



Provo, Utah

ERGONOMICS SAFETY PROGRAM

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1.0 POLICY STATEMENT

Brigham Young University (BYU) faculty, staff and students often perform job tasks that could cause ergonomic related injuries. These injuries are interchangeably called Cumulative Trauma Disorders (CTD's), Repetitive Strain Injuries (RSI's), or Musculo-Skeletal Disorders (MSD's). Most repetitive injuries could be prevented if the ergonomic principles outlined in this program are followed. These principles apply to sit-down office keyboarding as well as strenuous materials handling tasks.

Departments are encouraged to utilize the information in this program to help minimize the potential for work related cumulative trauma disorders.

2.0 PURPOSE & SCOPE

The information contained in this program is intended to help employees and students identify work related factors that contribute to the development of cumulative trauma disorders (CTD's), outline responsibilities, and (when coupled with the appropriate training) provide information intended to help workers understand how to make prudent work practice and workstation design decisions.

3.0 APPLICABLE FORMS & DOCUMENTS

- OSHA Standard 29 CFR § 1910.900 (not codified)

4.0 RESPONSIBILITIES

Departments:

- Must report cumulative trauma disorders, developed by the individuals they oversee, as outlined in section 6.2 of this program; (Page 6)
- Train employees to recognize cumulative trauma disorders, their causal factors, and proper reporting procedures as outlined in section 6.2 of this program;
- Provide training in accordance with section 7.0 of this program; (page 9)
- Maintain the most recent employee training records;
- Evaluate workstations and employee work practices as outlined in Level 2 of section 6.4; (page 8)
- When adjusting or constructing a workstation, supervisors must invite suggestions from the employee(s) who will work at the workstation regarding proper positioning or acquisition of equipment / furniture;
- Provide VDT training as outlined in section 7.1, or request such training from Risk Management & Safety (RM&S). (page 9)
- Use the prescreening checklist (appendix A) to determine potential CTD problem areas; and
- Minimize the likelihood of employees and students developing a cumulative trauma disorder by implementing engineering controls and changing work practices as needed. When necessary, consult with RM&S regarding worksite improvements.

University Employees:

- If signs and symptoms of a cumulative trauma disorder are developed from performing your work at BYU, promptly report the signs and symptoms to your supervisor;
- Attend annual training sessions, presented by your supervisor;
- Evaluate workstation as outlined in level 1 of section 6.4;
- Help supervisors properly adjust workstations to fit you; and

- Work with department to adjust work practices as necessary.

Risk Management and Safety

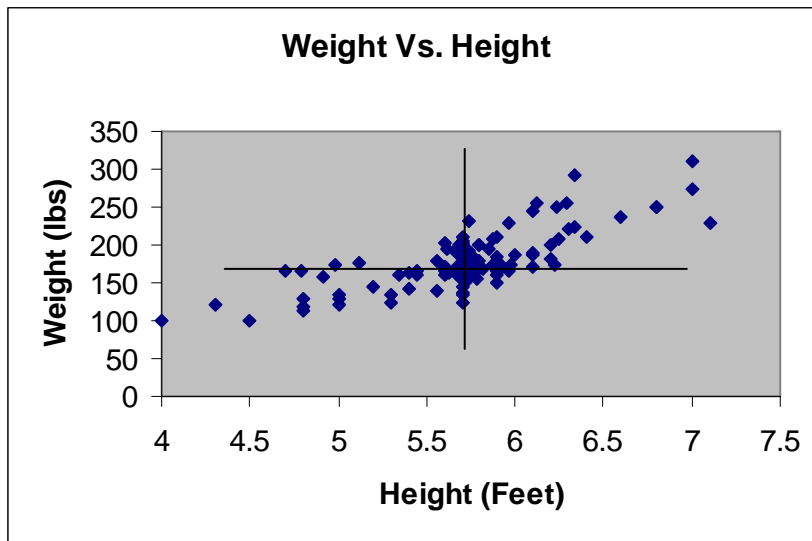
- Review and revise this program as necessary;
- Upon request, evaluate workstations & employee work practices; and
- Upon request, help supervisors train employees.

