Healthworks ergonomics

Ergonomics and Material Handling

Injury Types

Acute Trauma

Occurs instantly

You know when it happened

You can usually pinpoint a cause

Most accidents are acute trauma

Cumulative Trauma

Occurs over time

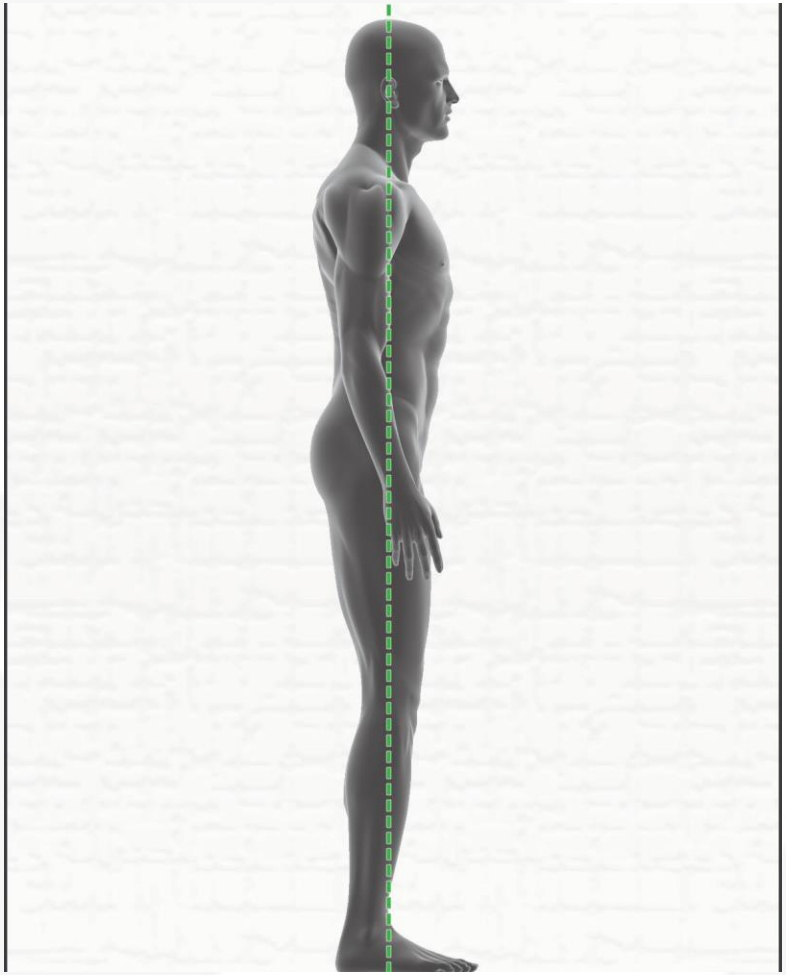
Occurs from repeated exposure to risk factors

Most ergonomic injuries are CTDs

Ergonomic Risk Factors

- Awkward postures
- Prolonged positions
- Repetition
- Contact stress
- Vibration
- Temperature
- Personal
- Environmental

Neutral Posture

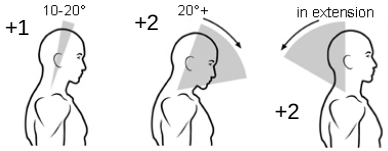


REBA Employee Assessment Worksheet

Task Name: Date:

A. Neck, Trunk and Leg Analysis

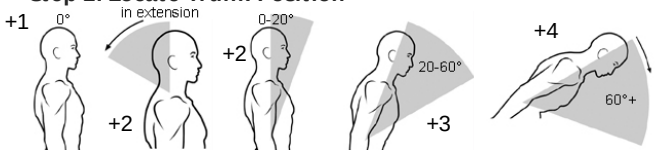
Step 1: Locate Neck Position



Neck Score

Step 1a: Adjust…
If neck is twisted: +1
If neck is side bending: +1

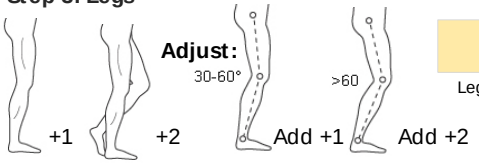
Step 2: Locate Trunk Position



Step 2a: Adjust…
If trunk is twisted: +1
If trunk is side bending: +1

Trunk Score

Step 3: Legs



Leg Score

Step 4: Look-up Posture Score in Table A

Using values from steps 1-3 above,
Locate score in Table A

Posture Score A

+

Step 5: Add Force/Load Score

If load < 11 lbs. : +0
If load 11 to 22 lbs. : +1
If load > 22 lbs.: +2
Adjust: If shock or rapid build up of force: add +1

Force / Load Score

=

Step 6: Score A, Find Row in Table C

Add values from steps 4 & 5 to obtain Score A.
Find Row in **Table C**.

Score A

Scoring
1 = Negligible Risk
2-3 = Low Risk. Change may be needed.
4-7 = Medium Risk. Further Investigate. Change Soon.
8-10 = High Risk. Investigate and Implement Change
11+ = Very High Risk. Implement Change

Scores

Table A		Neck											
		1				2				3			
	Legs	1	2	3	4	1	2	3	4	1	2	3	4
Trunk Posture Score	1	1	2	3	4	1	2	3	4	3	3	5	6
	2	2	3	4	5	3	4	5	6	4	5	6	7
	3	2	4	5	6	4	5	6	7	5	6	7	8
	4	3	5	6	7	5	6	7	8	6	7	8	9
	5	4	6	7	8	6	7	8	9	7	8	9	9

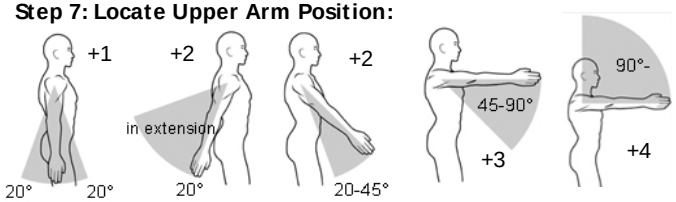
Table B		Lower Arm					
		1			2		
	Wrist	1	2	3	1	2	3
Upper Arm Score	1	1	2	2	1	2	3
	2	1	2	3	2	3	4
	3	3	4	5	4	5	5
	4	4	5	5	5	6	7
	5	6	7	8	7	8	8
	6	7	8	8	8	9	9

Score A	Table C											
	Score B											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	8	8	9	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

Table C Score + Activity Score = REBA Score

B. Arm and Wrist Analysis

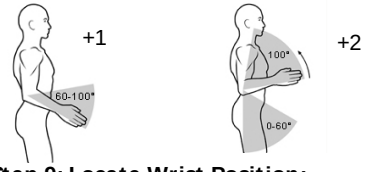
Step 7: Locate Upper Arm Position:



