

Ergonomics Study of  
Dining Services Positions  
At The University of California  
May 2012



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The UC Ergonomics Project Team



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## Executive Summary

At the University of California, Dining Services plays a critical role in providing food for thousands of students, patients, guests, staff, and faculty. To perform this critical job function, workers are exposed to ergonomic risks such as repetitive motion, strain, and awkward postures. During fiscal years 2008-2011, ergonomic injuries in dining services accounted for 705 workers' compensation claims, with an actuarial estimated ultimate direct cost of \$8,651,496. Loss data was valued as of November 30, 2011.

At the request of UCOP Risk Services, the UC Ergonomics Work Group conducted a study of Dining Services to identify the top five areas of ergonomic risk and develop strategies to address these issues. A project team comprised of ergonomists from various UC locations was formed.

Various approaches were used to meet the project objectives, including:

- Workers' Compensation data analysis
- Literature review
- Task analysis
- Direct observation and front line experiences at individual locations

The top 5 high risk tasks identified and addressed in this project include:

- 1. Food Preparation**
- 2. Manual Material Handling in the Kitchen**
- 3. Stocking the Storeroom/ Retrieving Items from Storeroom**
- 4. Transporting Food to Remote Locations** (catering, patient food distribution)
- 5. Dishwashing** (dishes, pots, pans)

From the compiled data, a set of reference documents was developed including *Best Practices Bulletins*, *Product Recommendation Sheets*, and *Ergonomic Design Guidelines for New Construction and Existing Buildings*. The *Best Practices Bulletins* provide work practice recommendations to reduce ergonomic risk factors. Each bulletin also includes information on equipment selection, training concepts, and work and staffing guidelines. The *Product Recommendation Sheets* offer equipment recommendations that have proven successful at one or more UC locations. The *Ergonomic Design Guidelines for New Construction and Existing Buildings* offer valuable ergonomic criteria to implement in the design phase of construction projects.

These documents are posted on the UC SharePoint website at <https://spsso.ucop.edu>. Content will be updated bi-annually.

UCOP Risk Services will provide funding, up to \$5,000 per location, to facilitate implementation of location-specific interventions to address one or more of the high risk tasks. The application and brief evaluation tool for this process are included in the report.



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## Project Sponsors

*Grace Crickette*, Chief Risk Officer, Office of the President  
*Erike Young*, Director of Environment Health and Safety, Office of the President

## Project Team

Ergonomics Study of Dining Services Positions at the University of California

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## Project Charter

### *Ergonomics Study of Dining Services Positions at the University of California*

#### Project Objective

At the request of UCOP Risk Services, the UC Ergonomics Work Group will conduct an ergonomics study of the high-risk job tasks within UC dining services.

#### Project Scope

The scope of the project is to identify the top five at-risk tasks within these positions and develop strategies to reduce injuries and decrease workers' compensation costs. This will be achieved by developing:

- *Best Practices Bulletins* so each location can use the resources and guidelines to make improvements
- *Product Recommendation Sheets* for equipment that has proven successful. Lists will include specifications, features, and appropriate applications.
- *Ergonomic Design Guidelines* for new construction and existing buildings.
- *Pilot Project Guidelines* to assist each location to develop and implement location-specific interventions to address one of the high risk tasks.
- *Evaluation Tool and Metrics for Effectiveness*

#### Project Methodology

Data will be collected from each location by asking the following three questions:

- What are the top five at-risk tasks within your dining services departments? This information will be gathered from resources such as:
  - Recorded injury history
  - Interviews with dining management of departments
  - Feedback from employees
  - IVOS system and injury statistics
  - Information gathered from ergonomic coordinators and accident investigators
- What interventions has your location already implemented to address these high at-risk tasks and what has been the outcome?
- What other interventions have you/are you considering implementing to reduce these risks?

The data will be analyzed by the Project Team via conference calls and in-person meetings. As needed, a representative from each location will be contacted for further data or clarification.

The data collected will help the group design and develop best practices, product evaluation processes, product information sheets, design standards and a pilot project proposal guideline.

### Project Team Members

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### Project Milestones

Milestones	Deliverables
Identify project team members	Project team roster
Confirm project charter (Facilitated by Kristie)	Approved project charter document
Identify top five at-risk tasks (Questionnaire results compiled by Kristie Elton)	Results ready for analysis
In-person meeting at UCOP	<ul style="list-style-type: none"> <li>Establish teams and leads</li> <li>Assign tasks to teams</li> <li>Determine information needed to complete the project deliverables</li> <li>Develop questionnaires to collect information related to each task</li> </ul>
Conference call to review questionnaires (Facilitated by Kristie/Julie)	Final version of questionnaires completed for distribution
Send email to members of entire work group with all questionnaires. (Kristie/Julie)	Distribute email with questionnaires attached
Project Team members follow-up with ergonomists for completed questionnaires	Completed questionnaires from all locations are due

Complete data collection and compilation (Each team collects necessary data with respect to their assigned task)	Data analysis- compilation of data for each task. Kristie and Julie will assist teams as necessary.
Conference call (Facilitated by Kristie/Julie)	Data analysis and next steps <ul style="list-style-type: none"> <li>• Each team provides a brief presentation on the summary of their data</li> <li>• Determine next steps</li> </ul>
Each project team: <ul style="list-style-type: none"> <li>• Develop Best Practices Bulletins for assigned at-risk task</li> <li>• Develop Recommended Product Lists for assigned at-risk task</li> <li>• Develop Design Guidelines for assigned at-risk task</li> </ul>	Draft documents of the following for each at-risk task: <ul style="list-style-type: none"> <li>• Best Practices Bulletins</li> <li>• Product Recommendation Lists</li> <li>• Design Guidelines</li> </ul>
In-person meeting to review and update drafts of the following documents: <ol style="list-style-type: none"> <li>1. Best Practices Bulletins</li> <li>2. Recommended Product Lists</li> <li>3. Design Guidelines</li> </ol>	<ul style="list-style-type: none"> <li>• Each team presents the 3 deliverables for their assigned task to Project Team</li> <li>• Documents are finalized</li> </ul>
Conference call (Facilitated by Kristie Elton)	<ul style="list-style-type: none"> <li>• Follow-up to in-person meeting.</li> <li>• Complete review of any documents not completed at in-person meeting.</li> <li>• Make necessary revisions for final copy</li> </ul>
Final documents are due from each team	Final drafts of the following documents are due: <ul style="list-style-type: none"> <li>• Best Practices Bulletins</li> <li>• Product Recommendation Lists</li> <li>• Design Guidelines</li> </ul>
Final report development (Distributed by Kristie Elton to project team)	Draft report distributed to project team for review
Conference call (Facilitated by Kristie/Julie)	Review final report and make necessary changes
Final report due	Final project report
Information presented to Erike Young and others at UCOP	Presentation summarizing research, analysis, and recommendations

### Project Success Measurements

This project will be a success if it culminates in specific actionable steps for each location to implement that will result in the reduction in the frequency and severity of injuries related to these top five at-risk job tasks. Since the field of ergonomics is dynamic, our goal is to continuously improve and incorporate lessons learned into the work practices. Therefore, this report is intended to be a living document and updated with new information as available.

Success measurements include:

- Completion of Best Practices Bulletins, made available to each location to use the resources and

guidelines to implement ongoing improvements

- Completion of Recommended Product Sheets that will provide equipment information to dining services departments and assist them with their injury reduction strategies
- Completion of Design Guidelines for New Construction and Existing Buildings
- System-wide support to implement recommended design guidelines
- Implementation of a one-year pilot project at all locations that includes training and evaluation
- Implementation of an evaluation tool
- Incorporation of evaluation outcomes and lessons learned into work practices

## Introduction and Project Overview

At the request of University of California, Office of the President (UCOP) Risk Services, the UC System-wide Ergonomics Work Group is conducting an ergonomic study of the five occupations within UC that have the highest incurred workers' compensation cost. The purpose of the study is to develop system-wide strategies that reduce ergonomic risks. In reviewing actuarial data, UCOP Risk Services determined that custodians, dining service workers, animal care technicians, groundskeepers, and building maintenance workers have the highest incurred costs. The first study focused on injury prevention strategies for custodians. The second study, focused on Dining Services, has recently been completed.