5.0 GETTING STARTED

Read this program and utilize the checklists to evaluate your workstation(s).

6.0 CORE ELEMENTS

People larger or smaller than the average person, who must fit into a non-adjustable workstation designed for an average size person, have a higher risk for developing a cumulative trauma disorder (CTD). The graph located below has been provided to demonstrate how designing a workstation for the average person leaves many workers at risk and everyone uncomfortable. As demonstrated in the graph, one can see that only those individuals who are near 5 feet 8.5 inches ($\pm \frac{1}{2}$ inch) tall, and 171 pounds (± 25 pounds) will fit into the average workstation. If a person who is larger or smaller than the average person is required to fit into a workstation designed for an average person, then the larger or smaller person must assume an awkward position to perform their work, thus increasing their risk for developing a CTD. All workstations should be adjusted to fit the worker, and all workers need to be trained to know how to properly their workstations. Furthermore, adjustable workstations are preferred.



*The average height & weight for a cohort of males 25 – 35 yrs old is indicated where the crosshairs intersect.

6.1 Cumulative Trauma Disorders

Factors contributing to the development of cumulative trauma disorders include:

- | | | |
|---|--|--|
| <input type="checkbox"/> Repetition | <input type="checkbox"/> Vibration | <input type="checkbox"/> Duration of Task |
| <input type="checkbox"/> Forceful Exertions | <input type="checkbox"/> Cold Temp. | <input type="checkbox"/> Piecework |
| <input type="checkbox"/> Static Postures | <input type="checkbox"/> Inappropriate Tools | <input type="checkbox"/> Mechanical Pressure |

- Awkward Postures
- Lack of Physical Activity
- Heredity
- Smoking
- Excess Body Weight
- Psychology

Cumulative trauma disorders can be divided into categories (i – iii) as follows:

- i) Tendon Related Disorders:
 - a) Tendonitis;
 - b) Tenosynovitis;
 - c) Stenosing Tenosynovitis;
 - 1. De Quervian’s Disorder
 - 2. Trigger Finger
 - d) Ganglion Cysts;
 - e) Epicondylitis (Lateral / Medial); and
 - f) Rotator Cuff Tendonitis.
- ii) Nerve Related Disorders:
 - a) Digital Neuritis;
 - b) Ulnar Neuritis; and
 - c) Carpal Tunnel Syndrome.
- iii) Neurovascular Disorders:
 - a) Thoracic Outlet Syndrome;
 - b) Hand-arm Vibration Syndrome; and
 - c) Raynaud’s Syndrome (vibration white finger disorder).

Cumulative Trauma Disorder(s) Signs & Symptoms

CTD Cumulative Trauma Disorder ↓	Signs & Symptoms							
	Inflammation of Tendons of fingers, hands, arms, shoulders, etc.	Dull, Burning, or Sharp Pain in affected joint, limb, body, etc.	Tenderness of affected area.	Functional Loss of affected area or adjoining limb.	Cracking Sounds in Joints	Tingling of Fingers, Hand(s), or Arms	Numbness of Fingers or Hands	Lack of Blood Flow to Fingers
Tendonitis	■	■	■	■				
Tenosynovitis	■	■	■	■	■			
Epicondylitis (tennis elbow / golfers elbow)	■	■	■	■				
Digital Neuritis		■				■	■	
Carpel Tunnel Syndrome		■		■		■	■	
Thoracic Outlet Syndrome (Symptoms usually worse at night.)		■		■		■	■	■

Raynaud's Syndrome				■				■
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Please Note – Not all of the symptoms associated with a disorder need to be present for an individual to have developed a CTD.

See Appendix C for more information about each disorder, including causal factors.

6.2 Reporting Requirements

Early treatment of a cumulative trauma disorder is very important because it provides the affected individual a much better chance that the disorder can be effectively treated, reversed, and possibly cured if detected and reported early.

Employees must immediately report any developing signs and symptoms of a cumulative trauma disorder to their supervisor for further action.

Supervisors need to report cumulative trauma disorders (see definitions for CTD and CTD incident) by completing a supervisor incident investigation report, available online at <http://www.byu.edu/hr/risk/investReport.htm>. Such a report needs to be made within 24 hours of an employee reporting the situation to their supervisor (the form needs to be completed by the effected individuals supervisor).