Step 7a: Adjust…
If shoulder is raised: +1
If upper arm is abducted: +1
If arm is supported or person is leaning: -1

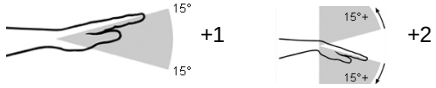
Upper Arm Score

Step 8: Locate Lower Arm Position:



Lower Arm Score

Step 9: Locate Wrist Position:



Wrist Score

Step 9a: Adjust…
If wrist is bent from midline or twisted : Add +1

Step 10: Look-up Posture Score in Table B

Using values from steps 7-9 above, locate score in Table B

Posture Score B

+

Step 11: Add Coupling Score

Well fitting Handle and mid rang power grip, **good: +0**
Acceptable but not ideal hand hold or coupling acceptable with another body part, **fair: +1**
Hand hold not acceptable but possible, **poor: +2**
No handles, awkward, unsafe with any body part, **Unacceptable: +3**

Coupling Score

=

Step 12: Score B, Find Column in Table C

Add values from steps 10 &11 to obtain Score B. Find column in **Table C** and match with Score A in row from step 6 to obtain Table C Score.

Score B

Step 13: Activity Score

+1 1 or more body parts are held for longer than 1 minute (static)
+1 Repeated small range actions (more than 4x per minute)
+1 Action causes rapid large range changes in postures or unstable base

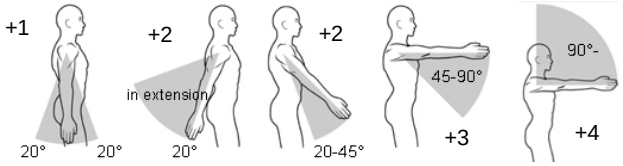
Original Worksheet Developed by Dr. Alan Hedge. Based on Technical note: Rapid Entire Body Assessment (REBA), Hignett, McAtamney, Applied Ergonomics 31 (2000) 201-205

RULA Employee Assessment Worksheet

Task Name: Date:

A. Arm and Wrist Analysis

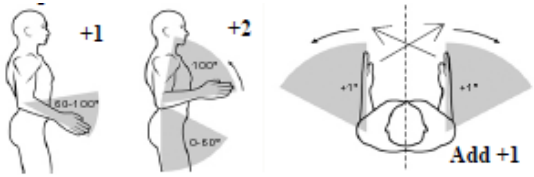
Step 1: Locate Upper Arm Position:



Step 1a: Adjust…
If shoulder is raised: +1
If upper arm is abducted: +1
If arm is supported or person is leaning: -1

Upper Arm Score

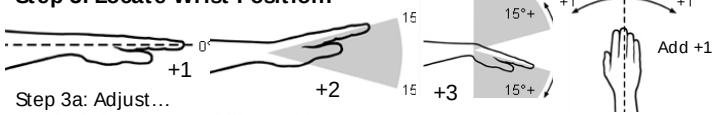
Step 2: Locate Lower Arm Position:



Lower Arm Score

Step 2a: Adjust…
If either arm is working across midline or out to side of body: Add +1

Step 3: Locate Wrist Position:



Step 3a: Adjust…
If wrist is bent from midline: Add +1

Step 4: Wrist Twist:

If wrist is twisted in mid-range: +1
If wrist is at or near end of range: +2

Wrist Twist Score

Wrist Score

Step 5: Look-up Posture Score in Table A:

Using values from steps 1-4 above, locate score in Table A

Posture Score A

+

Step 6: Add Muscle Use Score

If posture mainly static (i.e. held>10 minutes),
Or if action repeated occurs 4X per minute: +1

Muscle Use Score

+

Step 7: Add Force/Load Score

If load < .4.4 lbs. (intermittent): +0
If load 4.4 to 22 lbs. (intermittent): +1
If load 4.4 to 22 lbs. (static or repeated): +2
If more than 22 lbs. or repeated or shocks: +3

Force / Load Score

=

Step 8: Find Row in Table C

Add values from steps 5-7 to obtain Wrist and Arm Score. Find row in **Table C**.

Wrist & Arm Score

Scores

Table A

Upper Arm	Lower Arm	Wrist Score 1: Wrist Twist 1	1: Wrist Twist 2	2: Wrist Twist 1	2: Wrist Twist 2	3: Wrist Twist 1	3: Wrist Twist 2	4: Wrist Twist 1	4: Wrist Twist 2
1	1	1	2	2	2	2	3	3	3
	2	2	2	2	2	3	3	3	3
	3	2	3	3	3	3	3	4	4
2	1	2	3	3	3	3	4	4	4
	2	3	3	3	3	3	4	4	4
	3	3	4	4	4	4	4	5	5
3	1	3	3	4	4	4	4	5	5
	2	3	4	4	4	4	4	5	5
	3	4	4	4	4	4	5	5	5
4	1	4	4	4	4	4	5	5	5
	2	4	4	4	4	4	5	5	5
	3	4	4	4	5	5	5	6	6
5	1	5	5	5	5	5	6	6	7
	2	5	6	6	6	6	7	7	7
	3	6	6	6	7	7	7	7	8
6	1	7	7	7	7	7	8	8	9
	2	8	8	8	8	8	9	9	9
	3	9	9	9	9	9	9	9	9

Table C

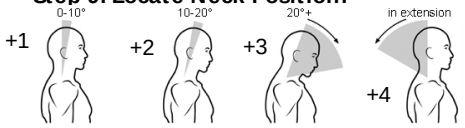
Wrist / Arm Score	Neck, Trunk, Leg Score 1	2	3	4	5	6	7+
1	1	2	3	3	4	5	5
2	2	2	3	4	4	5	5
3	3	3	3	4	4	5	6
4	3	3	3	4	5	6	6
5	4	4	4	5	6	7	7
6	4	4	5	6	6	7	7
7	5	5	6	6	7	7	7
8+	5	5	6	7	7	7	7

Scoring: (final score from Table C)
1-2 = acceptable posture
3-4 = further investigation, change may be needed
5-6 = further investigation, change soon
7 = investigate and implement change

RULA Score

B. Neck, Trunk and Leg Analysis

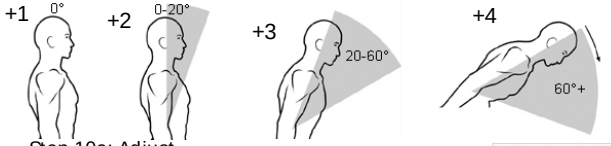
Step 9: Locate Neck Position:



Neck Score

Step 9a: Adjust…
If neck is twisted: +1
If neck is side bending: +1

Step 10: Locate Trunk Position:



Step 10a: Adjust…
If trunk is twisted: +1
If trunk is side bending: +1

Trunk Score

Step 11: Legs:

