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WELL AT HOME. SAFE AT WORK.

Session 255
Assessing Ergonomic Risk Factors
Greg Nartker, MS

2:30 to 3:30 p.m. Thursday, March 29

Ohio Bureau of Workers' Compensation

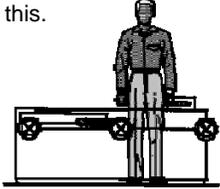
Objectives

- Increase awareness of basic ergonomics concepts and principles
- Identify risk factors for strains, sprains, and cumulative trauma
- Understand cumulative trauma disorder (CTD) risk factor assessment form

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Ergonomics Is Design

Most people look like this.



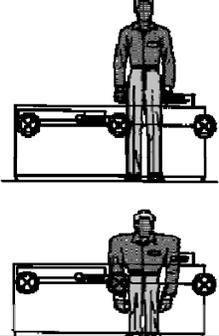
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Poor Ergonomics

Most people look like this.

Poor Design

- Some designers think that people look like this.



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Risk Factors - The Big Four

- Repetition
- Forceful exertion (weight)
- Duration
- Posture

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Repetition

Repetitive stress injuries (sometimes referred to as CTDs) can result in damage to the tissues – muscle, tendon, bone, nerves and blood vessels. It's caused by repeated stress.



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Repetition – Medco 14

% of Workday (8hr) Repetitions per hr	Work/Non-Work Capabilities			
	None at all 0%	Occasional 1-33% 4-6	Frequent 34-66% 6-12	Continuous 67-100% >12
Lift/Carry				
Up to 10 lbs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11-20 lbs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21-50 lbs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51-100 lbs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bending	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Twist/Turn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reach below knee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Push/pull	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Squat/Kneel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stand/Walk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No lifting above shoulders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Inadequate Recovery Time

If the body cannot recover between exertions, then the tissue cannot repair itself and our fuel tanks cannot be refilled.



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Risk Factors - The Big Four

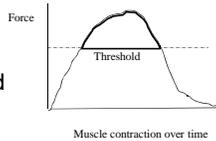
- Repetition
- Forceful exertion (weight)
- Duration
- Posture

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Forceful exertion

Forceful exertion can result in the use of more force and body resources than are necessary to complete an action. Jerking, swinging or a controlled dropping of an object increases chance for injury.



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Risk Factors - The Big Four

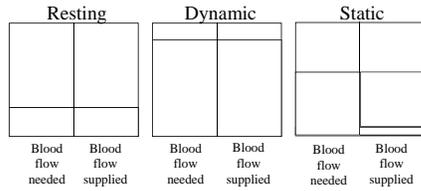
- Repetition
- Forceful Exertion (weight)
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Duration

Dynamic versus static work



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Static Posture Examples

What body parts are getting tired for these employees?

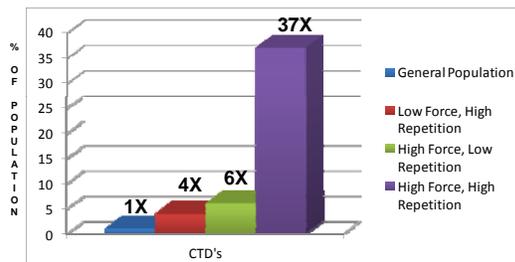


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Risk Factor Combinations

Force and repetition



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Source: Silverstein, et al., 1986

Risk Factors - The Big Four

Repetition
Forceful Exertion (weight)
Duration

• **Posture**

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High Risk Postures

Wash rag
Elbows out
Vibration
Shoulder low – high
Work reach
Hungry head
Butts up
Horizontal distance
Lifting above shoulder
Twisting



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Wash Rag



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Elbows Out – Chicken Wing



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Vibration – White Knuckles



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Shoulder High/Low - Airplane



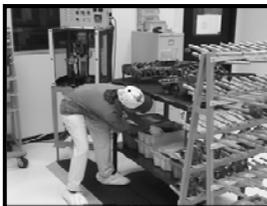
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Work Reach



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Hungry Head – Peek-a-Boo



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Butts Up



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Horizontal Distance



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Lifting Above Shoulder



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Twisting



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CTD Risk Factor Assessment Form/Check List



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Upper Extremity					
A	B	C	D	E	F
Risk Factor Category	Risk Factors	1 to 4 Hours	4 to 8 Hours	8+ Hours (add 0.5 per hour)	Score
Repetition (Finger, Wrist, Elbow, Shoulder, or Neck Motions)	1. Identical or Similar Motions Performed Every Few Seconds <i>Motions or motion patterns that are repeated every 15 seconds or less. (Keyboard use is scored below as a separate risk factor.)</i>	1	3		
	2. Intensive Keying <i>Scored separately from other repetitive tasks in the repetition category; includes steady pace, as in data entry.</i>	1	3		
	3. Intermittent Keying <i>Scored separately from other repetitive tasks. Keyboard or other input activity is regularly alternated with other activities for 50 to 75 percent of the work.</i>	0	1		
Hand Force (Repetitive or Static)	1. Grip More Than 10-Pound Load <i>Holding an object weighing more than 10 pounds or squeezing hand with hand in a power grip.</i>		1	3	
	2. Pinch More Than 2 Pounds <i>Pinch force of 2+ pounds as in the pinch used to open a small binder clip with the tips of fingers.</i>		2	3	

