Eagle Park Health Care Facility

Ergonomic Trolley

OHSAH

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INTRODUCTION

In January 2001, Eagle Park Health Care Facility submitted a request for funding to the Occupational Health and Safety Agency for Healthcare (OHSAH) in British Columbia. The proposal requested modifications to kitchen trolleys to reduce the risk of injury to staff while pushing and pulling loads between the main kitchen and three dining rooms.

Eagle Park Health Care Facility is a 75 resident long-term care facility. In the past three years, there have been two musculoskeletal injuries (MSI) related to trolley use in the kitchen department. Both incidents resulted in time loss. Current kitchen trolleys were viewed by staff to be heavy, awkward to push and difficult to maneuver.

OHSAH conducted ergonomic assessments of the kitchen area on February 28th and April 5th, 2002. The assessments were conducted to determine risk of MSI to kitchen staff while using kitchen trolleys, and to recommend modifications for the existing trolleys.

METHODS

Staff interviews were conducted to determine current issues with trolley use and ideas for redesign. Observation and video analysis were conducted to aid in the assessment process. Pushing forces for the kitchen trolleys were measured using a force gauge and compared to guidance for maximum allowable pushing forces (Snook and Ciriello, 1991).

RESULTS

General description of food delivery tasks

Food prepared in the kitchen area, utensils and dishes are transported via kitchen trolleys to and from the three dining rooms. One worker usually pushes a trolley. The “green” dining room is located approximately 260 feet from the kitchen; the “pink” dining room approximately 130 feet; and the “blue” dining room is located immediately outside of the kitchen. The “pink” and “blue” dining rooms are not equipped with a means of warming food, therefore warm dinner food for these two rooms is transported from the kitchen via a steam table. All meals for the “green” dining room, as well as breakfast and lunch for the other two dining rooms are transported via the kitchen trolleys. For meals that are delivered with trolleys, staff will make three separate trips: one with clean dishes, one with food, and one with dirty dishes and leftover food.

Summary of staff interviews

Three food service workers (FSW), one cook, and one senior dietary aide were interviewed regarding issues concerning current trolley use and recommendations for improvement. The main concern among workers was that most existing trolleys lacked handles. Staff felt that the trolleys were difficult to push and maneuver when fully loaded. In addition, staff commented that trolleys tend to move from side to side when they are being pushed, increasing the effort required to maintain the trolleys in a forward direction. Some staff reported experiencing pain and discomfort in the shoulder, chest, and low back regions when using the trolleys.

There were 5 different types of trolleys in use in the kitchen at Eagle Park. Table 1 summarizes the features of the different trolleys.

Table 1: Specifications for trolleys A, B, C, D and E

Trolley	Number of Trolleys	Handle	Dimensions (L x W x H) (inches)	Wheel diameter (inches)	Wheel thickness (inches)
A	4	Yes	24 x 15.5 x 36.5	3.5	.75
B	4	No	27 x 18 x 41	5	1.25
C	1	Yes (modified)	27 x 18 x 41	5	1.25
D	2	No	35 x 21 x 32	4	1
E	4	Yes	35 x 21 x 32	4	1

Workers and management agreed that trolley A is not big enough to hold all the food and dishes that have to be transported for a meal. As a result, these trolleys are often overloaded, which poses a safety concern for employees, particularly when transporting hot items.

Trolleys B and C are considered medium-sized trolleys. Both trolleys have the same basic dimensions, however trolley C was previously modified by the facility. Modifications included adding a new handle and wheels to make pushing and pulling more comfortable for the workers (Figure 1). Some workers, especially the taller ones, liked the vertical handle because it provided a higher handle height that minimized awkward low back postures. However, shorter workers felt that the modified vertical handle was not suitable for their use.

Figure 1. Trolley C with the addition of the vertical handle.

Trolleys D and E are the largest-sized trolleys and have the same dimensions. The only difference between the two types of trolleys is the presence of handles on trolley E. Staff felt that these trolleys have adequate space to safely transport food to and from the dining rooms. However, staff reported that it is difficult to maintain these trolleys tracking in a forward direction when they are being pushed. Trolley D (Figure 2) was chosen for modification because staff preferred its size, but found it awkward and difficult to push and maneuver.

Summary of pushing forces

The force gauge was used to measure the forces required to push a fully loaded trolley D. Three trials were conducted in which the trolley was pushed from a stationary position to calculate "initial" forces. Three further trials were conducted in which the trolley was pushed while it was already rolling to determine the "sustained" forces. Table 2 summarizes the pushing forces for trolley D and the recommended maximum pushing force (Snook and Ciriello, 1991).