If legs and feet are supported: +1
If not: +2

Leg Score

Table B: Trunk Posture Score

Neck Posture Score	1: Legs 1	1: Legs 2	2: Legs 1	2: Legs 2	3: Legs 1	3: Legs 2	4: Legs 1	4: Legs 2	5: Legs 1	5: Legs 2	6: Legs 1	6: Legs 2
1	1	3	2	3	3	4	5	5	6	6	7	7
2	2	3	2	3	4	5	5	5	6	7	7	7
3	3	3	3	4	4	5	5	6	6	7	7	7
4	5	5	5	6	6	7	7	7	7	7	8	8
5	7	7	7	7	7	8	8	8	8	8	8	8
6	8	8	8	8	8	8	8	9	9	9	9	9

Step 12: Look-up Posture Score in Table B:

Using values from steps 9-11 above, locate score in Table B

Posture B Score

+

Step 13: Add Muscle Use Score

If posture mainly static (i.e. held>10 minutes),
Or if action repeated occurs 4X per minute: +1

Muscle Use Score

+

Step 14: Add Force/Load Score

If load < .4.4 lbs. (intermittent): +0
If load 4.4 to 22 lbs. (intermittent): +1
If load 4.4 to 22 lbs. (static or repeated): +2
If more than 22 lbs. or repeated or shocks: +3

Force / Load Score

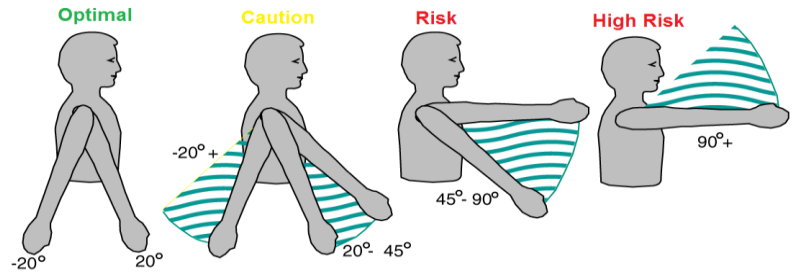
=

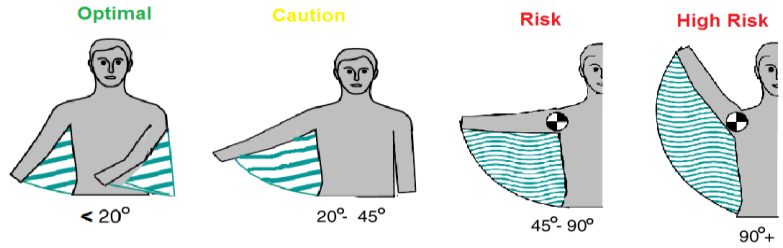
Step 15: Find Column in Table C

Add values from steps 12-14 to obtain Neck, Trunk and Leg Score. Find Column in **Table C**.

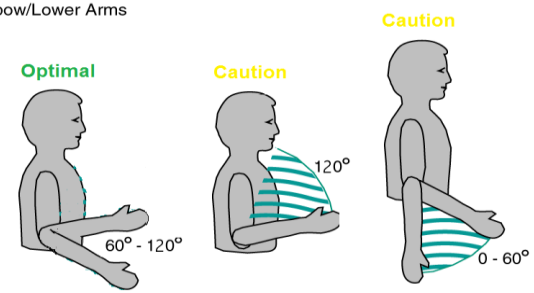
Neck, Trunk, Leg Score

Shoulders/Upper Arms



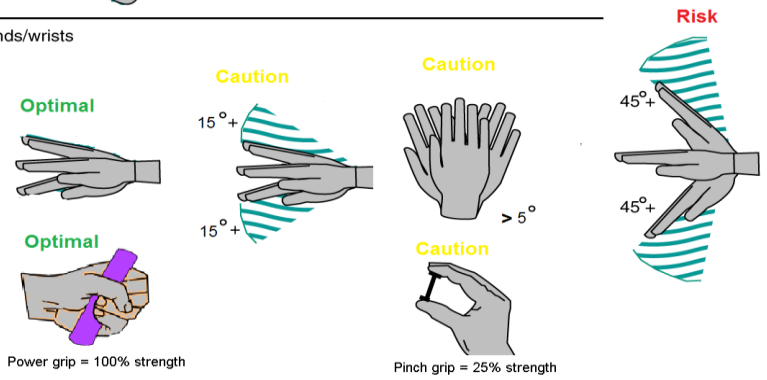


Elbow/Lower Arms

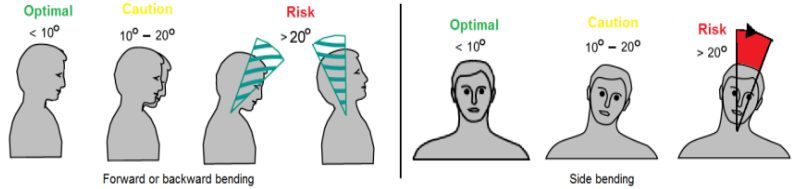


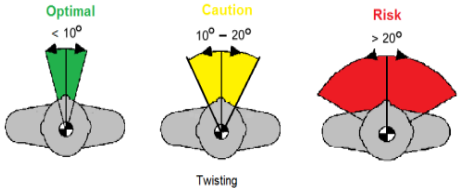
Risk to upper extremities increase with:
- Hammering/hand pounding
- Contact stress
- Forearm rotation
- Forceful exertions
- Repetitive motion

Hands/wrists



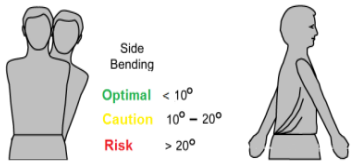
Neck



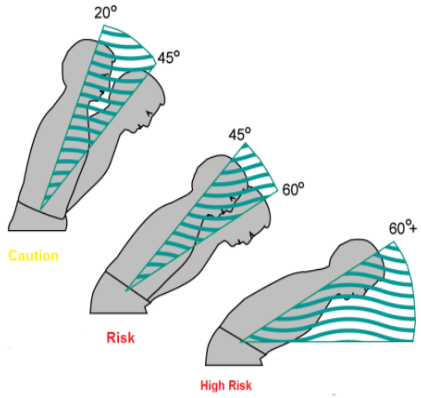


Risk increases with:
- Static neck posture
- Weight from headgear
- Repetitive bending, twisting