A Project Team of 12 ergonomists was established to complete this study. The objectives of the project were to help reduce ergonomic risk factors and injuries by developing:

1. *Best Practices Bulletins* to enable each location to use the resources and guidelines to make work practice improvements
2. *Product Recommendation Sheets* which provide information on equipment that has proven successful at one or more UC location
3. *Ergonomic Design Guidelines* for new construction and existing buildings (remodels)
4. *Pilot Project Proposal Guidelines* to assist each location in developing and implementing location-specific interventions to address one of the high risk tasks. For these interventions, UCOP Risk Services will provide funding, up to \$5,000 per location.
5. *Evaluation Tool and Metrics for Effectiveness* which provides direct feedback from front line employees on piloted strategies and interventions

To collect the necessary data, a questionnaire was developed to identify the most common at-risk job tasks. This questionnaire was sent to ergonomists at each UC location. To complete the questionnaire, the ergonomists used workers' compensation data, previous job analyses, recorded injury history, as well as interviews and feedback from managers, supervisors and employees. The results showed the most common at-risk job tasks for Dining Services were:

1. Food Preparation (repetitive tasks such as cutting, slicing, and chopping)
2. Manual Material Handling (in the kitchen areas)
3. Stockroom Duties
4. Transporting Food (catering, patient food distribution)
5. Dishwashing (dishroom, washing pots and pans)

During the data collection phase, the project team divided into 5 groups with 2 people in each group. The team also had a project leader and facilitator.

A second questionnaire was developed to determine the examples of successful equipment and products being used, maintenance and storage issues, processes and procedures, and design recommendations. The questionnaire also inquired as to the effectiveness of those factors in reducing injuries and

increasing productivity. Ergonomists from each location were charged with administering this questionnaire with their respective dining services units.

From the data results, literature review and front line experiences, *Best Practices Bulletins*, *Product Recommendation Sheet,s* and *Design Guidelines for New Construction and Existing Buildings* were created for the identified job tasks. These documents are posted on UC’s SharePoint site <https://spsso.ucop.edu/> (UC username and password required) and the UC EH&S website, <http://ucanr.org/sites/ucehs/Workgroups/Ergonomics/>, and should be utilized as part of the system-wide strategies to reduce risk and decrease workers’ compensation injuries and costs.

## **Findings and Recommendations**

### ***Background***

At the University of California, employees in dining services experience numerous ergonomic injuries according to the workers compensation data. The dining service employees included in this study comprise of dining service workers, cooks, and storekeepers.

### ***Data Analysis***

To determine the top five at-risk job tasks for dining service workers within the UC system, the ergonomics project team developed an initial questionnaire (Appendix A) and subsequently sent it to 13 locations for completion. Responses were received from 12 of the 13 locations. A summary of responses is provided below:

<b>Top at-risk tasks</b>	<b>Number of locations reporting this at-risk task</b>
<b>Food Preparation</b> (Includes scooping, stirring, chopping, cutting, peeling, making sushi, bakery, making pizza, etc.)	12
<b>Manual Material Handling in the Kitchen</b> (Includes transporting mixing bowls, pans/pots, liquid containers for dispensing stations, small kitchen equipment (such as waffle iron, rotisserie, etc.), trays of food, large containers of food, and changing fryer oil)	9
<b>Stocking Storeroom/ Retrieving Items from Storeroom</b>	8
<b>Transporting Food to Remote Locations</b> (Includes catering and patient food distribution)	7
<b>Dishwashing (dishes, pots, pans)</b>	6

Other at-risk tasks reported (but not included in this study) include cashiering, trash removal and food waste recycling, serving food, dietary order desk, moving furniture and vacuuming, and office work.

From the data results, 5 teams of 2 ergonomists were established to address the at-risk job tasks. Each team was assigned 1 task.

Each of the 5 teams generated a set of questions intended to collect the information necessary to evaluate current processes, equipment, and interventions from each UC location. These questions were compiled into a single questionnaire (Appendix B).

### ***Recommendations***

Each group developed a set of recommended strategies to reduce the risk of their assigned job task. A brief overview of strategies is provided below:

#### **Dishroom and Pot Washing**

- Powered sinks with circulating water to loosen food particles
- Automated washing systems for pots, pans, and baking sheets
- A rinse nozzle height of 40" from the floor with a locking mechanism
- Recommended water flow rate of 1-1.6 gpm
- High temperature hoses with 80-150 PSI to effectively clean
- Use of scrub brushes with handles versus abrasive sponges
- Wall-mounted soap dispensers versus floor dispensers
- Automated transport of dirty dishes and trays (when automation is not an option, provide mobile soak sinks and racks for customers to break down dirty ware)
- Compost area for customers to scrape food waste
- Staging area for dirty dishes with tables and racks to reduce lifting from the floor
- Self-leveling glass/cup dispensers which reduce bending

#### **Food prep**

- Automate food preparation
- Prepare food in advance, during slow periods
- Adjust the height of work surfaces to better fit individual employees
- Use of the following is recommended:
  - Pre-cut or pre-peeled foods
  - Appropriate cutting tools that are sharpened regularly
  - Powered equipment to mix or stir heavy or viscous foods
  - Appropriately-sized powered can openers and assistive devices for plastic lids
  - Pre-made dough or pre-cut dough pieces
  - Automated dough mixers, cutters, and sheeters

- Automated sushi machines
- Anti-fatigue mats

### **Food Transportation**

- Motorized carts or vehicles to transport heavy loads over long distances
- Hydraulic lift gates on vehicles
- Appropriate material handling equipment (such as carts), height-adjustable preferred
- Vertical handles with good grips on carts
- Hydraulic lifts on loading docks

### **Storeroom**

- Develop vendor contracts with provisions that include:
  - Staging product
  - Product weight limit of 50 pounds
  - Items pre-sorted in designated locations
- Select shelving specific to the product stored
- Store heavy items between mid-thigh and chest height (power zone)
- Use of material handling equipment such as automated lifters, pallet jacks, forklifts
- Labeling system to identify heavy items

### **Material Handling**

- Bowl trucks and automatic bowl lifters for large, heavy mixing bowls
- Proper wheel and caster selection for carts with a regular preventative maintenance program for all material handling equipment
- Refrigerated salad bars to eliminate the need for transporting ice for cooling
- Beverage dispensers with ice makers attached to reduce the transport of ice
- Gravity fed ice machines with totes to reduce scooping and lifting ice
- Scissor lift tables and carts that minimize bending and stooping
- Contract with a fat, oil, and grease (FOG) removal vendor to safely remove the FOG from the fryer to their own collection containers for recycle OR use an automatic FOG removal machine

### ***Best Practice Bulletins***

The Best Practice Bulletins are intended for supervisors and offer strategies to reduce ergonomic risk factors. There are four sections to each document:

1. **Best Practices** (specific to each task) provide work practice strategies to reduce ergonomic risk
2. **Equipment** information provides general guidelines for selecting and implementing new ergonomic equipment

3. **Training** information provides recommendations for the delivery of ergonomic training for this employee population
4. **Work and Staffing Guidelines** provide staffing information to enhance the injury prevention measures

### ***Product Recommendation Sheets***

Products and equipment recommended in the project include those that have proven successful at one or more UC locations. Although this project led to the discovery of many products that would likely improve the ergonomics of the dining facilities, these products were not evaluated by UC dining staff and therefore not included in this project.

It is the intention of the project team to update the product recommendation information as new equipment is tested and evaluated by UC dining staff.

### ***Design Guidelines***

The design guidelines were developed from a literature review, dining management input, and front-line experiences. They are intended as a resource for ergonomists and dining management to share with partners, such as architects and construction project managers, during the construction of new dining facilities or remodel of existing facilities. The guidelines offer design recommendations intended to reduce the ergonomic risk of employees within a dining facility. Preventing injury through facility design can save money and preserve employee health.

### ***Sponsored Pilot Program***

UCOP will provide up to \$5,000 to each UC location to pilot an ergonomic injury prevention strategy. The application for this program (Appendix E) can be submitted to UCOP EH&S. Following the implementation of such pilot programs, locations are asked to ensure that dining employees complete the Ergonomic Equipment Survey (Appendix F). This will ensure that the ongoing injury prevention strategy information is collected and included as updates to this project.

### ***Conclusion***

This project has provided the opportunity for procedures and processes, engineering controls, and design recommendations from 12 different UC locations to be collected into a single reference. This information will assist EH&S specialists, ergonomists, and dining services management to reduce the ergonomic risk for UC dining services employees.

The Best Practices Bulletins, Product Recommendation Sheets, Design Guidelines, Pilot Project Application Form, and Ergonomic Equipment Survey from this project are available on the UC SharePoint website at <https://spsso.ucop.edu> and the UC EH&S workgroup website at <http://ucanr.org/sites/ucehs/Workgroups/>.