Guidance for maximum acceptable pushing forces are based on a Western industrial population, and gives separate tables for men and women (Snook and Ciriello, 1991). This guidance estimates the percentage of the population that can safely push a given load (weight).

Figure 2. Trolley D loaded with food, dishes and utensils.

Table 2: Pushing forces for trolley D

	Initial Force (lbs)			Sustained Force (lbs)		
Trial	Mean	Peak	Guidance	Mean	Peak	Guidance
1	9.5	18	37.4	6.5	13	15.4
2	10	18.5		8.5	11.5	
3	10.5	24.5		8.5	11.5	
Average	10	20.3		7.8	12	

Initial and sustained forces were below recommended allowable limits (guidance) for women, indicating that 75 percent of the population should be able to perform this activity. However, this does not preclude risk of injury or associated fatigue when pushing and maneuvering the trolley.

RISKS AND RECOMMENDATIONS

The following section describes ergonomic issues that may contribute to an increased risk of MSI and lists recommendations that will help control the risks.

Task: Loading/unloading food and utensils from trolley

Risks

- Forceful exertions: low back, shoulder
- Awkward posture: back flexion

Recommendations

- Load heavier items on the top shelf
- Avoid reaching for heavier objects
  (e.g., work on the top shelf; position bins on the near edge of the trolley)
- Reduce the weight of individual loads
  (e.g. use multiple smaller bins, instead of one large one; or fill two bins half full rather than one bin full)

Task: Pushing the kitchen trolley

Risks
- Forceful exertions: low back, shoulder
- Static posture: back flexion, shoulder flexion, neck flexion

Recommendations
- Increase wheel diameter and thickness
- Attach height-adjustable handles
- Use locking front or rear castors to improve steering

Task: Pushing steam table

Risks
- Static/awkward posture: back flexion, shoulder flexion, neck flexion
- Forces: high pushing force

Recommendations
- Push steam table without food and bring food on separate trolley
- Push steam table using at least two staff
- Add telescopic front handle

Trolley modifications

It is recommended that the maximum benefit will be derived if initial modifications are made to trolley D. Trolley D is used to carry a sufficient load and also lacks a handle.

The height of staff varies considerably, with the shorter workers standing just over five feet and the taller workers standing about six feet. A height adjustable handle will accommodate the difference in height between workers. The handle should be adjustable from 31" to 39", with a quick release mechanism that will allow workers to easily and safely adjust the handle. Although pushing forces are below allowable limits, staff found it difficult to push the trolley. Increasing the wheel diameter from four inches to eight inches will make it easier to maneuver and push. When pushing the trolley long distances, locking front castors will make it easier for workers to maintain the trolley in a straight forward direction. The larger wheels will increase cart height by approximately four inches, thereby increasing the top shelf height to 36". A higher top shelf will be easier to access than the current shelf height (32").

CONCLUSIONS

Eagle Park Health Care Facility has raised concerns about the impact of kitchen trolleys on worker safety and risk of MSI. This ergonomic assessment has confirmed that risk factors exist for use of these trolleys, and that modifications to the existing trolleys may minimize those risks.

The main concerns identified were absence of handles on some trolleys, difficult pushing and maneuvering, and low shelf heights. Trolley D was recommended for modifications because it did not have a handle and it was the most suitable sized trolley for staff needs.

Recommended modifications include: increasing the wheel size and adding locking front castors to make pushing and maneuvering easier; and adding a height adjustable handle to reduce awkward postures and accommodate staff of different heights. Adding larger wheels will increase cart height by four inches, which will increase the upper shelf height to approximately elbow height for the smallest employee.

Kitchen workers will be asked to trial the modified trolley and to participate in the evaluation of the intervention.

REFERENCES

1. Lawson, J. and Potiki, J. 1994. Research Report: Development of Ergonomic Guidelines for Manually-Handled Trolleys in the Health Industry.

2. Snook, S.H. and Ciriello, V.M. 1991. The design of manual handling tasks: revised tables of maximum acceptable weights and forces. *Ergonomics*, 34(9): 1197-1213.

ABOUT THIS DOCUMENT

The Occupational Health and Safety Agency for Healthcare (OHSAH), which operated from 1998-2010, was a precursor to SWITCH BC. Conceived through the Public Sector Accord on Occupational Health and Safety as a response to high rates of workplace injury, illness, and time loss in the health sector, OHSAH was built on the values of bipartite collaboration, evidence-based decision making, and integrated approaches.

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