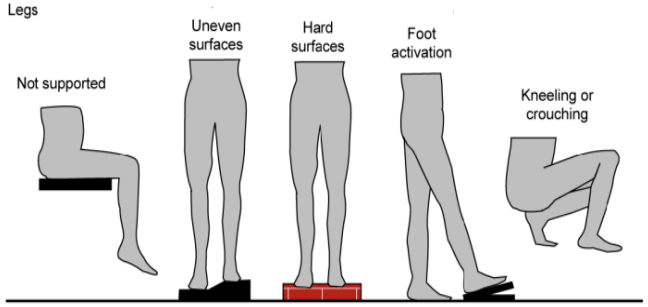
Back



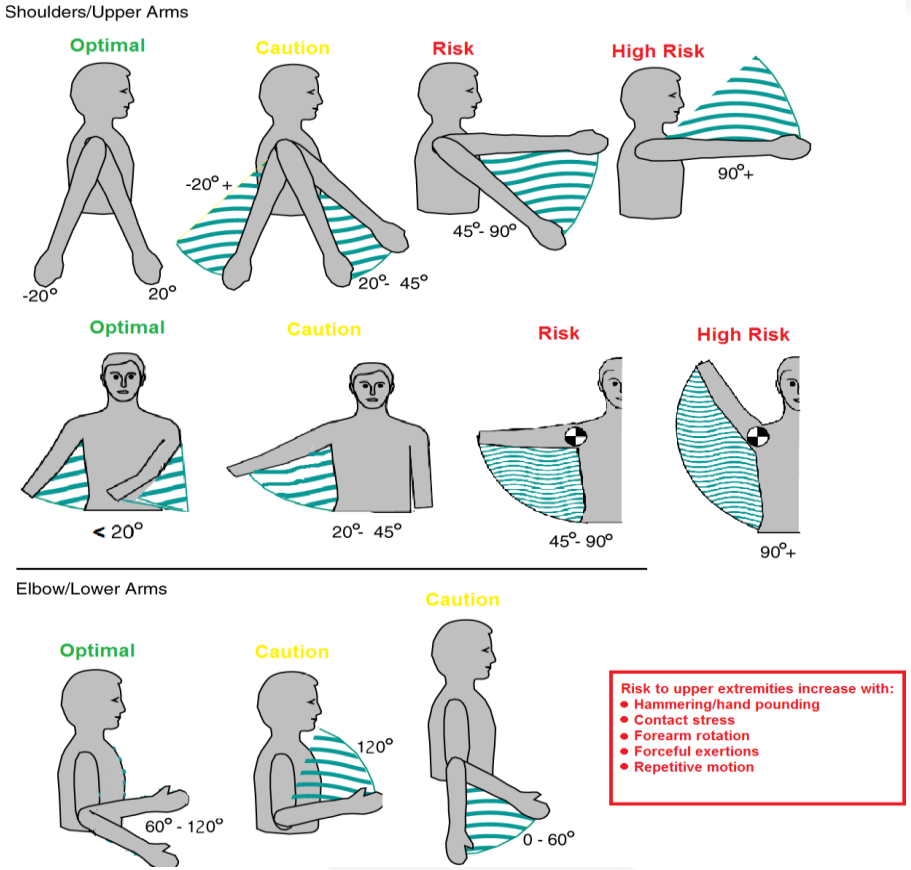
Risk to back and legs increases with:
- Static postures
- Lifting, pushing, pulling
- Extended duration



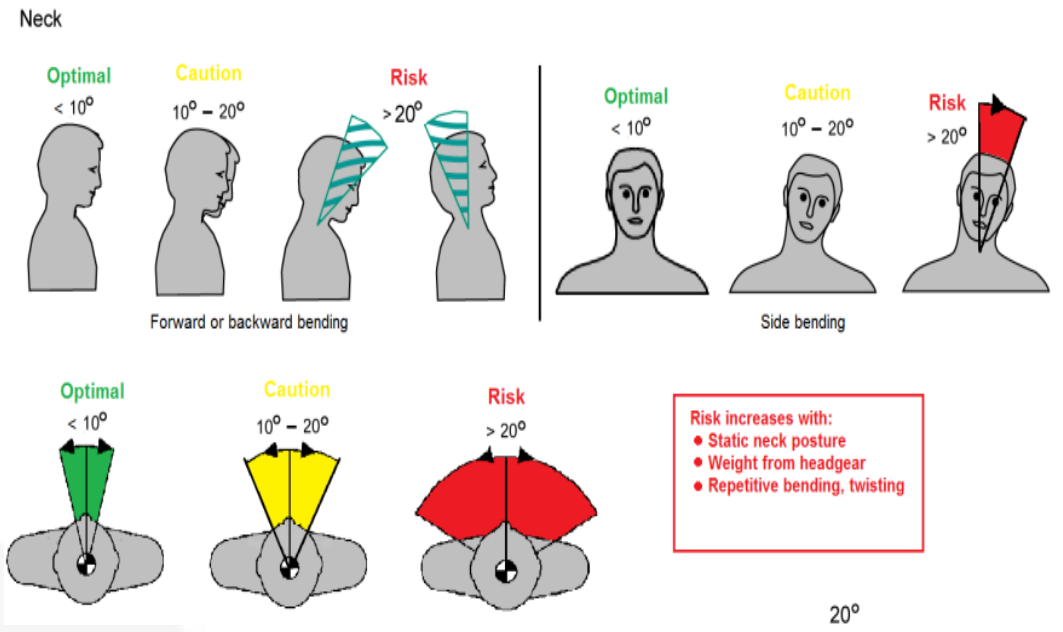
Legs



Chicken Wing



Neck


Neck
Optimal
< 10°
Caution
10° – 20°
Risk
> 20°
Forward or backward bending
Optimal
< 10°
Caution
10° – 20°
Risk
> 20°
Side bending
Optimal
< 10°
Caution
10° – 20°
Risk
> 20°
Risk increases with:
• Static neck posture
• Weight from headgear
• Repetitive bending, twisting
20°

Spine

Twisting

Back

Side Bending

Optimal < 10°

Caution 10° – 20°

Risk > 20°

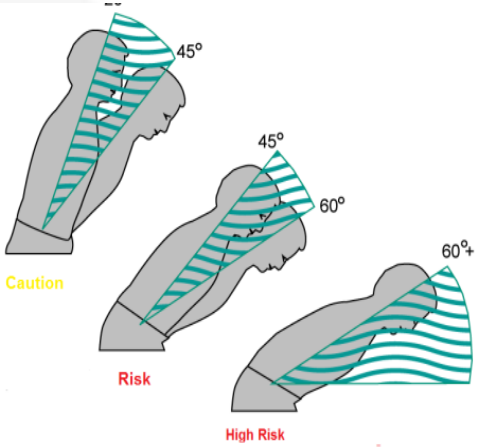
Twisting

Optimal < 20°

Caution 20° - 40°

Risk > 40°

Risk to back and legs increases with:
- Static postures
- Lifting, pushing, pulling
- Extended duration



