching was the most common leisure activity at 2.8 hours per day1 . This extreme between repetitive motion, whether sitting at a computer or working on a shop floor, has led to less time and interest in proper maintenance of the body.

A healthy lifestyle is made up of many aspects and needs to be practiced daily, weekly, monthly and yearly to keep function at its prime. The first aspect, and most important to this discussion, is physical conditioning. Physical conditioning being the improvement of soft tissue flexibility, overall muscular strength and cardiovascular output, discussed in greater detail later in this report. Along with physical conditioning, nutrition, hydration levels, rest and annual preventative screens need to be performed. Each of these are crucially important and must be practiced regularly to maintain the required functioning in today's world.

This maintenance is not much different than the maintenance schedule of a machine we would use throughout the day. Tools need to be calibrated, engines must have clean fuel to operate, waste products are removed through exhaust and regular care taken to change oil, rotate tires and fill fluids will keep all machines operating as they were intended to do.

The Body's Systems

There are 12 classified systems to the human body ranging from the Integumentary System, the largest sensory organ to the Immune System, dealing with some of the smallest particles in the natural world. For this discussion we are going to focus on Skeletal, Muscular and Nervous Systems, or what can be combined to call the musculoskeletal system.

The skeletal system is made up of 206 bones, providing the structural support needed to maintain a vertical posture, protect vital organs and produce red blood cells. Protecting bone ends is cartilage, which is a dense "rubbery" material that reduces friction and absorbs forces aimed at the skeletal structure. Where two or more bones meet is called a joint. Supporting the joints of the skeletal system are ligaments, a strong material that binds bones together while still allowing for movement of these bones. Common ligaments are the anterior cruciate of the knee and acromial clavicular ligament of the shoulder. Injury to bones can consist of fractures, degeneration to the cartilage or a structural breakdown in the density of bone material. Injury to ligaments are called sprains, and can lead to instability of the joints they support.

The second system is the muscular system, made up of 640 separate muscles, each with individual cells that produce contractions of the muscle tissue. This tissue not only propels the skeletal system, but is designed to aid in many activities such as stabilizing the spine, allowing for eye focus and aiding in food digestion. Merging with muscle tissue is another strong material called tendon. Tendon's join with muscle, providing the attaching point to the bones. Injury to muscles and tendons are referred to as strains and effect the ability of force output.

The third system is the nervous system, providing sensory input as well as coordination of muscle activity. Nerves act as the wiring of the body, sending electrical impulse throughout the circuits, controlling both fine and gross movements. Common nerves are the ulnar nerve, "funny bone" and sciatic nerve of the low back. Injury to a nerve can produce numbness, tingling and ultimately dysfunction of the region they support.

Causes of Injury

Injury causes, outside of acute injury, are normally caused by one of or a combination of individuals performing activities in static holds or repetitive motions. Static holds, such as looking up at the work they are performing, kneeling for long periods of time or holding tools can lead to injury. Injury from this situation usually is caused from the increase in load on a select muscle group, leading to fatigue of that group and possibly swelling around nerves, innervating the area. Along with increased load, static holds tend to decrease blood flow throughout the body which lessens the amount of oxygen and nutrients being delivered to tissues and causes a build-up of tissue waste products.

Repetitive motion injury has many of the same negative aspects of static holds as far as load placement, but with the addition of "wear and tear" to the soft tissue. This is similar to a pulley system on a crane. As the cables are stressed, the integrity of the material is compromised and fraying occurs. As the cable fray's, individual strands weaken and tear, increasing the force placed on the remaining strands. Those strands suffer from fatigue and eventual have the

potential for a catastrophic failure event. In the situation of the crane, it means the cable is severed, causing the load to be dropped. In the case of the body, micro tearing of the tendons lead to discomfort and eventually larger tearing of tissue away from the bone.

Stages of Injury

Whether an individual is suffering from a static hold or repetitive motion problem, the stages of injury are the same. The progression of most non-acute injuries follow a similar path in most cases. This progression is:

- Stage 1: Muscle tightness and fatigue
- Stage 2: Discomfort
- Stage 3: Pain
- Stage 4: Disability

These stages progress in a similar fashion for most parts of the body. With the beginning stage, the individual will report feeling a tightness and general fatigue developing in a region of the body. As they continue to perform the activity, the sensation they are experiencing is now reported as discomfort. Discomfort is a general negative sensation that does not limit movement or function. Progression from here leads to pain, which can be described more as a specific sensation, at a specific location that tends to limit movement or function. The pain stage will transition to disability when there is a mechanical change in the anatomical structure of the body part and function is now greatly impacted.

Common Injuries in Today's Workforce

According to published data available, 38% of all injuries with days away from work were due to sprains, strains, and tears. Of those, 63% were due to overexertion and bodily reaction. Slips, trips, and falls were only 23%. Employees who suffered from a Musculoskeletal Disorder (MSD) were away from work for a median of 12 days where all other injuries averaged 9 days away from work.