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## Dining Services Ergonomic Design Guidelines

### *For New Construction and Existing Buildings*

#### ***Basic Design Principles***

1. ***Modular and Flexibility:*** Provide flexible and modular design for relatively easy re-design as the needs change.
  - Kitchen equipment (ranges, refrigerators, carts, racks, etc.) and service components should be modular to allow for changing conditions such as different methods of services, new menu items, or a new preparation method
  - Using quick-connect utility lines is another example of flexible, modular design
  - Plan for various serving styles and recognize future renovations, additions, and expansions of the facility are likely
2. ***Flow of Materials and Personnel:*** The relationship among the various storage, preparation, cooking, serving, and cleaning functions must be carefully studied to provide maximum flow and efficiency.
  - Travel distances should be kept short and there should be minimal crossover of circulation paths
  - Open sight lines should be maintained as much as possible
  - The movement of food through the facility should follow a logical sequence beginning with receiving and ending with waste disposal. Flow considerations include:
    - Movement of employees from one area of the facility to another
    - Flow of dishes, pans, and utensils through the dishwashing area and back to the service area
    - Flow of customers from the entrance through the service area, to the dish drop-off area
    - Flow of raw foods through the main traffic aisles of the kitchen to the prep area
    - Flow of materials from the loading dock to storage areas
3. ***Ease of sanitation:*** Sanitation considerations should be addressed in the design phase to significantly reduce time spent cleaning and thus reduce the ergonomic risk for the employees. Examples of these sanitation considerations include:
  - ***Building finishes:*** durable and easy to clean, including structural glazed ceramic tile on the walls and quarry tile on the floors
  - ***Utilization of wall-hung equipment:*** equipment attached to the wall eliminates the use of legs, pedestals and other supports which makes it easier to clean the floors
  - ***Equipment racks:*** provide minimum number of legs for ease of cleaning
  - ***Shelf storage design:*** portable shelving systems and open shelving under tables can easily be cleaned
  - ***Transitions between flooring types:*** eliminate thresholds (at carpet/tile transitions) for easy of moving heavy furniture
4. ***Maintenance:*** Provide easy access to all kitchen equipment, facility mechanisms, and systems for regular maintenance.

## ***Human Engineering***

A work space that is designed with the safety and comfort of the employee in mind can positively impact productivity, efficiency, and reduce injuries.

Sufficient work space- The amount of space necessary for individual workers can vary based on the task performed. The following should be considered when determining work space:

- The number of people working in the space
- The amount and type of equipment
- Equipment door clearance
- The number and types of meals prepared and served
- Necessary storage space (and its proximity to the work space)
- Aisle space

## ***Space Requirements***

Storage needs will increase over time and this growth should be considered during the design phase. Having sufficient storage space allows employees to more easily access product. This can reduce the risk of injury by reducing awkward posture, extended reaches, and handling distances. Sufficient space for the use of material handling equipment use should also be considered. (See appendix for specific space requirements)

## ***Work Surfaces***

Height adjustable work surfaces (such as pedal assist) improve productivity and comfort. Install these in strategic locations to accommodate employee height differences and to make heavy tasks (i.e. using meat slicers and cheese graters) and light work (i.e. slicing, peeling, and cleaning foods) easier to perform. Such work surfaces should have a range of at least 28-44 inches in height.

## ***Equipment Storage***

The facility design should include storage space for material handling equipment, such as:

- Carts
- Hand trucks
- Skate wheel conveyors
- Forklifts

The storage location should provide easy accessibility to the equipment as well as power to charge the equipment.

## ***Temperature and Humidity***

Temperature and humidity levels can impact the risk of musculoskeletal injuries. For this reason, HVAC systems in the dishwashing and potwashing areas should be designed to provide a sufficient amount of air supply and exhaust to maintain the moisture level as low as possible and the temperature within the comfort zone. Considerations should also be given to areas with higher temperatures such as a bakery or rotisserie.

## ***Noise Levels***

It has been demonstrated that high levels of noise in a work setting can cause fatigue, accidents, and low productivity. Some design techniques to reduce noise levels include:

- Sound-reducing materials placed onto the underside of tables and counters.
- Separation of areas in the food facility, especially warewashing
- Designing conveyors to create a sound barrier between dish drop-off points and warewashing
- Acoustic ceilings which are grease- and moisture-resistant
- Carpeting in dining seating areas
- Carpeting on walls of dining areas
- Remote refrigerator compressors

If necessary, partner with Environmental Health and Safety specialists to determine safe and acceptable noise levels.

## ***Lighting***

Proper lighting levels are essential for the safety and well-being of foodservice employees. Below are the recommended lighting levels for foodservice facilities.

<b>Space</b>	<b>Recommended Lighting (Foot Candles)</b>
Receiving	25-45
Storage	15-20
Pre-preparation	20-30
Preparation and Production	30-50
Warewashing	70-100
POS/ Cashier	35-50
Intimate Dining	5-15
Casual Dining	10-20
Quick Service Dining	40-50

## ***Floor Finishes***

When selecting floor finishes, employee safety (slip and fall prevention) as well as ease of sanitation should be considered

## ***Furniture Selection***

Purchase durable light-weight tables and chairs for the dining facility that can easily be moved for daily cleaning

## ***Agency Approval***

All design and construction projects must have the proper approval from local agencies and/or campus Environmental Health and Safety

# **Task-Specific Design Guidelines**

*(Addressing the University of California's top at-risk tasks)*

## ***Food Preparation***

1. Create dedicated corridor(s) for major traffic patterns to minimize cross traffic within cook and food-prep areas
2. Install 'hands free' automatic door openers from kitchen and food-prep areas to service areas
3. Design communication systems (computerized screens, wireless headsets, intercom systems, etc.) between frontline, backline, kitchen, and order desk to reduce foot traffic and increase efficiencies
4. Plan for use of smaller, height-adjustable tables in food-prep areas to accommodate different height users and make it easier to adjust and work with taller equipment. Table top surfaces must be approved by your campus Environmental Health and Safety sanitarian or other specialist.
5. Provide sufficient dry and refrigerated storage for food preparation demands in specialized food-stations in the front of the house
6. Place refrigerated storage in close proximity to food preparation areas to reduce trips to main cooler(s) to get product.
7. Select refrigerated salad bars to eliminate transport and clean-up of ice
8. Locate ice dispensers adjacent to areas of frequent use (i.e. beverage dispensers or smoothie stations)
9. Place sinks in locations providing easy access to users while minimizing cross traffic
10. Design self-serve food stations when possible. When not possible, pass-through areas (cooks to food-prep, or food-prep to customer) should not exceed a reach distance of 16 inches.
11. Install safety mirrors on blind corners to prevent collisions

## ***Dishroom***

1. Provide the appropriate ware washing machine to the specific dining commons. Flight type machines are used where there are more than 600 people served per meal.<sup>1</sup>
2. If using a single belt return, the height of the belt should be 36 inches and collection of dirty ware can occur from both sides of the belt.
3. If using a tray accumulator, design so the forward reach from edge of break down area to the tray or dishes does not exceed 16 inches and the overhead reach to the top carriage does not exceed 58 inches<sup>2,3</sup>
4. Provide removable racks on the tray accumulator to make it easier to clean
5. When using a tray accumulator, provide a conveyor belt to transport dirty ware and racks to the ware washing machine and design so the other end of the belt is located close to and at the same height as the ware washing machine to reduce lifting and reaching.
6. The length of the overhead hose should allow for the nozzle not to exceed 40 inches from the floor to reduce awkward reaching motions. The nozzle should provide a locking mechanism for the trigger to reduce repetitive and sustained squeezing.
7. For user satisfaction, nozzle design should allow water flow rate of at least 1 gpm and to save water no more than 1.6 gpm
8. Use high temperature hoses which provide 80-150 psi to clean the dirty ware
9. Recess the under counter hose holder to prevent it from protruding when the hose is being used
10. Provide adequate drainage in the floor for the daily amount of water and manual cleaning

## ***Pot/Pan Washing***

1. Provide a separate pot/pan washing area from the dish room
2. Provide a turbo wash unit for the pot/pan area
3. Provide pot washing machines as needed
4. The length of the overhead hose should allow for the nozzle not to exceed 40 inches from the floor to reduce awkward reaching motions. The nozzle should provide a locking mechanism for the trigger to reduce repetitive and sustained squeezing.<sup>4,5</sup>
5. For user satisfaction, nozzle design should allow water flow rate of at least 1 gpm and to save water no more than 1.6 gpm<sup>6</sup>
6. Use high temperature hoses which provide 80-150 psi to clean the dirty ware
7. Install 1-lb wall-mounted liquid soap and sanitizer dispensers near the end of counter

## ***Loading Docks***

1. Provide adjacencies between the loading dock, stockroom, preparation, cooking, and serving functions to limit the number and distance of material handling transfers required to transport products
2. Design modular loading dock (bays, vehicular access, waste bins, materials handling equipment) to adapt to work process changes
3. Match dock loading platform heights with the type of truck(s) servicing the facility. Typical docks are 55 inches above grade level to accommodate most trucks. Equip at least one loading berth with a dock leveler to accommodate varying truck platform heights.
4. Provide automated lift system to transport goods from dock surface to ground level
5. Install edge guards and dock bumpers in each loading berth
6. Provide steps with rails in each loading berth to promote safe employee access
7. Provide ramp to connect dock with truck parking area to facilitate use of hand trucks/carts from small trucks and vans. Ramp should have maximum slope of 1:12 and comply with ADA guidelines.
8. Provide canopy extending 48 inches beyond edge of dock platform. Canopy height must accommodate trucks servicing the facility.