Legs

Spine

Twisting

Back

Side Bending

Optimal < 10°

Caution 10° – 20°

Risk > 20°

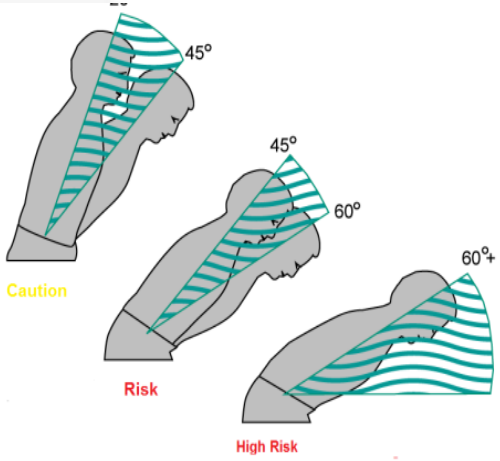
Twisting

Optimal < 20°

Caution 20° - 40°

Risk > 40°

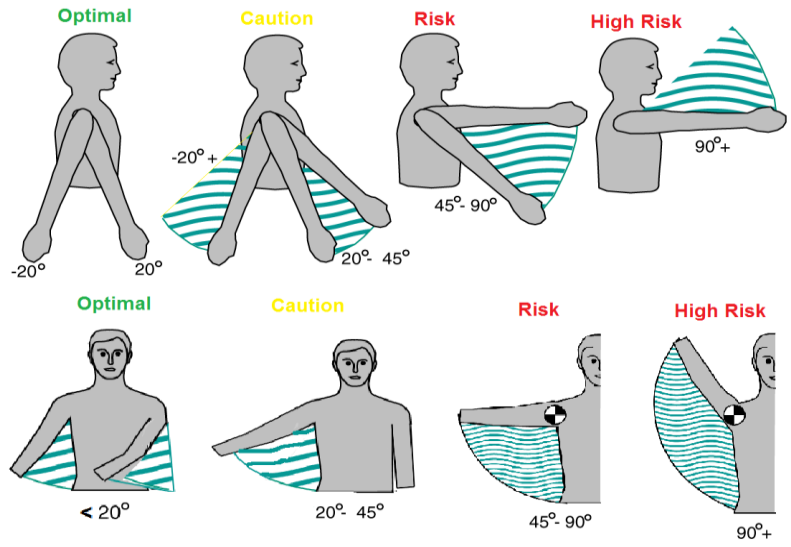
Risk to back and legs increases with:
- Static postures
- Lifting, pushing, pulling
- Extended duration



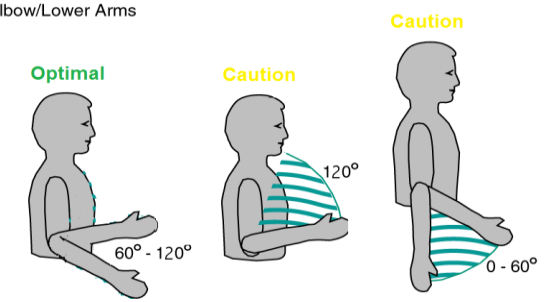
Legs

Waist level

Shoulders/Upper Arms

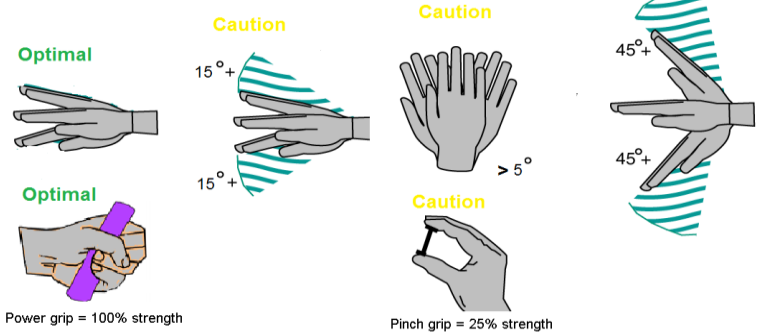


Elbow/Lower Arms

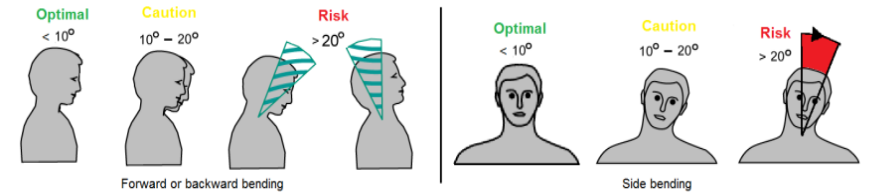


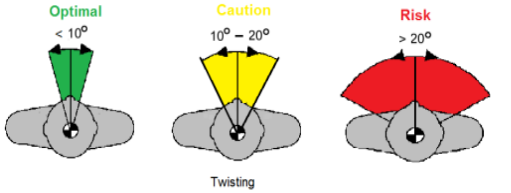
Risk to upper extremities increase w
- Hammering/hand pounding
- Contact stress
- Forearm rotation
- Forceful exertions
- Repetitive motion

Hands/wrists



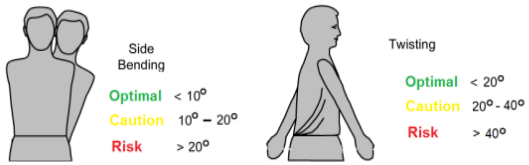
Neck



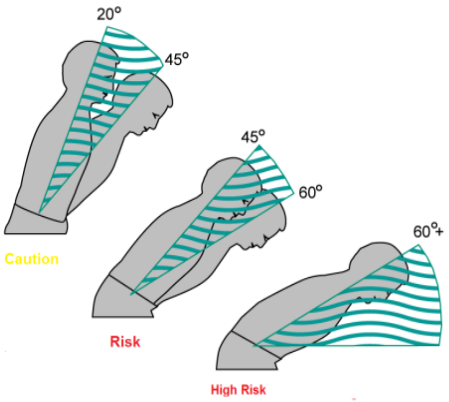


Risk increases with:
- Static neck posture
- Weight from headgear
- Repetitive bending, twisting

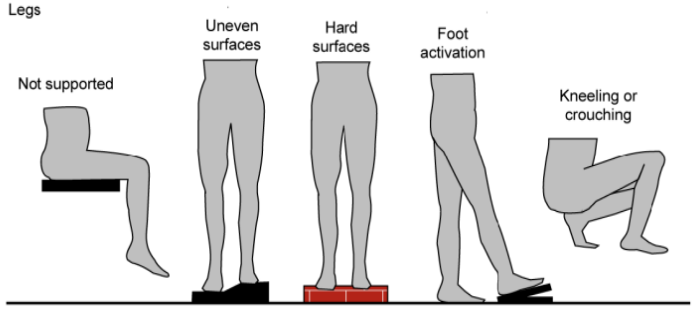
Back



Risk to back and legs increases with:
- Static postures
- Lifting, pushing, pulling
- Extended duration