The most commonly injured body parts seen in an industrial environment are to the wrist / hand, elbow, shoulder and neck / back. Each of these can be detrimental to not only the occupation of an individual, but can greatly affect their lives outside of work.

The wrist and hand are made up of 27 bones, each placed to allow for proper function and optimal performance. As this region is made-up of many small structures and is very fragile, additional caution needs to be taken to prevent injury. Common injuries of the wrist and hand include fractures, trigger finger and carpal tunnel.

The second high risk region is the elbow, which is made up of 3 bones, 2 (ulna and radius) in the forearm and one (humerus) in the upper arm. This joint is categorized as a hinge joint, allowing for flexion and extension of the arm, with rotation of the hand taking place between the ulna and radius. Two primary groups of muscles are associated with motions of this area, with attachments beginning on the outside (lateral) and inside (medial) aspects of the elbow joint. These muscles control movements of the fingers, hand and wrist. Common injuries to the

forearm and elbow are lateral or medial tendonitis, called lateral or medial epicondylitis. Due to the tension placed on the ulnar nerve during full elbow flexion, symptoms of numbness and tingling can be felt into the last to fingers.

The next anatomical area of concern is the shoulder. As a ball and socket joint, the shoulder is designed for great motion, relying on a small group of muscles called the rotator cuff. These muscles are responsible for positioning the humeral head (ball) in the center of the glenoid (socket). With a properly functioning rotator cuff, the shoulder is able to perform at many different angles and can move at speeds of over 1,600 degrees per second. Along with the rotator cuff, large muscles such as the pectorals, deltoid, trapezius, biceps and latissimus dorsi all play a role in providing the strength to lift, push and pull objects. Common injuries associated with the shoulder include rotator cuff tears, joint sprains, joint stiffness and arthritis.

The neck and back make up the infrastructure that supports the entire skeletal system. As the pillar of support, all 4 of the extremities are anchored to the spine, thus providing the platform for leverage throughout the joints. The spine is made up of 33 vertebrae, positioned with 3 curves acting as a type of shock absorber. The spine is supported by core muscles of the abdomen, low back and pelvis. Running through the spine is the spinal cord, the main neurological highway connecting the brain to the rest of the body. The nerves branch out along the length of the spine, traveling through tunnels called foramen. Between each vertebra is a jelly filled cushion called the vertebral disk, providing separation between the vertebral bodies and absorbing force. Common injuries to the neck and back are muscle strains, ligament sprains, nerve impingement, disk degeneration and arthritis.

Program Development

The Program Injury prevention and physical conditioning programs can have differing components based on specific site needs. For this discussion, we will address all four components needed to develop a comprehensive physical conditioning and injury prevention program, which are active warm-ups, static stretching, core strengthening and proper body mechanics. Each is important on its own, together they address most musculoskeletal risk factors today's workforce will face.

Active warm-ups, or what may be known as dynamic stretching, is "an activity-specific functional stretching exercise that should utilize movements to prepare the body for activity"3 . This form of stretching is best used to increase muscle – tendon blood flow, temperature and range of motion throughout a group of tissue surrounding a joint. Ideally, these should be performed at the start of the day as well as prior to performing a strenuous activity. Benefits are also seen when utilized in cold climates or environments to combat the elements and reduce the effects of cold on the soft tissues.

The second component is static stretching, which focuses on fewer muscles at a time, held at the muscle end-point and for periods of 15 seconds to 5 minutes. Static stretching is an excellent tool for the management of repetitive motion discomfort, chronic injury and general muscle health. The lasting effects of static stretching vary between individuals and climates and need to be performed throughout the length of the day.

The third piece to the conditioning puzzle is strengthening. In this, strengthening exercises are used to target imbalances throughout the body that develop when the body's posture is poor and antagonist muscles compete for dominance. This is commonly seen with the muscles of the chest overpowering the muscle of the mid back or the quadriceps group overpowering the

hamstring group. When this occurs, posture is changed, pulling the body out of its optimum position to perform activities. Strength exercises in this case are used to improve the strength of identified muscle groups, lessening the dominance of their counterparts. In most cases strengthening for this reason can be performed daily and done at short intervals of 10-20 repetitions.

The fourth component of the program is the identification and instruction of proper body mechanics per body part. This is a combination of proper movement principles as well as neutral joint positions recommended to lessen the forces placed on the body as well as improve the body's leverage when performing activities. This can be done as a general instruction or task specific depending on the program goals.

Program Components per Body Region

To bring this all together, the following are general recommendations and suggestions for the top 4 body regions at risk for injury in the workforce. These are only a few possible suggestions and should be used as a basic template for the development of a site specific program.