Appendix D has been provided to help workers, supervisors, and RM&S understand what to do if a worker experiences signs and symptoms of a work related CTD.

6.3 General Workstation Design

General guidelines have been developed to help reduce the risk of developing cumulative trauma disorders associated with different types of workstations. The guidelines found in this section will help individual's set-up workstations in a manner that will help reduce the possibility for developing a cumulative trauma disorder. These guidelines are intended to be used upon initial assignment of an employee to a workstation or job task. Another situation that demands a workstation assessment is when an employee is physically uncomfortable at their workstation, even if a prior assessment has been made (if you've made many assessments, then you may consider contracting the risk management and safety ergonomic specialist to assess the workstation).

Video Display Terminal Workstations

Adjust your workstation(s) according to the "Checklist For Computer Workstation" form, Appendix B, and the following guidelines: (these are starting point suggestions only- please don't get locked into rigid positions-movement and frequent breaks are more important than exact angles)

- Ensure that the backrest supports the lower back;
- When seated, ensure that there is about 2" of clearance between the seat pan & back of your knees
- When seated with your feet flat on the ground (or other surface), the back of your knees should be about 2" higher than seat pan, and your lower legs should be more or less in a vertical position. If these adjustments, or those outlined on the VDT checklist, cannot be achieved then consider switching to equipment / furniture that will allow such adjustments.

Materials Handling

Ergonomic issues dealing with materials handling are very complex. Frequency of task, repetitive motion, and force are some of the factors that need to be considered. However, simple guidelines can be implemented to help reduce the chances of developing CTD's. The simple guidelines are as follows:

- Install/use equipment that prevents individuals from having to repeatedly lift heavy items.
- Survey the area around the object to be lifted and the path to be traveled for trip / slip hazards. When possible, remove the trip (or slip) hazards. When the hazards cannot be removed, take precautions to protect the individuals performing the lift(s) from slipping or tripping.
- When lifting objects, only perform lifts you feel are not strenuous.
- Avoid twisting at the waist while lifting or carrying a load.
- When feasible, objects should be resting at a height of about 31 inches (waist level) prior to lifting. This helps avoid bending at the waist.
- When lifting objects, keep the load as close as you can to your body.
- Avoid lifting objects above shoulder level.
- Avoid repeated and frequent extended reaches (Extended reaches include reaches outside the arc created when you keep you elbow tucked against your side and sweep your forearm and hand in a horizontal plane, while maintaining a 90 degree angle between your forearm and upper arm).
- Have other people assist you when performing lifts that would otherwise be considered strenuous or awkward.

(For more detailed information regarding materials handling please reference NIOSH information, including the NIOSH equation $AL = (51 \text{ lbs})(HM)(VM)(DM)(AM)(FM)(CM)$, online at www.cdc.org).

Hand Tools

The following guidelines are provided to help individuals evaluate, select, & purchase hand tools.

Handle design is by far the most important ergonomic characteristic of a hand tool. However, weight, shape, and size are also important. Prior to purchase, please consider whether or not the employee using the tool is left or right handed. If possible, allow the potential user the opportunity to try the tool(s) before purchasing.

When commercially available, and feasibility allows, hand tools that allow a user to maintain a natural body posture (wrist, elbow, etc.) need to be purchased and used.

Handle Types:

- Pistol Grips – Should flare at base to prevent slipping. Fluted handles and finger grooves should be avoided because they allow less blood flow.
- D-Handle or Stirrup – Use this type of handle when employees must guide the tool while performing work.
- Bar & wrap-around bar handle – Helps user resist forces. These handles should not have triggers.

- Body Grip – Operator holds the main body casing of the tool. Operators using this type of handle usually have a hard time resisting any torque provided by the tool. It is important to have the user hold the tool prior to purchasing (the handles are usually too big around).

Handle Sizes:

- Should be at least 4.5 inches long for barehanded work (5.25” if the tool is used at an angle).
- Should be at least 5.25 inches long for gloved work (6” if the tool is used at an angle).
- Round handles should have a 1.5” diameter.
- The perimeter of other than round handles should measure 4.25” (barehanded).