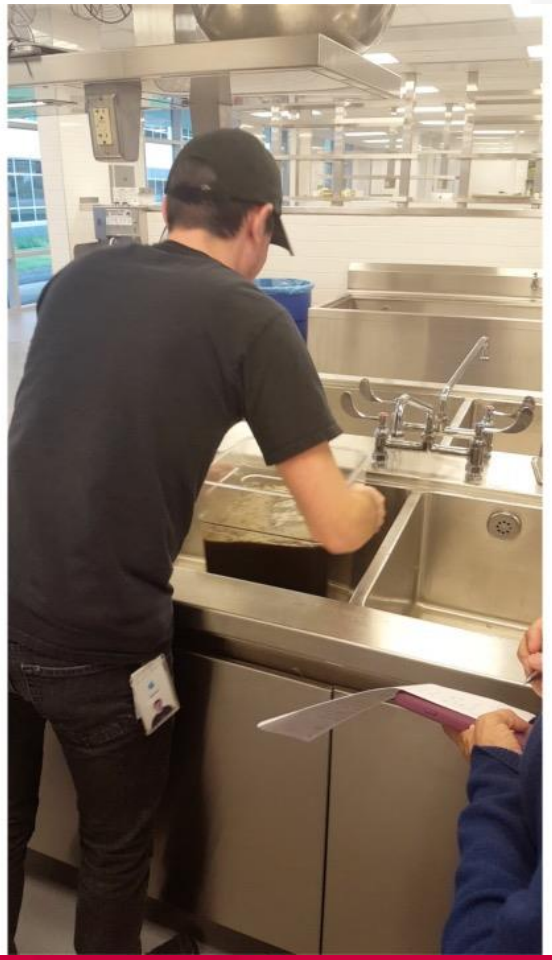
Legs



Spine

Spine

Spine



Pinch Grip

Power Grip

Repetitive Work

Repetition: the number of times a movement is repeated in a given timeframe (often over a total shift).

Cycle time: the time needed to complete an individual task.

Image from Flinders University

Categorization of Work Repetitiveness

Repetition: the number of times a movement is repeated in a given timeframe (often over a total shift).

Cycle time: the time needed to complete an individual task.

Image from Flinders University

Repetition

Low Repetition

Cycle time> 30 seconds

or

Less than 50% of cycle time involved performing the same kind of fundamental cycle

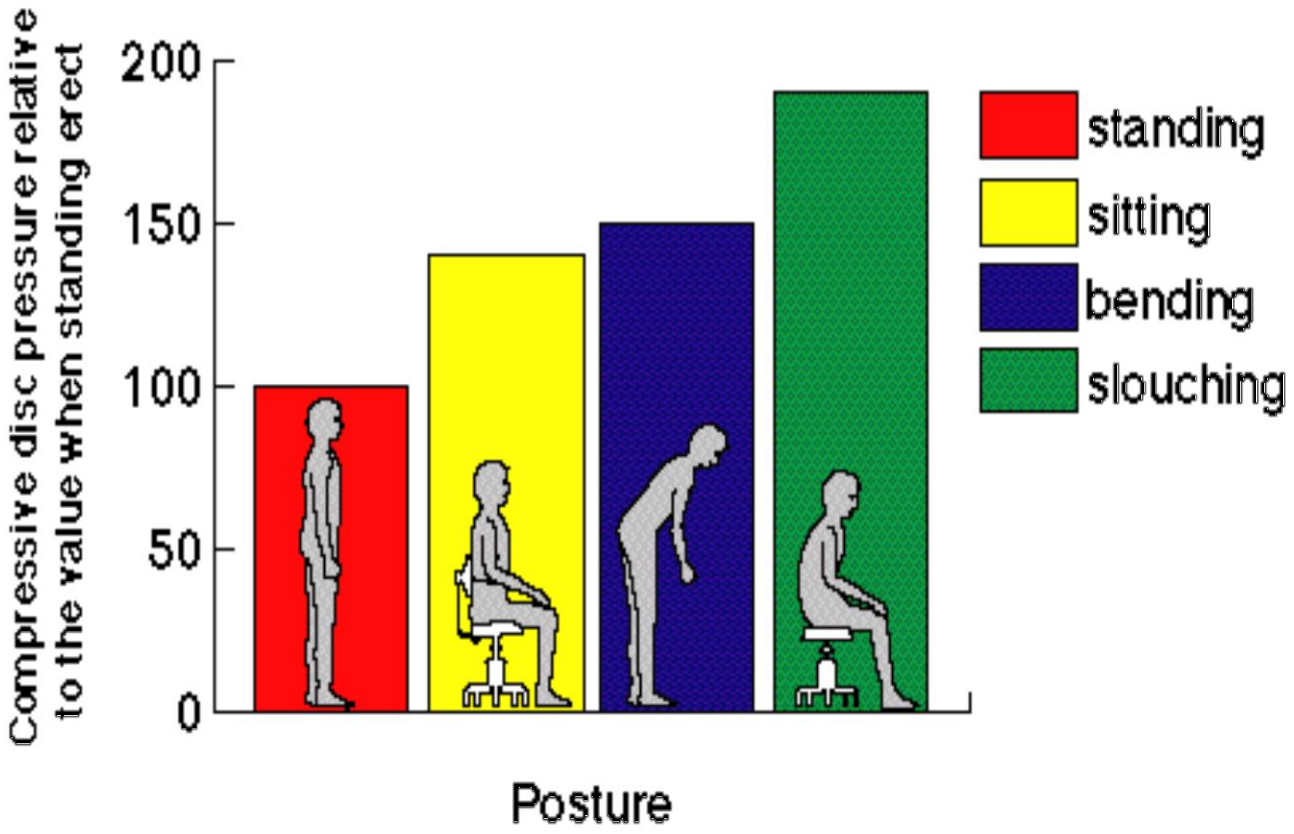
High Repetition

Cycle time< 30 seconds

or

More than 50% of cycle time involved performing the same kind of fundamental cycle