Wrist and Hand

Active Warm-Up: Wrist circles

1. With hands relaxed, rotate wrists in a clockwise / counter clockwise motion for 10 – 20 seconds

2. Repeat 1-3 times

Static Stretch: Clam stretch

1. With palm of hand placed on a flat surface, grasp the half of the palm not obstructed by surface and pull up, "opening" the palm like a clam shell

2. Hold stretch 20 – 30 seconds

3. Repeat 1-3 times

Strengthening: Finger extension

1. Using a light exercise band, place fingers in the pinch grasp position with the band wrapped around the outside of the finger tips

2. Separate fingers by opening the hand as wide as possible

3. Hold for a count of 5 4. Slowly return to starting position and repeat

Body Mechanics: C-Grasp

1. Utilize a "C" grasp when gripping tools and items

2. Avoid a pinch grasp of the fingers

3. This reduces hand fatigue and maximizes grip strength

Elbow Active Warm-Up: Elbow extension

1. With the elbow flexed and palm facing the shoulder, extend elbow straight while rotating palm out towards the ground, pause and bring back to the starting position.

2. Repeat 3-5 times Static Stretch:

Wrist flexion & Extension stretch

1. With elbow straight, use opposite hand to pull wrist / hand down.

2. Hold stretch 20 – 30 seconds 3. Repeat by pulling hand up and holding.

Strengthening: Wrist extension

1. Using a light exercise band, grasp the band with one hand, palm down, holding the opposite end of band with the free hand.

2. Raise the wrist up through the entire range of motion.

3. Hold for a count of 2, slowly return forward.

4. Repeat 10-20 times

Body Mechanics: Handshake position of wrist

1. Make sure work is done with the with in the same position used to shake hands

2. This aligns the bones of the forearm and wrist, reducing the forces placed on this region

Shoulders Active Warm-Up: Chest hugs

1. With arms extended at the sides, raise your hands up and across the chest as if to hug yourself

2. Increase speed to a pace that is comfortable, smooth and approximately one motion every 1-2 seconds, for 20-30 seconds

3. Repeat 1-3 times

Static Stretch: Chest stretch

1. While standing clasp both hands behind the back with elbows straight.

2. Raise arms up and look towards the ceiling.

3. Hold stretch 20 – 30 seconds

4. Repeat 2-3 times

Strengthening: Lateral pull down

1. Using a medium resistance band above the head, grasp the band with both hands.
2. Keep elbows straight and pull band down towards the side squeezing the shoulder blades.
3. Hold for a count of 2, slowly return forward
4. Repeat 10-20 times

Body Mechanics: Keep elbows at the side

1. Keep elbows close to side
2. Reduces forces on the body
3. Reduces unsteady loads
4. Reaches should be no further than length of forearm

Neck Active Warm-Up: Chin tucks

1. With eyes looking forward, actively slide head back
2. Tuck chin and move head down towards ground
3. Pause and reverse motion
4. Repeat 3-5 times

Static Stretch: Neck stretch

1. Place arm behind your back look down and to the side.
2. Gently put the chin to the chest.
3. Hold stretch 20 – 30 seconds
4. Repeat 2-3 times

Strengthening: Standing row

1. Using a medium resistance band at chest level, grasp the band with both hands.
2. Pull elbows back squeezing the shoulder blades.
3. Hold for a count of 2, slowly return forward.
4. Repeat 10-20 times

Body Mechanics: Keep ears over shoulders

1. Maintain a base position of: Ears over shoulders, looking straight ahead
2. Avoid range of motion 25% past base position

Back Active Warm-Up: Walking high knees

1. While walking, exaggerate walk by lifting knees as high as possible for 10-20 seconds
2. Repeat 3-5 times

Static Stretch: Hamstring stretch

1. In a standing position with one leg straight, bend upper body towards the straight leg making sure your back remains straight, leading with your chest.
2. You will feel this stretch from your calf to your low back.
3. Hold stretch 20 – 30 seconds
4. Repeat 2-3 times on both legs

Strengthening: Abdominal chops

1. With band attached low, grasp band with both hands
2. Rotate arms up in a diagonal pattern using the abdominal muscles
3. Hold for a count of 2, slowly return down
4. Repeat with band attached high
5. Repeat 10-20 times

Body Mechanics: Pivot feet towards direction moving or working

1. Pivot on the balls of the feet
2. Rotate so feet are pointing towards work
3. Bring items / work closer to you.
4. Position body or work within the Power Zone

Conclusion

With the ever increasing demands placed on an aging workforce, the risk of injury continues to rise. Though implementing physical conditioning programs can be a challenge, the rewards are endless. As you embark on this journey, remember these few keys: Show the participants you are doing this for them; explain this is for their health and well-being; make comparisons to the

human body and machines; focus on the four areas: Active Warm-Ups, Static Stretching, Core Strengthening and Body Mechanics; and be patient. Change is slow and anything worthwhile is worth the time and energy you will put in.

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