Handle Surfaces: (select surfaces that will present the fewest problems)

- Knurled or rough surfaces help with grip, but must be kept clean.
- Soft surfaces help with comfort, but may hold chemicals or particle chips.

Hand Tool Triggers should not be used if the trigger is to be pulled frequently. If this situation cannot be avoided then the whole finger(s) should be involved in the actuation of the trigger (i.e. lever or foot switches).

Keep in mind that the information provided in this section is to be used as guidance, and not set rules. Some circumstances may not require application of any particular guideline, due to how often the tool is used, the duration of use, and the type of work the hand tool will be used.

6.4 Job Safety Analysis (Ergonomic Focus)

A job safety analysis is performed by any employee (level 1 analysis), supervisor (level 2 analysis), or RM&S (level 3 analysis) as explained below.

Supervisors and employees must always evaluate job tasks in which they function or oversee.

-Level 1 Analysis-

Each time an employee begins a job task for which they have not previously been evaluated, or for which they are experiencing signs and symptoms of a cumulative trauma disorder, they need to analyze their workstation(s) and work practices, making changes as necessary to help minimize their risk. Individuals may consult with RM&S or their supervisor regarding any safety or health issue.

Once an individual has conducted their own job hazard analysis they are to request a level 2 analysis from their supervisor.

A level one analysis allows employees a chance to correct their own workstation.

-Level 2 Analyses -

Supervisors are to use the prescreening checklist (appendix A) when performing a job hazard analysis. Any employee found, which has more than one risk factor associated with their work, needs to be given a more detailed assessment by RM&S.

Prescreening checklists do not need to be maintained for any specific period of time.

-Level 3 Analyses -

If a CTD incident, or signs / symptoms of a CTD are developed by an employee or work student then RM&S needs to perform a job safety analysis of the workstation and employee work-practices. A level 3 assessment is initiated when a supervisor completes a supervisor incident report form, or contacts RM&S regarding a specific issue. Outside resources may be used for such assessments.

7.0 TRAINING

All workers affected by work related practices or conditions that are known to contribute to cumulative trauma disorders are to receive training prior to engaging in their job task(s). The following topics must be included in the training:

- Definition of cumulative trauma disorder (CTD);
- Their responsibilities;
- Understanding of the signs and symptoms CTD's listed in this program;
- Understanding of the factors that contribute to the development of the cumulative trauma disorders listed in this program;
- When and how to perform a job hazard analysis;
- How and when to use the appendices attached to this program; and
- How and when to report the development of a work related CTD.

Subsequent training is needed if the worker demonstrates that they have not learned what they should have in the initial training, and when a worker develops signs or symptoms related to a cumulative trauma disorder.

7.1 Video Display Terminal (VDT) Training

Employees and students are to receive video display terminal training upon initial hire and assignment to work at a VDT. This training is to be performed by the VDT operators supervisor, or RM&S upon request. Appendix B & C can be used in conjunction with section 6.3 of this program to accomplish VDT training.

APPENDIX A PRESCREENING CHECKLIST

Risk Factors	Performing job or tasks that involve:	Body Part			
		Neck Shoulder	Hand Wrist Hip	Back Trunk Hip	Leg Knee Ankle
Repetition	(1) Repeating the same motions every few seconds or repeating a cycle of motions involving the affected body part more than twice per minute throughout the workday.	✓	✓	✓	✓
	(2) Using an input device, such as a keyboard and/or mouse, in a steady manner for more than four hours total in a workday.	✓	✓		
Force	(3) Lifting light objects (up to 20 pounds) repetitiously, lifting moderately heavy objects (20 – 50 pounds) frequently, or lifting heavy objects (over 50 pounds) during a work shift.	✓	✓	✓	✓
	(4) Pushing/pulling with more than 20 pounds of initial force (e.g. equivalent to pushing a 65 pound box across a tile floor or pushing a shopping cart with five 40 pound bags of dog food), for more than 2 hours total per day.	✓	✓	✓	✓
	(5) Pinching an unsupported object weighing 2 or more pounds per hand, or use of an equivalent pinching force (e.g. holding a small binder clip open) throughout the work shift.		✓		
	(6) Gripping an unsupported object weighing 10 pounds or more per hand, or use of an equivalent gripping force (e.g. crushing the sides of an aluminum soda can with one hand), frequently throughout the work shift.		✓		
Awkward Postures	(7) Repeatedly raising or working with hand(s) above head level, or elbow(s) above shoulder level.	✓	✓	✓	
	(8) Kneeling or squatting throughout the work shift.			✓	✓
	(9) Working with the back, neck or wrists bent or twisted.	✓	✓	✓	
Contact Stress	(10) Using the hand or knee as a hammer.		✓		✓
Vibration	(11) Using vibrating tools or equipment that typically have high vibration levels (such as chainsaws, jack hammers, percussive tools, riveting or chipping hammers) for more than 30 minutes total per day.	✓	✓	✓	
	(12) Using tools or equipment that typically have moderate vibration levels (such as jig saws, grinders, or sanders) for more than 2 hours total per day.	✓	✓		