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Upper Extremity						
A	B	C	D	E	F	
Risk Factor Category	Risk Factors	1 to 4 Hours	4 to 8 Hours	8+ Hours (add 0.5 per hour)	Score	
Repetitive Posture	1. Neck Tilt - Back <i>Neck tilt in either direction more than 20°. Standing and 30° seated when done 20% or more of a motion, or holding neck backward more than 2°.</i>		1	2		
	2. Neck Tilt - Forward <i>Neck tilt forward more than 20° when standing or sitting.</i>		2	3		
	3. Forward Head Posture <i>Forward head posture (FHP) is a common condition involving a rounded upper back and protruding head.</i>		1	2		
	4. Wrist Bend - Flexion <i>Wrist flexion that involves more than 20° of flexion (bending the wrist palm down) or more than 20° of extension (bending the wrist back). Bending can occur during several assembly and disassembly.</i>		2	3		
	5. Wrist Bend - Extension <i>Wrist extension that involves more than 20° of extension (bending the wrist palm up) or more than 20° of flexion (bending the wrist back). Bending can occur during several assembly and disassembly.</i>		2	3		
Load Mass	1. Carrying <i>Carrying a weight or load on the back, such as a bag or a box, with a weight greater than 10 pounds or adding with a bag.</i>		0	1		
	2. Carrying over shoulder <i>Carrying a weight or load over the shoulder.</i>		1	2		
	3. Carrying under the arm <i>Carrying a weight or load under the arm.</i>		1	2		
Vibration	1. Hand Vibration <i>Hand vibration from a power tool, such as a jackhammer, or a power drill.</i>		1	2		
	2. Whole Body Vibration <i>Whole body vibration from a vehicle, such as a truck or a train.</i>		1	2		
Total Upper Extremity Score						

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Back and Legs					
A	B	C	D	E	F
Risk Factor Category	Risk Factors	1 to 4 Hours	4 to 8 Hours	8+ Hours Add 0.5 per hour	Score
Manual Materials Handling - Pushes or Pulls	1. High Extent of Manual Handling of Items More Than 10" High (See #1)	1	2		
	2. High Frequency Handling of Items More Than 10"	2	3		
	3. Reduced Stability of Items	1	2		
	4. Pushing/Pulling Without Adequate Back Support <i>Back is not pushed/pulled in a box or on an extended cart.</i>	1	2		
Control Boxes	5. "Twisting" Movement or Rotation - Risk Higher - High Speed <i>Rotational force used with the cart wheel (instead of hand) or rotation or walking, or just one wheel (instead of two) is used.</i>	3	4		
	6. Repetitive Push/Pull/Carry / Frequent <i>Doing a job repeatedly in a row or stop or machine cycling time in a row (machine operation).</i>	1	2		
Vibration	7. High Vibration From the Box <i>High vibration speed or force.</i>	1	2		
	8. High Rate of Rotation or Shift	1	2		
Push/Pull	9. Pushing/Pulling on Vehicle/Walker (Without Vibrations/Impacts)	1	2		
	10. Push/Pull <i>Force used to push/pull is too heavy, difficult to maneuver or repeated force.</i>	1	2		

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Back and Legs (continued)					
A	B	C	D	E	F
Risk Factor Category	Risk Factors	Up to 4 Hours	4+ to 8 Hours	8+ Hours Add 0.5 per hour	Score
Manual Materials Handling - Load	1. Weight <i>Load being handled is more than 20 pounds. (Write actual weight of maximum load in box to right.)</i>	Actual Weight (lbs.)	2	3	
	2. Distance <i>Horizontal distance from the mid-point between the ankles to center of the hand is greater than 10 inches. (Write actual maximum distance in box to right.)</i>	Actual Distance (in.)	2	3	
Manual Materials Handling - Frequency	1. Lifting Frequency <i>Lifting frequency is between 1 and 5 times per minute. (Write actual lifting frequency in the box to right.)</i>	Lifting Frequency	1	1	
	2. Lifting Frequency <i>Lifting frequency is 5 or more times per minute.</i>		2	3	
TOTAL BACK AND LEGS SCORE:					

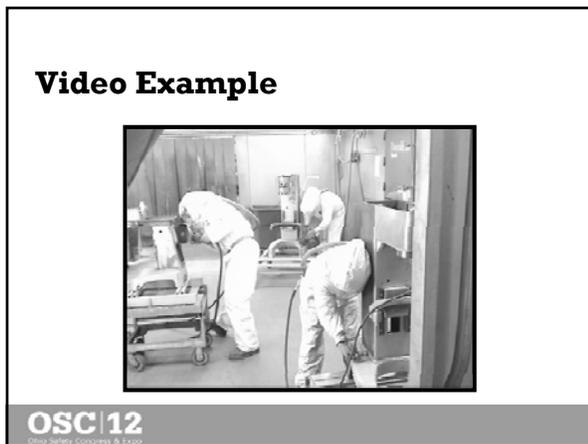
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Environmental Worksheet					
A	B	C	D	E	F
Risk Factor Category	Risk Factors	2 to 4 Hours	4+ to 8 Hours	8+ Hours Add 0.5 per hour	Score
Environ-ment	1. Lighting (Poor Illumination / Glare) <i>Inability to see clearly (e.g. glare on a computer monitor).</i>	0	1		
	2. Cold Temperature <i>Air temperature less than 60°F for sedentary work, 40°F for light work, 20°F for moderate/heavy work; cold exhaust blowing on hands.</i>	0	1		
TOTAL ENVIRONMENTAL SCORE:					
Total Score: (Upper Extremity + Back and Legs + Environmental)					

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Your Turn to Practice!

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<http://www.ohiohwc.com/downloads/blankpdf/ErgoRiskFactorMeasureForm.doc>

For more information on these topics, check out these classes:
Basic Ergo;
Ergonomics Process Class;
Understanding and Identifying Ergonomic Risk Factors;
Quantifying Ergonomic Risk Factors.

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Questions ?

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Open Source Compliance & Ethics