9. Ensure the trucks servicing facility have access to loading dock via driveways or service roads with minimal pedestrian or bicycle traffic.
10. Provide manually adjustable lighting in each loading berth to illuminate the interior of trailers
11. Provide automatic doors with sufficient width to accommodate loaded pallet jacks
12. Keep loading dock, storeroom and food preparation areas on same level. If not possible, locate storerooms adjacent to freight elevators in multi-level environments
13. Position dumpsters below dock level and provide sufficient, dedicated space to accommodate the use of automated lifting equipment
14. Avoid grades at dock to avoid rolling of vehicles and containers away from dock. Use chocks, wheel stops, dock locks, or hooks on axles to prevent rolling
15. Provide staging area inside building adjacent to the loading dock to inventory and organize received goods
16. Provide durable, slip-resistant, level concrete dock surfaces that are easy to clean and maintain. Avoid thresholds, lips, and uneven drains
17. Include a wet room/wet area with hose connections and drainage to sanitation system to clean equipment such as trash containers, carts and floor mats
18. Provide electrical and utility hookups for equipment used on the loading dock. Consider the size and voltage of electrical hook-ups, the size and coupling of utility hook-ups, the number of hookups to meet demands, and the placement of hookups to limit cords, hoses and cables in walkways and high traffic areas.

### ***Storerooms***

1. Provide separate functional storage areas (i.e. dry storage, freezer, produce and dairy coolers, meat and meat thawing coolers, and prep area) that are large enough to promote organization and efficient access to products
2. Provide sturdy, adjustable stockroom equipment (shelving, racks, etc.) that support the weight of items stored on them.
3. Provide mobile equipment (i.e. wheeled shelving) to accommodate re-design and cleaning needs
4. Keep loading dock, storeroom and food preparation areas on same level. If not possible, locate storerooms adjacent to freight elevators in multi-level environments.
5. Design storage areas and circulation paths to accommodate size and type of lifting/moving equipment used (i.e. forklifts, carts, pallet jacks/lifts)
6. Use doors with windows and domed mirrors in corners to avoid collisions and improve sight lines
7. Install double doors that accommodate pallets and pallet jacks at each end of storeroom to promote movement through the area and limit crossover traffic
8. Provide automatic door openers to facilitate movement through the storeroom.
9. Provide durable, slip-resistant and easy to clean quarry tile or concrete on storeroom floors. Floors should be continuous and level with no ramps, thresholds, lips or uneven drains.
10. Install glazed, ceramic tile on storeroom walls for cleaning purposes
11. Use wall-hung and ceiling mounted equipment and track systems to eliminate the legs, pedestals and other supports mounted on floor for ease of cleaning and movement
12. Provide electrical and utility hookups for equipment used in the storeroom. Consider the size and voltage of electrical hook-ups, the size and coupling of utility hook-ups, the number of hookups to meet demands, and the placement of hookups to limit cords, hoses and cables in walkways and high traffic areas.
13. Use sliding rather than swinging doors to optimize space and avoid collisions

### ***Transporting Food***

1. Catering kitchen should be in close proximity with and on the same level as the loading dock
2. For locations with multiple levels:

- a. Install adequate freight elevators and/or dumbwaiters for catering to minimize traffic
- b. The distance from the service elevator to the catering kitchen and prep areas shall be a maximum distance of 50 feet with no impediments (stairs, textured surfaces, bumps, drains, slopes greater than 2% incline)
3. Design and install hydraulic lifts onto loading dock for ease of transfer and transport. If docks are not equipped with hydraulic lift, allow sufficient space to accommodate either mobile or stationary lifts or an ADA compliant ramp.
4. Provide sufficient dedicated storage space for transits and carts. Location of storage should be in close proximity so as to avoid unnecessary transporting of equipment.

### ***Material Handling***

1. Provide refrigerated salad bars which provide access from all sides. Installation of electrical, plumbing, and drainage systems (floor troughs with suspended, non-skid grating) must accommodate placement of salad bar.
2. Provide storage space under salad bar with slide out shelves if the design allows.
3. Include design and space for a total Fat Oil Grease (FOG) management system (including equipment) that automatically dispenses, contains, monitors, extracts, transports and filters cooking oil for immediate on-premise recycling and use
4. Provide adequate space around fryers for FOG machines to be used for removal (either by staff or by outside vendor)
5. Provide storage space/area (recessed, if necessary) for the FOG machine near the largest fryers; include electric outlet for recharging
6. Provide adequate space adjacent to milk, soda, and frozen yogurt dispensers for equipment maintenance, loading/unloading products, including space for storing a step stool or safety ladder. Install soda dispensers in close proximity to storeroom to limit distance supplies must be transported.
7. Specify adjustable or variable height and depth counters to accommodate varying sizes and designs of these dispensing machines so they can be accessed easily when loading and cleaning them.
8. Design for installation of gravity-assisted ice dispensing machines with integrated portable totes and carts (see product recommendations for product details)
9. Installation of electrical, plumbing, and drainage systems (floor troughs with suspended, non-skid grating) must accommodate placement of ice machines
10. Locate ice machines close to where ice is used most frequently .
11. Provide adequate aisle space in bakery to accommodate the movement of automatic bowl lifters
12. Provide door width and height in bakery to accommodate an automatic bowl lifter (see product recommendations for product details).
13. Design equipment storage in dining areas under self-serve counters with slide out shelves (for waffle irons, toasters, etc).
14. Designate one (or more) cooler or walk-in specifically for transits and carts that hold prepared food (before final preparation and serving). Cooler should be shallow with no shelving to accommodate one row of transits.
15. Include sufficient storage for pots and pans to prevent congestion and stacking pots and pans to unsafe heights. Shelf height with equipment stored should not exceed 70"
16. Allow for a minimum of 24-inch by 43-inch space next to large tilt kettles, skillets, etc. to accommodate material handling devices and carts
17. Counter space next to steamers, convection, and combi ovens should be at least 22-inches by 13-inches to provide sufficient space for unloading full-sized pans
18. Floor troughs with suspended, non-skid grating should be integrated into the design at all ice machines, tilting skillets, kettles, vertical cutter and mixers, and dish/pot washing areas to minimize slip hazards from water on the floor

## ***Material Handling***

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7. Specify adjustable or variable height and depth counters to accommodate varying sizes and designs of soda, milk, and frozen yogurt dispensing machines so they can be accessed easily during loading and cleaning
8. Design for the installation of gravity-assisted ice dispensing machines with portable totes (**see product recommendation sheet for product details**)
9. Installation of electrical, plumbing, and drainage systems (floor troughs with suspended, non-skid grating) must accommodate placement of ice machines
10. Locate ice machines close to where ice is used most frequently
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## Design Guidelines Appendix

### Space Requirements

#### *Aisle Space*

Space Description	Aisle Width
Single aisle with limited equipment	3.0 feet
Double aisle with limited equipment	4.5 feet
Single aisle with protruding equipment	4.5 feet
Double aisle with protruding equipment	6.0 feet
Aisle with little traffic	4.0 feet
Aisle with major traffic	6.0 feet

#### *Storage Space*

Type of Food Operation	Dry Storage*	Paper/Cleaning Supplies	Refrigerated Storage
Fast Food	50-125 square feet	60-100 square feet	90-120 square feet
Small Restaurant	100-150 square feet	75-120 square feet	120-150 square feet
Medium Restaurant or Small Institution	200-300 square feet	120-175 square feet	180-240 square feet
Large Restaurant or Medium Institution	400-1000 square feet	175-250 square feet	240-400 square feet
Large Institution with simple menu	1000-2500 square feet	250-300 square feet	400-600 square feet
Large Institution with complex menu, catering facilities, snack bars	3000+ square feet	300+ square feet	600-900 square feet

\*Additional space for staging product should also be considered.