Force – postural changes



Force – Load location

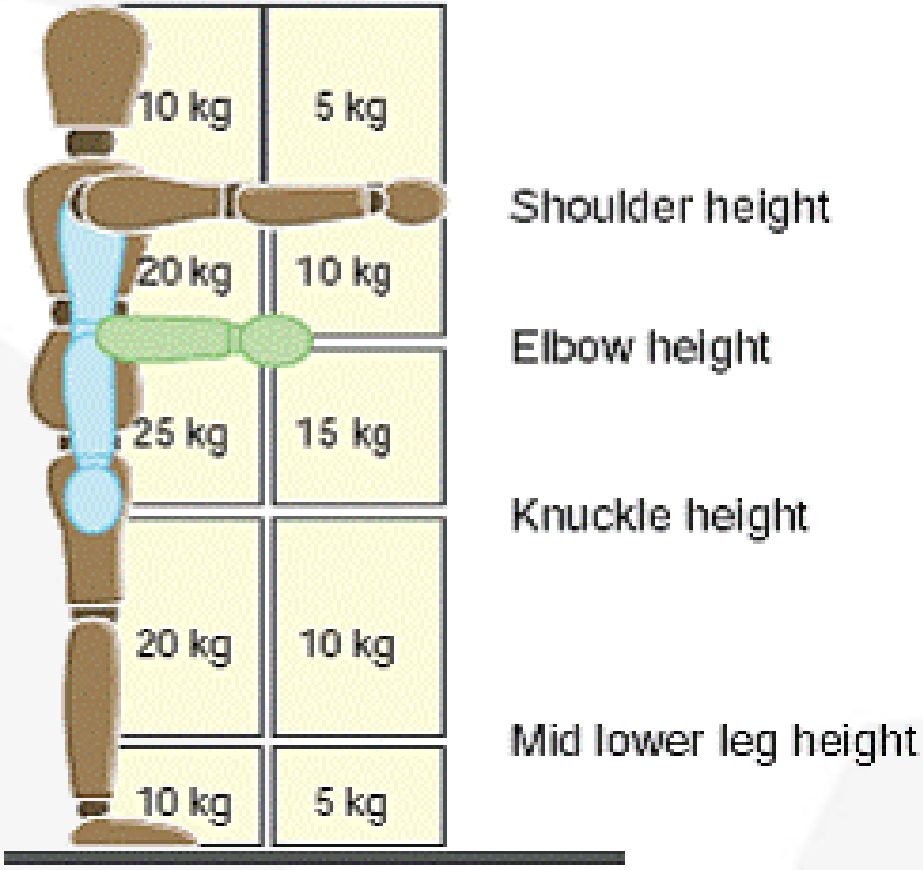


Image from Flinders University

Force + Repetition

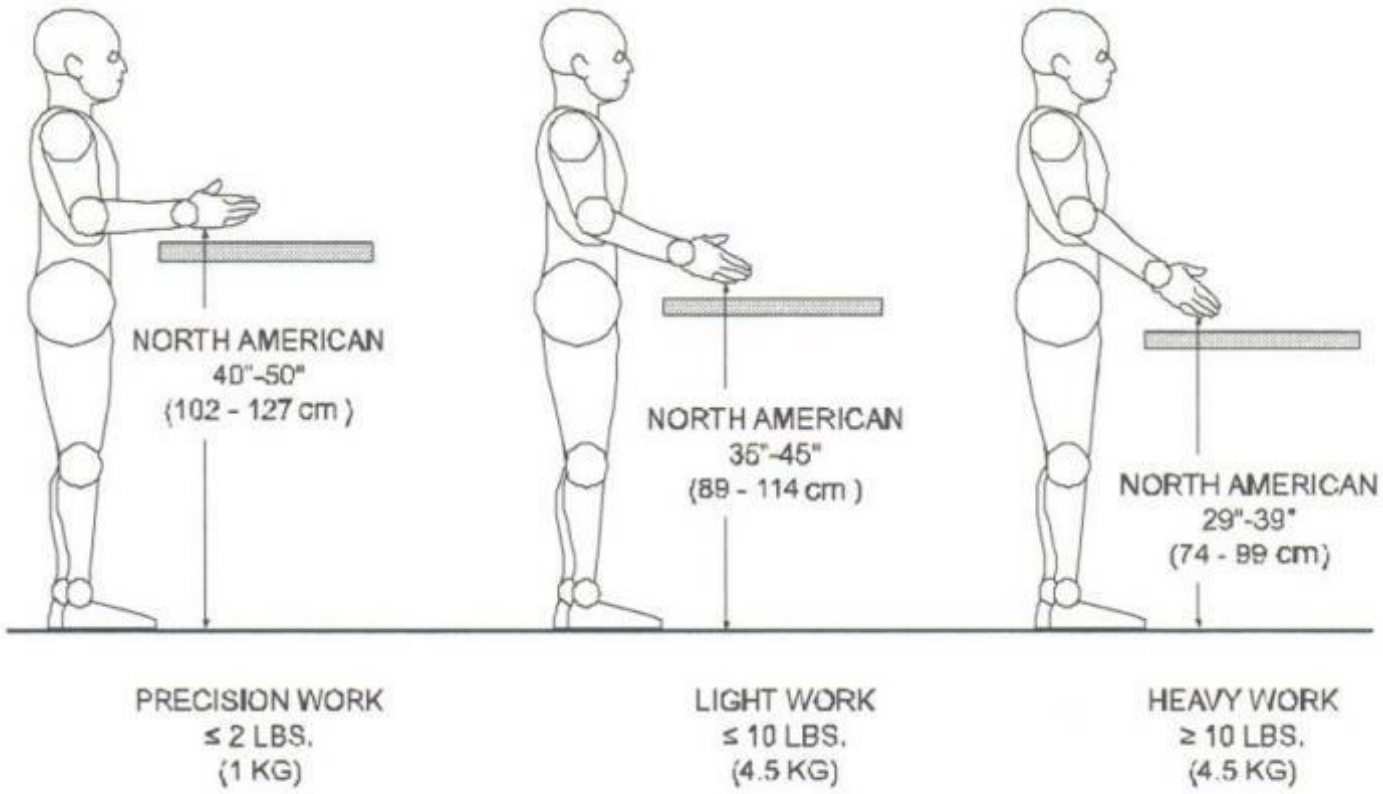
Odds for Injury

		Force: Low	Force: High
Repetition	Low	1.0	5.2
	High	3.3	29.1

Source: Armstrong, Silverstein and Fine, 1985

Image from Flinders University

Standing Workstation Guidelines



Standing Workstation Guidelines (Adapted from Pheasant, 1988)

Contact Stress

- Forearms on edge of worksurface
- Pressure from tool handles
- Kneeling on floor during maintenance operations

Image from Flinders University

Contact Stress

Assessment Tools

Postural

RULA

REBA

Lifting

NIOSH

Snook Tables

Combination

Rogers Fatigue: Posture + Effort

General/Medical

Physical Demand Category

Functional Job Demands

The activities listed below are rated by the ***Dictionary of Occupational Titles*** based on the frequency and duration of performance during the workday as shown in Table 1, below. Please check ONE box for each activity to indicate the appropriate job demand level for that activity.

Activity	Job Demand Level			
	C	F	O	N
Walk				
Climb				
Balance				
Stoop				
Kneel				
Crouch				
Crawl				
Reach				
Handling				
Fingering				
Feeling				
Sitting				
Standing				

The activities listed below are rated by the ***Dictionary of Occupational Titles*** based on the Physical Demand Characteristic (PDC) as defined in Table 2, at the bottom of the page. Please check ONE box for each activity to indicate the appropriate job demand level for that activity.

Activity	Job Demand Level (PDC)				
	S	L	M	H	VH
Lift High					
Lift Mid					
Lift Low					
Lift Full					
Carry					
Push					
Pull					
Overall *					

*** Overall job demand – includes all activities**

Functional Job Demands

The activities listed below are rated by the ***Dictionary of Occupational Titles*** based on the frequency and duration of performance during the workday as shown in Table 1, below. Please check ONE box for each activity to indicate the appropriate job demand level for that activity.