Checkmarks indicate conditions the evaluator should address when the employee is performing the specified job or tasks.

APPENDIX B CHECKLIST FOR COMPUTER WORKSTATION

CHECKLIST FOR COMPUTER WORKSTATION

“Yes” answers are desirable features / conditions.

YES NO **SEAT / POSTURE**

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Is the chair easily adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is the chair correctly adjusted for operator? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is the chair comfortable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Seat height adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Seat depth adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Seat width about 25% wider than operator? |
| <input type="checkbox"/> | <input type="checkbox"/> | Lumbar support height adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Backrest angle adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Seat pan angle adjustable (rearward tilting)? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is the chair upholstered in breathable, easily cleaned material? |
| <input type="checkbox"/> | <input type="checkbox"/> | Arm rests available? |
| <input type="checkbox"/> | <input type="checkbox"/> | Arm rests adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Five legs on chair? |
| <input type="checkbox"/> | <input type="checkbox"/> | Does the chair have castors? |
| <input type="checkbox"/> | <input type="checkbox"/> | Feet flat on stable surface? |
| <input type="checkbox"/> | <input type="checkbox"/> | Shoulders relaxed and level? |

Comments:

YES NO **WRIST / KEYBOARD**

- | | | |
|--------------------------|--------------------------|---------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Keyboard support height adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Keyboard support angle adjustable? |
| <input type="checkbox"/> | <input type="checkbox"/> | Wrists supported? |
| <input type="checkbox"/> | <input type="checkbox"/> | Wrists maintained in neutral posture? |
| <input type="checkbox"/> | <input type="checkbox"/> | Elbow angle about 90°? |
| <input type="checkbox"/> | <input type="checkbox"/> | Upper arms hang down at side? |

Comments:

YES NO **SCREEN & DOCUMENT
PLACEMENT**

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Top of monitor horizontal with the eyes? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is the screen tilt able? |
| <input type="checkbox"/> | <input type="checkbox"/> | Document holder at screen level? |
| <input type="checkbox"/> | <input type="checkbox"/> | Documents placed at same distance from eyes as monitor? |
| <input type="checkbox"/> | <input type="checkbox"/> | Does the document holder match the workload? |
| <input type="checkbox"/> | <input type="checkbox"/> | Viewing distance about arms length? |

Comments:

YES	NO	
		WORKER PARAMETERS
<input type="checkbox"/>	<input type="checkbox"/>	Worker understands how to adjust furniture and VDT accessories?
<input type="checkbox"/>	<input type="checkbox"/>	Worker understands the risk factors for ergonomic related disorders?
<input type="checkbox"/>	<input type="checkbox"/>	Worker knows whom to report signs and symptoms?
<input type="checkbox"/>	<input type="checkbox"/>	Has a work / alternate task schedule been established?
<input type="checkbox"/>	<input type="checkbox"/>	Does supervisor recognize and support the schedule?
<input type="checkbox"/>	<input type="checkbox"/>	Worker involved in furniture and accessory selection?
<input type="checkbox"/>	<input type="checkbox"/>	Worker takes regular vision breaks?
<input type="checkbox"/>	<input type="checkbox"/>	Worker takes regular stretch breaks?