#### *Kitchen and Dining Room Size*

Type of Food Operation	Meals per Day	Dining Room Size	Kitchen Size
Restaurant, table service, 100 seats	1000	1400 square feet	1300 square feet
Restaurant, table service, 175 seats	1800	2625 square feet	2000 square feet
Hospital, cafeteria, and 200-bed tray service	600	2250 square feet	2300 square feet
College cafeteria, 350 seats	1400	4200 square feet	1500 square feet
University cafeteria and catering	2400	5625 square feet	2530 square feet
Coffee shop, 100 seats	800	1225 square feet	850 square feet

### ***Bakery Size***

<b>Number of Seats in the Facility</b>	<b>Limited Baking*</b>	<b>Extensive Baking**</b>
Under 50	40 square feet	80 square feet
50-100	100 square feet	150 square feet
100-175	250 square feet	400 square feet
175-250	300 square feet	600 square feet
250-500	400 square feet	800 square feet
More than 500	600 square feet	1400 square feet

\*Limited baking includes rolls, cobblers, sheet cakes, and a few specialty desserts

\*\*Extensive baking includes a variety of baked goods such as pies, cakes, pastries, doughnuts, rolls, loaf bread, and extensive specialty products

### ***Warewashing***

<b>Type of Dish System</b>	<b>Dishes Per Hour</b>	<b>Square Feet</b>
Single-tank Dishwasher	1500	250
Single-tank Conveyor	4000	400
Two-tank Conveyor	6000	500
Flight-type Conveyor	12000	700

# Food Preparation



## Risk Services Best Practices Bulletin

### Food Preparation

*Presented by Office of the President Risk Services – May 2012*



Throughout the UC system, dining staff are among the highest occupational groups at risk for injury. Their high frequency and severity of injury is due to the physical nature of their work that often involves awkward postures, repetition of motion, and forceful exertion.

The following Best Practices are offered to guide those responsible for supervising and/or ensuring the health and safety of these dining service workers.

### **Best Practices**

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Food Preparation involves a variety of repetitive physical tasks. To reduce fatigue and risk of injury, the following are recommended:

- Use pre-cut or pre-peeled foods
- Use of automated equipment for repetitive tasks
- Complete food preparation in advance during slow periods to reduce fatigue during peak hours

### **Chopping, cutting, and slicing**

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- Use pre-cut food products whenever possible
- Use automated equipment whenever possible (**see product recommendation sheet**)
- NSF Certified height adjustable cutting surfaces are preferred over fixed height tables
- When height-adjustable work surfaces are not available, encourage workers to modify work surface height through temporary modifications (i.e. use inverted baking pan under cutting board to raise work surface or provide lower work surfaces, such as a cart, for shorter workers).
- The use of electric knives can reduce the force required to cut certain foods. Proper training and safe operations is important to minimize risk of cuts.
- Ensure knives or cutting tools are sharpened regularly and frequently
- Use an ergonomic serrated knife for slicing fruit, bread, and ribs (**see product recommendation sheet**)

- Cut resistant gloves should be worn whenever these tasks are performed and when cutting equipment is cleaned by hand

### **Peeling**

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- Use pre-peeled food products wherever possible
- Use automated peeling equipment wherever possible (**see product recommendation sheet**)

### **Stirring**

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- Consider using powered stirring equipment when stirring thick or viscous liquids (**see product recommendation sheet**)
- Consider using a smaller, light-weight spatula when stirring vegetables in a wok (**see product recommendation sheet**)
- Stirring tasks should be performed below shoulder height
- When possible, consider using mixing bowls or kettles with automated stirring paddles (**see product recommendation sheet**)

### **Opening Containers**

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- Hand-crank, mounted can-openers provide reliable and efficient service. The design or placement of the opener should allow can to be opened without having to manually hold the weight of the can.
- Heavy duty electric or motorized can-openers are acceptable (**see product recommendation sheet**) but may require more frequent maintenance
- Consider using larger can sizes on frequently used products to reduce the frequency of can opening tasks
- Use appropriate openers for the size of cans
- For opening jars or containers with plastic lids, consider use of assistive devices to reduce the forceful exertions of these repetitive tasks (**see product recommendation sheet**)
- Whenever possible, use a scissor lift table for lifting heavy containers (i.e. when pouring 6 gallons of milk into cooking vessels) (**see product recommendation sheet**)

### **Scooping**

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Scooping tasks are performed in a wide variety of serving applications. Use the most appropriate tool for the particular task involved.

- Match serving size to scoop size to minimize repetitive motions
- For heavy scooping tasks (i.e. transferring soup or chili from kettle to serving containers), limit scoop size to a volume of 1 quart

- Consider using a scoop with a trigger handle for sticky foods (i.e. sticky rice)
- Regarding ice cream:
  - Maintain ice cream scoops in heated water trough between uses
  - Use a scoop without a trigger on handle (to reduce repetitive grasping and squeezing)

### **Baking, Grilling and Cooking**

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- Use pre-mixed dough or pre-made dough products
- Use automated tools for baking tasks whenever possible. Consider use of any or all of the following (see **product recommendation sheet**):
  - Automatic mixers
  - Automatic dough dividers
  - Automatic dough roller or sheeter
  - Cookie machine/ pie crust maker/ pizza dough stretcher
  - Bread slicer
- Use a light-weight pizza paddle (see **product recommendation sheet**)
- Establish team-lift procedures for lifting heavy or large bakery items into/out of ovens
- Cooking pots that tilt allow for easier cleaning
- Pasta
  - Use automated (timed) pasta cooker, with basket lifter and separate rinse tank, to reduce lifting strain while transferring product (see **product recommendation sheet**)
  - If pasta is manually prepared, use team lifts to move heavy loads
- Sushi
  - Use automated sushi maker and rice tumbler (see **product recommendation sheet**)
  - Use automated dicer for cutting vegetables
  - Use automatic cutting machine for cutting sushi rolls (see **product recommendation sheet**)

### **Use of tilt skillets**

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- Use the tilting feature during cleaning of the equipment. It is not practical for moving cooked product into serving containers.
- Size (capacity) of tilting skillets should be compatible with anticipated output of prepared foods

### **Food Preparation Areas – General Considerations**

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- Coordinate the menus daily – consider time consuming and fatiguing tasks to manage complexity of preparation
- Anti-fatigue mats (with a beveled edge) should be used at food-prep tables, counters or cook areas. The mats should adequately match the dimension of the floor area where prolonged standing is required.

- Place hooks next to warmers to hang hot gloves or oven mitts for use when pulling trays out of warmers
- Purchase lighter weight serving containers – ceramic containers are heavy and more difficult to grasp

## **Equipment**

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Selecting the most appropriate equipment is an important decision. Prior to purchasing:

- Contact the campus ergonomist to help with the selection process
- Include dining staff in the selection process
- Arrange for demonstration of product by manufacturer or distributor
- Refer to the Ergonomics Recommended Product Sheet for applications and recommendations
- Pilot the preferred equipment for a minimum two–week trial period

During the pilot period, consider the following:

- Adjustability, size and weight of equipment to accommodate wide range of body types
- Appropriate sized casters and swivel design to allow for easy rolling and maneuverability
- Location of controls and ease of operation
- Storage and transporting needs
- Equipment maintenance and replacement parts
- Battery life and charging time
- Need for back-up equipment

## **Training**

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Initial training should be provided for new employees within the first 30 days and annually thereafter. Training is best provided in small groups with the involvement of supervisors, leads, ergonomists and vendors.

Training should include:

- Hands-on performance of job tasks and related activities
- Hands-on practice when new tools, equipment, or procedures are introduced to the workforce
- Equipment use, maintenance, storage, safety procedures and use of personal protective equipment (PPE) as required
- Instructions on ergonomic practices focusing on the following:
  - practicing neutral postures
  - safe lifting, carrying, and pushing techniques
  - proper body mechanics
- Verbal and/or written materials to accommodate non-English speaking workers as well as visual aids (e.g., pictures, charts, videos) of actual tasks in the workplace
- Sufficient opportunity for questions

## **Work and Staffing Guidelines**

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Work and staffing guidelines ensure that employees are adequately trained and assigned reasonable workloads. Guidelines include:

- Staff levels that provide adequate coverage to complete assigned work tasks
- Staff levels to avoid overtime
- Back-up staffing to accommodate unplanned absences
- Use of task and job rotation to limit repetition and fatigue
- Use of teams for heavy lifting and moving tasks
- Pre-shift exercises to warm up muscles to prepare for work
- Frequent rest breaks
- Implementation and support of a work hazard notification system to identify ergonomic problems



Environment, Health, and Safety

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Oakland, California 94607-5200

## Dining Product Recommendations

Task: Opening food container lids

Equipment: Assistive device to open plastic lids

	<b>Criteria:</b>	Reducing strain on the hand and wrist while opening food containers	
	<b>Application:</b>	Opening food container pail lids	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
TableCraft	EZ Pail Opener	<b>PRO:</b> <ul style="list-style-type: none"> <li>Improves wrist posture and reduces strain while opening plastic lids</li> </ul>	<b>CON:</b> No cons noted
	<b>Approximate Cost:</b>	\$20.99	
	<b>For more information:</b>	Robert Wachter, UCD <a href="mailto:rawachter@ucdavis.edu">rawachter@ucdavis.edu</a>	
<b>URL:</b>	<a href="http://www.chefsfirst.com/RestaurantEquipment-Pail-TableCraft-p/tcp15.htm">http://www.chefsfirst.com/RestaurantEquipment-Pail-TableCraft-p/tcp15.htm</a>		