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Push					
Pull					
Overall *					

*** Overall job demand – includes all activities**

Table 1: Activity Frequency - Dictionary of Occupational Titles Volume II, Fourth Edition, Revised 1991		Lifting Activity Height Definitions
Constant (**C**)	67 – 100% of the workday	High – above shoulder
Frequent (**F**)	34 – 66% of the workday	Mid – knuckle to shoulder
Occasional (**O**)	0 – 33% of the workday	Low – floor to knuckle
Not Present (**N**)	Activity is not performed	Full – full vertical work plane

Crawl				
Reach				
Handling				
Fingering				
Feeling				
Sitting				
Standing				

Pull					
Overall *					

*** Overall job demand – includes all activities**

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Table 2: PDC - Dictionary of Occupational Titles - Volume II, Fourth Edition, Revised 1991			
Physical Demand Level	**OCCASIONAL** 0-33% of the workday	**FREQUENT** 34-66% of the workday	**CONSTANT** 67-100% of the workday
Sedentary (**S**)	1 - 10 lbs.	Negligible	Negligible
Light (**L**)	11 - 20 lbs.	1 - 10 lbs.	Negligible
Medium (**M**)	21 - 50 lbs.	11 - 25 lbs.	1 - 10 lbs.
Heavy (**H**)	51 - 100 lbs.	26 - 50 lbs.	11 - 20 lbs.
Very Heavy (**VH**)	Over 100 lbs.	Over 50 lbs.	Over 20 lbs.

Upper Body Risk Reduction

- Avoid forceful pinch grips, use power grips
- Avoid forceful exertions over shoulder height
- Avoid the chicken wing
- Minimize hammering

Upper Body Risk Reduction

- Slight bend of the elbow when carrying
- Minimize forceful forearm rotations & high torque reactions
- Keep things close, avoid extended reaching

Safer Reaching

To remove items from the back of a shelf, slide the items closer to you

To place items toward the back of a shelf, place the item on the front of the shelf and slide it to the back.

Lifting

- Avoid storing stock on the floor.
- Heavy or frequently-accessed items should be stored at the preferred height of 18" to 50" from the floor.

Pushing/Pulling

- Use a hand truck, pallet jack, or cart when:
  - Moving a heavy load
  - Travelling with a load
- Pushing is easier on the body then pulling
  - When you have a choice, push instead of pull
- Make sure equipment stays in good shape
  - If wheels won't turn easily, or cart is hard to push/pull, let a team lead know

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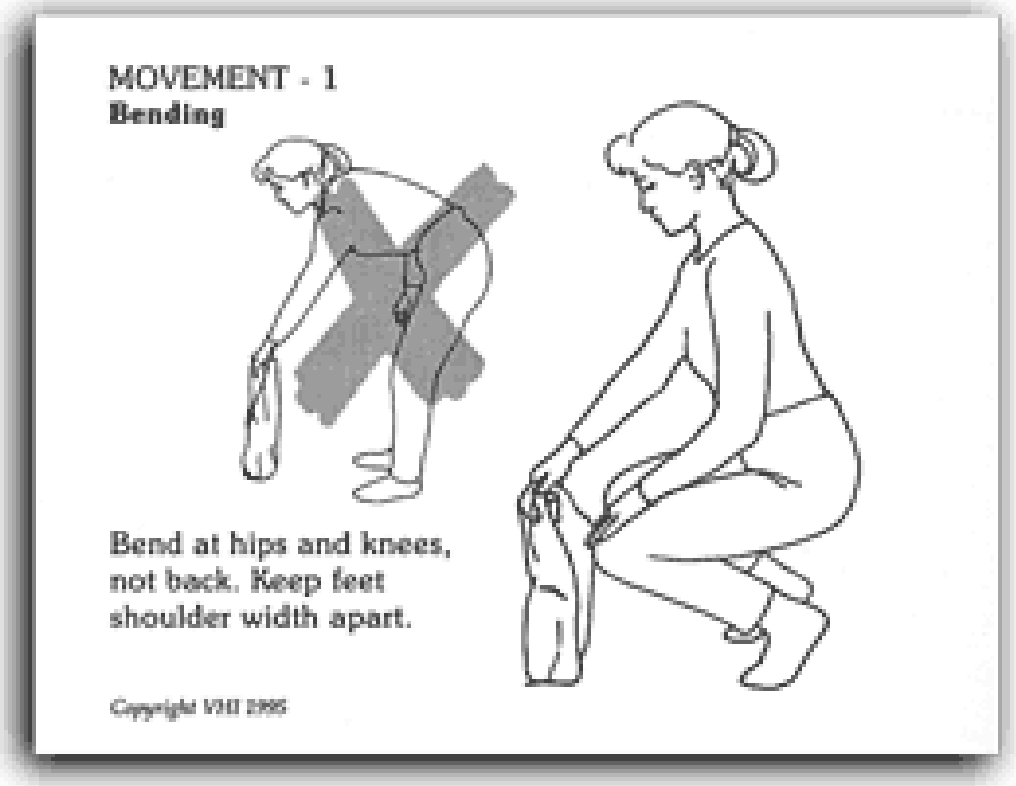
Safe Material Handling

Proper Lifting



Golfer's Lift

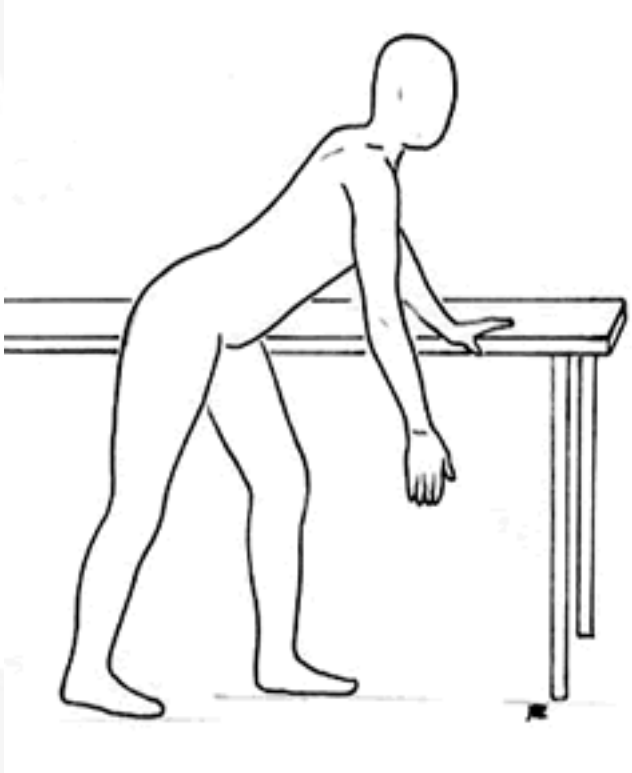


Image from VHI

Proper Lifting

- Keep Spine Straight
- Avoid Twisting
- Test the Load