Comments:

YES	NO	
		LIGHTING / GLARE
<input type="checkbox"/>	<input type="checkbox"/>	Screen placed at right angle relative to windows?
<input type="checkbox"/>	<input type="checkbox"/>	Lighting at 50 to 70 foot candles for documents?
<input type="checkbox"/>	<input type="checkbox"/>	Window treatments (blinds, curtains) adequate?
<input type="checkbox"/>	<input type="checkbox"/>	Light diffusers reduce overhead-lighting glare?
<input type="checkbox"/>	<input type="checkbox"/>	Work surfaces with anti-glare matte finish?
<input type="checkbox"/>	<input type="checkbox"/>	Glare screen available?
<input type="checkbox"/>	<input type="checkbox"/>	Operators' line of vision parallel to light sources?

Comments:

YES	NO	
		MISCELLANEOUS
<input type="checkbox"/>	<input type="checkbox"/>	Headset used for telephone?
<input type="checkbox"/>	<input type="checkbox"/>	Minimal reaching above shoulder level?
<input type="checkbox"/>	<input type="checkbox"/>	Minimal reaching below waist level?
<input type="checkbox"/>	<input type="checkbox"/>	Reaching is performed without leaning forward?
<input type="checkbox"/>	<input type="checkbox"/>	Adequate desk space?
<input type="checkbox"/>	<input type="checkbox"/>	The need to grasp and hold objects has been minimized?
<input type="checkbox"/>	<input type="checkbox"/>	The employee minimizes bent working postures?

Comments:

APPENDIX C CUMULATIVE TRAUMA DISORDER INFORMATION

Tendonitis:

-Signs & Symptoms-

Inflammation of tendons;
Pain where the inflamed tendons are located;
Tenderness of the inflamed area; and
Possibly some functional loss in the affected limb.

-Contributing Factors-

Overuse of tendons (relative to the individual involved).

Tenosynovitis:

-Signs & Symptoms-

Inflammation of tendon sheath(s) (synovial membrane).
Pain;
Swelling;
Cracking sounds;
Tenderness; and
Usually some form of functional loss.

-Contributing Factors-

Overwork of a muscle;
Wrenching or stretching of a tendon (extreme side to side wrist movements); &
Spread of inflammation from surrounding skin or muscular tissues.

Epicondylitis (tennis elbow / golfers elbow):

-Signs & Symptoms-

Inflammation of elbow tendons;
Pain around the elbow;
Tenderness where the pain is; and
Possibly some functional loss in the affected limb.

-Contributing Factors-

Overuse of tendons (relative to the individual involved).

Digital Neuritis:

-Signs & Symptoms-

Dull, burning, or sharp pain in the fingers or thumb.

-Contributing Factors-

Compression of the nerves along the sides of fingers or thumbs.

Carpal Tunnel Syndrome:

-Signs & Symptoms-

Pain in wrist or hand;
Tingling and burning sensation;
Numbness in hand;
Weakening of muscles at base of thumb;

Dry shiny palm; and
Hand clumsiness (functional loss).

-Contributing Factors-

Using hand motions, or exerting forces while your wrist is bent or twisted (causing compression of the medial nerve).

Thoracic Outlet Syndrome:

-Signs & Symptoms-

Numbness and tingling in the fingers;
Pain in the neck, shoulder, and arm;
Headaches in the back of head;
Weakness of the arm (dropping things from the hand); and
Worsening of the symptoms when elevating the arm.
*Symptoms are often worse at night or when using arm(s).

-Contributing Factors-

Pressure against the nerves or blood vessels that supply the arm, due to tight muscles, ligaments, bands, or bony abnormalities in the thoracic outlet area of the body, which lies just behind the collar bone.

Raynaud's Syndrome:

-Signs & Symptoms-

Lack of blood flow to fingers;
White fingers (dead tissue); &
Less feeling and control in fingers and hands.

-Contributing Factors-

Holding vibrating tools with a frequency between 40 – 125 cycles per second (Hz), in cold temp.

APPENDIX D “What To Do” Flow Chart