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## Dining Product Recommendations

Task: Food Preparation  
Automated Equipment – Sushi

	<b>Criteria:</b>	Automated sushi preparation	
	<b>Application:</b>	Automate process of preparing sushi to eliminate repetitive motion injuries	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Autec Shari Mixer	ASM770A	<b>PRO:</b> <ul style="list-style-type: none"> <li>• High production rice mixer and cooler</li> <li>• Simple to operate</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Limited use with rice only. Cannot use with other food products</li> <li>• Must disassemble to clean</li> </ul>
	<b>Approximate Cost:</b>	\$15,000	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a> Kristie Elton, UCR <a href="mailto:kristie.elton@ucr.edu">kristie.elton@ucr.edu</a>	
<b>URL:</b>	<a href="http://www.autec-usa.com/products/sharimakers.html">http://www.autec-usa.com/products/sharimakers.html</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Autec Maki Maker	ASM860A	<b>PRO:</b> <ul style="list-style-type: none"> <li>• High production (up to 450 rolls per hour)</li> <li>• Reduces repetitive motions to make sushi rolls</li> <li>• Produces consistent product</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Must disassemble to clean</li> </ul>
	<b>Approximate Cost:</b>	\$18,000	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a> Kristie Elton, UCR	

	<a href="mailto:kristie.elton@ucr.edu">kristie.elton@ucr.edu</a>
<b>URL:</b>	<a href="http://www.autec-usa.com/products/norimakimakers.html">http://www.autec-usa.com/products/norimakimakers.html</a>



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## Dining Product Recommendations

Task: Food Preparation

Equipment: Slicers, Cutters, Tenderizers, Openers

	<b>Criteria:</b>	Automated equipment to reduce repetitive motions and force during food preparation	
	<b>Application:</b>	Automate cutting, slicing, opening cans, and other repetitive food preparation tasks	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Biro Sir Steak Meat Tenderizer/Cuber	Pro 9	<b>PRO:</b> <ul style="list-style-type: none"> <li>Reduces cooking time.</li> <li>Eliminates repetitive motion to tenderize or cube meats and poultry</li> <li>Relatively compact, can be used on counter (20" x 20" space)</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Time consuming to clean and sanitize</li> <li>Difficult to clean, exposed sharps</li> <li>Must follow specific operating instructions to be effective.</li> </ul>
	<b>Approximate Cost:</b>	\$2,000	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.birosaw.com/products/tenderizers.html">http://www.birosaw.com/products/tenderizers.html</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Hobart Buffalo Chopper	84186	<b>PRO:</b> <ul style="list-style-type: none"> <li>Durable</li> <li>Reduces repetitive motion required to cut and chop meats, vegetables and fruits</li> <li>Improves production time</li> <li>Improves consistency</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Must be taken apart to clean and sanitize after use</li> </ul>

		of cut products	
	<b>Approximate Cost:</b>	\$7,500	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.hobartcorp.com/products/food-prep/choppers-grinders/">http://www.hobartcorp.com/products/food-prep/choppers-grinders/</a>		
Make	Model	Comments (Pros and Cons)	
Grote MultiSlicer	713-SS	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>Cuts meats, cheeses, vegetables, fruits and bread products.</li> <li>Can cut whole meat products such as turkeys and hams.</li> <li>Bulk slices, stacks and shingles into portions.</li> <li>Improves consistent product size.</li> </ul>	<ul style="list-style-type: none"> <li>Cannot cut frozen foods.</li> <li>Very large floor print (3' x 4 1/2')</li> <li>Meat is inserted on top, step stool is required for shorter work force to insert product</li> <li>Cleaning of "band saw" blade is challenging</li> </ul>
		<b>Approximate Cost:</b>	\$ 62,000
		Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.grotecompany.com/equipment/slicers/multislicer-713-ss/">http://www.grotecompany.com/equipment/slicers/multislicer-713-ss/</a>		
Make	Model	Comments (Pros and Cons)	
Edlund Electric Tomato Slicer	350 Series	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>Slices tomatoes, soft fruits and vegetables</li> <li>Provides consistent size products</li> <li>Can be washed in dishwasher</li> <li>Compact size (11 1/2" x 17")</li> </ul>	None reported
		<b>Approximate Cost:</b>	\$1,700
		Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.edlundco.com/pdf/kiElecSlicers.pdf">http://www.edlundco.com/pdf/kiElecSlicers.pdf</a>		
Make	Model	Comments (Pros and Cons)	
Edlund Electric Can Opener	203- 2 speed opener 266- Single speed opener	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>2 speed opens variety of can shapes/sizes</li> <li>Compact</li> </ul>	<ul style="list-style-type: none"> <li>Single speed Model 266 limited to large cans</li> <li>Large cans can overflow when opened</li> <li>Very slow</li> <li>Not NSF certified</li> </ul>
		<b>Approximate Cost:</b>	\$500-550
		Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	

**URL:** <http://www.edlundco.com/pdf/ElecCanOpener.pdf>

<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Edlund Electric Can Opener	270 NSF	<b>PRO:</b> <ul style="list-style-type: none"><li>• 2 speeds open variety of can shapes/sizes</li><li>• Lever handle requires minimum effort to operate</li><li>• Compact</li><li>• Easy to clean</li><li>• Application – open between 100-200 cans/day</li><li>• Mounting bar available to allow opening of cans &gt;#10</li></ul>	<b>CON:</b> <ul style="list-style-type: none"><li>• Large cans can overflow when opened</li><li>• Expensive</li></ul>
	<b>Approximate Cost:</b>	\$1,000	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a> Janice Fletcher, UCSDMC <a href="mailto:jfletcher@ucsd.edu">jfletcher@ucsd.edu</a>	
<b>URL:</b>		<a href="http://www.edlundco.com/pdf/ElecCanOpener.pdf">http://www.edlundco.com/pdf/ElecCanOpener.pdf</a>	



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## Dining Product Recommendations

Task: Mixing heavy, viscous food  
Equipment: Portable electric mixer

	<b>Criteria:</b>	Reducing hand and wrist strain from manual mixing	
	<b>Application:</b>	Mixing viscous foods	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Bermixer Electrolux-Dito	B3000	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Portable and light weight</li> <li>• Multiple attachments available</li> <li>• Promotes neutral wrist position</li> <li>• Works well with large batches of viscous foods, increases productivity</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Attachments must be purchased separately</li> </ul>
	<b>Approximate Cost:</b>	\$900	
	<b>For more information:</b>	Robert Wachter, UCD <a href="mailto:rawachter@ucdavis.edu">rawachter@ucdavis.edu</a>	
<b>URL:</b>	<a href="http://professional.electroluxusa.com/index.asp?o=p&amp;l=BC&amp;c=0">http://professional.electroluxusa.com/index.asp?o=p&amp;l=BC&amp;c=0</a>		



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## Dining Product Recommendations

Task: Loading bulk food into slicer/dicer

Equipment: Lift cart

	<b>Criteria:</b>	Eliminate heavy lifting of bulk food items	
	<b>Application:</b>	Lifting bulk foods into food slicer, dicer, or shredder	
<b>Make</b>			
<b>Model</b>		<b>Comments</b> (Pros and Cons)	
Dandy	UDL-250	<b>PRO:</b> <ul style="list-style-type: none"> <li>• 550 lb. capacity</li> <li>• Locking brakes</li> <li>• Adjustable height range of 9.5-31.5"</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Heavy, not easy to maneuver</li> <li>• Lifts only, does not tilt</li> </ul>
	<b>Approximate Cost:</b>	\$825	
	<b>For more information:</b>	Robert Wachter, UCD <a href="mailto:rawachter@ucdavis.edu">rawachter@ucdavis.edu</a>	
<b>URL:</b>	<a href="http://www.southworthproducts.com/content264.html">http://www.southworthproducts.com/content264.html</a>		
<b>Make</b>		<b>Comments</b> (Pros and Cons)	
<b>Model</b>		<b>Comments</b> (Pros and Cons)	
Global Equipment	168080	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Prevents employees from having to lift, twist and turn above shoulder level</li> <li>• 600-pound capacity</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Heavy, not easy to maneuver</li> <li>• Need to lift at the precise angle for removal or delivery to</li> </ul>

		<ul style="list-style-type: none"> <li>• Tilts to a 45-degree angle</li> <li>• Adjustable height range of 14.5” to 36.3” in the front and 59.5” in the rear</li> <li>• Lifts and tilts bulk food product for ease of loading into slicer, shredder, etc.</li> </ul>	the feeder
	<b>Approximate Cost:</b>	\$600	
	<b>For more information:</b>	Robert Wachter, UCD <a href="mailto:rawachter@ucdavis.edu">rawachter@ucdavis.edu</a>	
<b>URL:</b>	<a href="http://www.globalindustrial.com/p/material-handling/lift-tables/mobile-scissor/mobile-li-tilt-scissor-li-table-600-lb-capacity">http://www.globalindustrial.com/p/material-handling/lift-tables/mobile-scissor/mobile-li-tilt-scissor-li-table-600-lb-capacity</a>		



