

# RiskTopics

## Minimizing lower back injuries caused by lifting, pushing, or pulling

### Zurich Resilience Solutions - Risk Engineering

#### Tips for evaluating work tasks and activities to minimize lower back injuries.

##### Introduction

Contrary to popular belief, many lower back injuries are not the result of sudden mishaps that damage spinal discs or strain muscles and sprain tendons and ligaments. Rather, these injuries may develop gradually over a period of weeks, months, or even years because of repeated stresses on the back.

##### Discussion

###### **Risk Factors**

The five major risk factors or sources that may be, individually or in combination, related to the development of lower back injuries are force, repetition, duration, posture, and shape and design of the object.

There are two types of controls that are most effective: administrative and engineering. Administrative controls include items such as training, job rotation, shift/break schedules, and careful selection of workers. Engineering controls include a redesign of the job, a tool, or a workstation. Ideally, engineering controls the best way to eliminate or reduce hazards.

Good job design reduces the worker's exposure to the hazards of lower back injuries. It also reduces the medical and legal problems of selecting the worker for the job, as well as finding replacements for absent workers. Good job design also places less reliance on the worker's willingness to follow safety procedures.

This RiskTopic will help identify risk factors and choose control options. Keep in mind that lower back injuries may be the result of more than one risk factor. The opportunity to minimize lower back injuries improves by controlling as many risk factors as possible.

##### Guidance

The best way to use this document is to:

- Observe the task being performed.
- Consider each identifying risk factor and determine how these factors relate to the job or task.
- Identify the effects of performing that task in the current manner. Examples include strained back, pinched fingers, an object dropped on the foot causing foot injury, or a damaged product.

- Review and choose the appropriate control. Please understand that these factors and controls cannot possibly be all-inclusive. Utilize available knowledge, creativity, and judgment in applying this information.

A sample evaluation form is included in Appendix A. This may assist in data collection by allowing the division of the work task into its various components (hazards) and then reviewing these components by risk factor and possible control technique.

Identifying risk factors for lifting, pushing, and pulling

### **Force**

Does the job require a worker to lift, push, or pull weighted objects?

Some examples include:

- Sliding materials, containers, or boxes to the front or rear of pallets
- Use of hand jacks
- Pulling containers off storage racks
- Picking up dropped parts
- Cleaning up workstations
- Lifting items off pallets or floor

### **Repetition**

Does the job require a worker to move objects over and over?

Some examples include:

- Frequently moving materials in and out of the working area of the machine
- Frequently picking up and sorting materials
- Frequently moving materials from storage to shelving

### **Duration**

How much time is spent lifting, pushing, or pulling?

Considerations include:

- This is the worker's full-time job every day.
- It is done frequently over an eight-hour shift.
- It is done occasionally throughout the shift.

### **Shape and design of object**

Is it difficult to handle or move the materials?

Considerations include:

- The objects moved do not have handles or hand grips.
- The hand grips are poorly placed.
- The objects handled are awkward and difficult to grasp.

### **Posture**

Do any workers twist or bend while moving objects?

Some examples include:

- Reaching away from the body to the front or sides
- Bending to lift objects from the floor
- Bending at the waist to lift objects
- Moving objects to above shoulder height

Note the risk factors identified in the Identifying/Loss Drivers columns of the worksheet.

Consider the possible control options for lifting, pushing, and pulling activities.

### **Force**

Increase the weight to necessitate mechanical handling:

- Bags with greater weight
- By packaging many objects together
- By changing the size of the object

### **Reduce the weight by decreasing**

- Size
- Container capacity (size and load capacity)
- Container weight
- Number of objects being handled at the same time
- Purchase materials in less than 50-pound containers

### **Repetition/duration**

- Eliminate the need to handle manually.
- Use mechanical devices whenever possible.

### **Reduce repetitions**

- Cross-train workers to keep them from repeating the same task over and over
- Rotate workers between job stations frequently
- Broaden jobs to use different muscles

### **Shape and design of object**

- Reduce the size of the container
- Add handles that will aid in grasping
- Encourage grasping and carrying objects with two full handgrips instead of just using finger grips

### **Posture and technique**

Bending

- Keep materials at waist level during processing
- Use mechanical devices to raise items to about waist level

Twisting

- Keep materials in front of the worker
- Provide swivel seats
- Use mechanical devices to change material flow direction
- Allow enough space to turn and step into the work area

Reaching

- Reduce the size of the object
- Place items (materials, tools, controls) as close to the worker as possible
- Allow space to walk around and get closer to objects
- Pad conveyor edges to allow workers to stand closer

Note the control possibilities in the Controlling column of the worksheet.

Consider the possible control options for lifting, pushing, and pulling activities.

## Conclusion

There are a wide variety of risk factors that may contribute to lower back injuries. These injuries may be avoided by analyzing the risk factors and implementing controls following the guidance included. Control methods may include a combination of both administrative controls and engineering controls. An example worksheet showing the analysis of a fictitious job task is also included in Appendix B.

For more information on Zurich's extensive Risk Engineering and Sustainability services, please contact your Risk Engineer or visit us at [Risk Engineering and Sustainability Services | Zurich Resilience Solutions](#).

## References

NIOSH [1994]. Applications manual for the revised NIOSH lifting equation. By Waters TR, Ph.D., Putz-Anderson V, Ph.D., Garg A, Ph.D. Cincinnati, OH: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-110 (Revised 9/2021), <https://doi.org/10.26616/NIOSH PUB94110revised092021>

NIOSH 1981. Work Practices Guide for Manual Lifting. NIOSH Technical Report No. 81-122, US Department of Health and Human Services, National Institute for Occupational Safety and Health, Cincinnati, OH

## Other resources

[Elements of Ergonomics Programs](#)

[Applications Manual for the Revised NIOSH Lifting Equation](#)

[Ergonomics - Overview | Occupational Safety and Health Administration \(osha.gov\)](#)

[Warehousing - Hazards and Solutions | Occupational Safety and Health Administration \(osha.gov\)](#)

## Other related Zurich RiskTopics

- Manual Material Handling
- A guide to controlling lifting exposures

# Appendices

## Appendix A

### Analysis worksheet

Department \_\_\_\_\_

Date \_\_\_\_\_

Hazards (jobs)	Identifying Risk Factors	Loss drivers/root causes	Controls
	Force		
	Repetition		
	Duration		
	Shape/Design		
	Posture		

Appendix B

Analysis example

Department \_\_\_\_\_

Date \_\_\_\_\_

Hazards (jobs)	Identifying Risk Factors	Loss drivers/root causes	Controls
The receiver unloads the trailer at the dock and places cargo on pallets	<b>Force</b> Picking up materials Weight: (20 to 60 lbs.)	Back/shoulder sprains could drop an item on foot, and the item could break	Weight: Suppliers place cargo on pallets or reduce carton weight
	<b>Repetition</b> Five cartons per minute	Same	Repetition: Mechanical assist or rotate the worker
	<b>Duration</b> Frequently over an eight-hour shift	Same	Duration Mechanical assist or rotate worker
	<b>Shape/Design</b> Large cartons; inconsistent handles/grips; difficult to hold	Same	Shape/Design: Smaller cartons, cartons with handholds
	<b>Posture</b> Bending to floor level, reaching and twisting across the pallet	Same	Technique: Turn the whole body, raise the pallet, rotate the pallet

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