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## Dining Product Recommendations

Task: Processing Dough  
Equipment: Dough Divider

	<b>Criteria:</b>	Automates the division of dough	
	<b>Application:</b>	Automated dough processing	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Scale-O-Matic	AM S-301	<b>PRO:</b> <ul style="list-style-type: none"> <li>Divides up to 2000 pieces/hour</li> <li>Divides between 1-32oz</li> <li>Can be operated by one person</li> <li>Eliminates need to hand cut and thus repetition</li> <li>Portable</li> <li>Rounder is gravity fed to reduce mechanical breakdowns</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Hopper is on top and requires lifting of up to 80lbs (dough should be cut and set in hopper first)</li> <li>Requires 220V electrical</li> <li>Hard to clean</li> </ul>
	<b>Approximate Cost:</b>	\$29,000	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.bakeryequipment.com/bakery-equipment/productDetail.asp?ProductID=13924">http://www.bakeryequipment.com/bakery-equipment/productDetail.asp?ProductID=13924</a>		



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## Dining Product Recommendations

Task: Piping

Equipment: Depositor

	<b>Criteria:</b>	Automates the piping process, replaces a pastry bag	
	<b>Application:</b>	Automates piping such as batter, fruit fillings, frostings, creams and custards	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Unifiller	Universal 1000i Depositor	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Mobile</li> <li>• Can be used for liquids such as batters, fruit fillings, frostings, creams and custards, mashed potatoes</li> <li>• Increases productivity</li> <li>• Eliminates pastry bag</li> <li>• Air powered, not electrical</li> <li>• Height adjustable</li> <li>• Foot pump is easy to use</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Training is an extra cost</li> <li>• Cleaning can be challenging</li> <li>• Need a compressed air source to run it</li> </ul>
	<b>Approximate Cost:</b>	\$20,000	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.unifiller.com/bakery-machines/pro-1000i-depositor">http://www.unifiller.com/bakery-machines/pro-1000i-depositor</a>		

# Material Handling



## Risk Services Best Practices Bulletin Material Handling in Foodservice

*Presented by Office of the President Risk Services – May 2012*



Throughout the UC system, dining staff are among the occupational groups most at risk for injury. The high frequency and severity of injury is due to the physical nature of the work that often involves awkward postures, repetitive tasks and forceful exertion.

The following Best Practices are offered to guide those responsible for supervising and/or ensuring the health and safety of dining service workers.

### **Best Practices: Large Mixing Bowls**

Large mixing bowls present a hazard to many staff, especially bakers and pot washers. Large mixing bowls can weigh over 40 lbs, even when empty. Train staff to lift these items safely and to transport on carts from bakery to pot washing area.

- Use bowl trucks for moving and pushing bowls; avoid pulling with a kitchen towel or pushing with feet (**see product recommendation sheet**)
- Remove or reduce floor mats from the bakery area to decrease force needed to move mixing bowl dollies, bowl trucks, and automatic bowl lifters and tippers. Rather than mats, provide anti-fatigue insoles to employees.
- If there is adequate space, use an automatic mixing bowl lifter and tipper (**see product recommendation sheet**)
- When it is necessary to lift a large bowl without a mechanical bowl lifter, always use 2 people who have been trained in safe lifting to lift and move the bowl (**see Safe Manual Material Handling Information sheet, Appendices C and D**)
- Ensure that casters/wheels on bowl dollies and trucks are maintained regularly
- Use the golfer stance technique when scooping dough and other food from the large bowls to the baking counter or into smaller bowls, unless the large bowl can be safely lifted (**see Safe Manual Material Handling Information sheet, Appendices C and D**)

## **Best Practices: Using Equipment with Casters and Wheels**

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- Select carts that function well for the intended task. Discuss the following issues with a knowledgeable sales person to make the best selection of materials for the cart and for casters or wheels:
  - the floor surface (tile, cement, mats, ramps, grass, sand)
  - the environment (wet, chemicals, grease, food particles, indoors/outdoors, cooler/freezer)
  - the weight of the load
  - the narrowest aisle width measurement where the cart will be used
- Establish a regular scheduled inspection and cleaning and maintenance program for all equipment (carts, hand trucks, pallet jacks, etc.) that have tires or casters, especially for carts that are used daily. It is recommended this be performed at a minimum once every 3 months.
- Extra force is required to push and pull carts if:
  - they are damaged
  - the tires are under-inflated
  - the casters are not lubricated or cleaned
  - flat spots develop from sitting too long
- Train staff to limit the height a cart or transit can be stacked (no greater than chin height) to avoid awkward positions used to see around the cart while pushing
- Limit the weight to the load rating of the cart. Permanently mark the load rating directly on the cart, in a highly visible location.
- Consider carts that have vertical handles since they will fit a larger number of users. If possible, modify carts by adding vertical handles.
- Select height adjustable spring or scissor carts to allow the user to load/unload at preferred heights
- Place heavier items at the base of tall transits for better stability. This lowers the center of gravity and keeps the transit from tipping over.

## **Best Practices: Loading Beverage and Frozen Yogurt Containers**

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Loading heavy items into dispensing machines presents significant risks. For example, 6 gallon milk cartons weigh over 50 lbs and require awkward postures to lift and insert into the dispenser. Space is often limited, further increasing the risk. Regardless of the size and weight of the container, lifting above shoulder height should be avoided.

### ***Soda Syrup Containers***

- Arrange to have vendors deliver soda syrup containers to shelves where they will be stored, or staged as close to them as possible to minimize the amount of handling required by staff
- Arrange storage and vending racks so containers are stored on middle shelves, between knee and chest height
- Maintain enough clearance around dispensing rack to allow cart access and sufficient space for staff to disconnect and connect hoses using safe postures
- Train staff to always transport these containers by using carts
- Assign 2 people to this task if one person is not able to do it safely

### *Milk Containers and Cartons*

- Arrange to have vendors deliver milk cartons to the cooler where they will be stored, or staged as close to them as possible to minimize the amount of handling required by staff
- Store milk cartons in cooler on middle shelves, between knee and chest height
- Train staff to always use carts to transport milk containers
- Maintain sufficient space in the cooler for safe transfer from shelf to a cart
- Maintain enough clearance around milk dispenser to allow the worker to:
  - use a cart (and not carry)
  - use a step stool or safety ladder as needed
  - safely disconnect and connect hoses without using awkward postures
- Use 2 people if one person is not able to do this task safely
- An alternative option to 6-gallon bagged and boxed milk containers is to use milk delivered in 1 gallon jugs to minimize weight when handling. Milk can be dispensed from the jugs directly by placing them in appropriate small refrigerator on the beverage serving area.

### *Soft Serve Frozen Yogurt Products*

- Train staff to use carts to transport frozen yogurt ingredients
- Maintain enough clearance around frozen yogurt machine to allow the worker to:
  - use cart (and not carry)
  - use a step stool or safety ladder as needed
  - safely disconnect and connect hoses without using awkward postures
- Avoid placing the machine on risers so that the top of the machine is maintained at a comfortable height to avoid reaching above shoulder height
- Place the powders and water into 1- or 2- gallon containers to reduce product weight when pouring them into the machine
- Use 2 people if one person is not able to do this task safely

### **Best Practices: Using Ice**

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- Whenever possible, limit the amount of ice that must be collected, transported, loaded and cleaned up to reduce material handling. As a sustainable practice, this conserves water and energy as well.
  - Avoid the use of ice for aesthetic purposes. Refrigerated systems (e.g. salad bars) should have food containers that fit well to avoid the need for additional ice.
  - Use beverage dispensers that have ice-makers attached to them if the ice is able to keep up with demand (**see product recommendation sheet**). Otherwise, use a beverage dispensing machine that does not require loading ice into the top of the machine.
  - Use gravity fed ice making systems that automatically drop ice into totes in carts to reduce material handling (**see product recommendation sheet**). Instruct staff to manually scoop ice when totes are completely filled. This reduces the weight when lifting the tote.
  - Tote systems need to be regularly maintained (replace handles and grips as needed and perform regular preventive maintenance to cart)

- Offer staff a choice of equipment made of acceptable food grade materials to load ice (ice shovels, scoops, etc.)
- Use containers with comfortable grips that hold the ice (grips for crutches can be used). Avoid using thin metal or plastic grips, such as those traditionally found on 5-gallon buckets.
- Instruct staff who load/unload ice to avoid filling containers above 10-15 lbs.
- Use a scissor type lift cart to load and unload ice (**see product recommendation sheet**) to minimize stooping, reaching and bending.

### **Best Practices: Removing Fat, Oil, and Grease (FOG)**

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Removing fat, oil, and grease from fryers to outdoor collection containers poses several risks, including burns and injuries to the back, shoulder and arms.

- Contract with a FOG (fat oil grease) removal vendor such as <http://www.darlingii.com/UsedOilStorage.aspx> that will safely remove used FOG from the fryer to their own collection containers for recycling. This increases staff productivity and reduces potential injury risk to kitchen staff and frees space on the back dock.
- If using a FOG vendor is not an option or a vendor cannot meet all of your used oil removal needs, purchase and use an automatic FOG removal machine.
  - Provide sufficient space (with an electric outlet for recharging) to park it adjacent to where it will be needed

### **Equipment**

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Selecting the most appropriate equipment is an important decision. Prior to purchasing:

- Contact the campus ergonomist to help with the selection process
- Include dining staff in the selection process
- Arrange for demonstration of product by manufacturer or distributor
- Refer to the Ergonomics Recommended Product Sheet for applications and recommendations
- Pilot the preferred equipment for a minimum two–week trial period

During the pilot period, consider the following:

- Adjustability, size and weight of equipment to accommodate wide range of body types
- Appropriate sized casters and swivel design to allow for easy rolling and maneuverability
- Location of controls and ease of operation
- Storage and transporting needs
- Equipment maintenance and replacement parts
- Battery life and charging time
- Need for back-up equipment

### **Training**

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Initial training should be provided for new employees within the first 30 days and annually thereafter. Training is best provided in small groups with the involvement of supervisors, leads, ergonomists and vendors.

Training should include:

- Hands-on performance of job tasks and related activities
- Hands-on practice when new tools, equipment, or procedures are introduced to the workforce
- Equipment use, maintenance, storage, safety procedures and use of personal protective equipment (PPE) as required
- Instructions on ergonomic practices focusing on the following:
  - practicing neutral postures
  - safe lifting, carrying, and pushing techniques
  - proper body mechanics
- Verbal and/or written materials to accommodate non-English speaking workers as well as visual aids (e.g., pictures, charts, videos) of actual tasks in the workplace
- Sufficient opportunity for questions

## **Work and Staffing Guidelines**

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Work and staffing guidelines ensure that employees are adequately trained and assigned reasonable workloads. Guidelines include:

- Staff levels that provide adequate coverage to complete assigned work tasks
- Staff levels to avoid overtime
- Back-up staffing to accommodate unplanned absences
- Use of task and job rotation to limit repetition and fatigue
- Use of teams for heavy lifting and moving tasks
- Pre-shift exercises to warm up muscles to prepare for work
- Frequent rest breaks
- Implementation and support of a work hazard notification system to identify ergonomic problems

## **References**

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- 2) Occupational Safety and Health Administration. (2004). *Guidelines for Retail Grocery Stores: Ergonomics for the Prevention of Musculo-skeletal Disorders*. <http://www.osha.gov/ergonomics/guidelines/retailgrocery/retailgrocery.html#bakery>.
- 3) National Food Service Management Institute, The University of Mississippi. (2012). *Section Two: Making Specific Equipment Choices*. [www.nfsmi.org](http://www.nfsmi.org).
- 4) Washington State Department of Labor and Industries. *Ergonomics Ideas Bank*. <http://www.lni.wa.gov/Safety/Topics/ReduceHazards/ErgoBank/default.asp>.
- 5) Jansen, J., Hoozemans, M., et al. *Evaluation of ergonomic adjustments of catering carts to reduce external pushing forces* *Applied Ergonomics* 33 (2002) 117-127.
- 6) Darcor Casters and Wheels. (2012). *Caster Selection Criteria: How to Select the Perfect Caster and Wheel*. <http://www.darcor.com/technical/caster-selection-criteria/>.
- 7) Caster Maintenance. eHow. [http://www.ehow.com/way\\_5745328\\_caster-maintenance.html](http://www.ehow.com/way_5745328_caster-maintenance.html).



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## Dining Product Recommendations

Task: Loading, unloading and Cleaning Salad Bars

Equipment: No-Ice Salad Bar

	<b>Criteria:</b>	Refrigerated salad bars (requiring no ice)	
	<b>Application:</b>	Self-serve salad bars	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
VIAP Vienna Series	#VIAP-SC	<b>PRO:</b> <ul style="list-style-type: none"> <li>Counters are customizable to reduce horizontal reach</li> <li>Evaporator features a lift-up mechanism that allows the inner pan to be easily rinsed clean</li> <li>Saves time, water, labor, waste and energy not to load up, deliver, and then remove/clean out ice</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Maximum length available is 60 inches</li> <li>People like to see ice in salad bars for reassurance and appearance</li> <li>Perception that foods are not kept as cold when ice is not present</li> <li>Must use containers that fit precisely – otherwise foods will not be well chilled. May limit menu offerings</li> </ul>
	<b>Approximate Cost:</b>	(depends on size and customization)	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:Burt@ehs.ucla.edu">Burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://rpiindustries.com/">http://rpiindustries.com/</a>		



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## Dining Product Recommendations

Task: Collecting and Transporting Ice

Equipment: Ice Storage and Transport System

	<b>Criteria:</b>	Gravity-assisted ice storage and transport system	
	<b>Application:</b>	Loading and transporting ice from kitchen to areas of use	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Follett	ABICETOTP Ice Transport Totes with handles. Fits SmartCART 240 25 lb capacity (set of 6) (Match with ICE BIN Model # ITS1350sG-60)	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>• Uses gravity to remove ice from the bin storage section to drop directly into SmartCart totes</li> <li>• SmartCart holds 240 lbs without totes; 150 lbs with totes</li> <li>• Totes eliminate shoveling of ice from the cart</li> <li>• Ice flow from bottom of bin provides fresher, cleaner delivered ice</li> <li>• Continuous ice turn over eliminates stale ice with off-taste and odor</li> </ul>	<ul style="list-style-type: none"> <li>• Tote handles may break after 3-4 years of use</li> <li>• Totes weigh 25+ lbs when full</li> </ul>
		<b>Approximate Cost:</b>	Ice Bin: \$9,000-\$10,000 Ice Transport Totes: \$600-\$700
	<b>For more information:</b>	<b>South:</b> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://follettice.com/default.aspx">http://follettice.com/default.aspx</a>		



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## Dining Product Recommendations

Task: Moving and Preparing Food; Holding Food Prep Equipment

Equipment: Height Adjustable Mobile Carts/Work Stations and Folding Cart

	<b>Criteria:</b>	Moving dining equipment or product; providing height adjustability at work area for dining staff	
	<b>Application:</b>	Hydraulic stainless steel height adjustable mobile carts provide clean work surfaces for food prep or equipment for staff of different heights. The carts can be moved out of the way when not needed.	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Unidex	SS PH	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>• Multi-functional lifter, transporter, adjustable height work surface</li> <li>• Standard load capacities of 250 and 500 pounds</li> <li>• Large, stable platform (24x24) is standard but can be customized</li> <li>• Adjustable height range 28" to 42" (some customization available)</li> <li>• Large locking casters provide easy mobility over uneven surfaces.</li> <li>• Custom drawers, extensions, lips and work holders available</li> <li>• Foot pedal folds up when not in use</li> <li>• Design allows for foot rests for standing work</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive</li> <li>• Takes up some space</li> <li>• Not certified by NSF</li> </ul>
		<b>Approximate Cost:</b>	\$2500 - \$5000 (depending on customization)
<b>For more information:</b>		<b>South:</b> Ginnie Thomas, UCSB	

		<a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://www.unidex-inc.com/">http://www.unidex-inc.com/</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Carlisle	SBC1521 16"x29"x36" Fold N Go Folding Utility Cart	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Can be quickly unfolded and folded for storage</li> <li>• Holds up to 116 lbs. per shelf</li> </ul>	<b>CON:</b> None reported
	<b>Approximate Cost:</b>	\$330	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a>	
<b>URL:</b>	<a href="http://www.webstaurantstore.com/carlisle-sbc1521-16x29x36-fold-n-go-folding-utility-cart/271SBC1521%20%20BK.html">http://www.webstaurantstore.com/carlisle-sbc1521-16x29x36-fold-n-go-folding-utility-cart/271SBC1521%20%20BK.html</a>		



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## Dining Product Recommendations

Task: Moving large mixing bowls  
Equipment: Mixing bowl truck

	<b>Criteria:</b>	Tool with handle for moving large, heavy mixing bowls	
	<b>Application:</b>	Moving heavy mixing bowls from mixers to prep areas	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Hobart Bowl Truck	HL80 (depends on size of bowl- bowl truck adaptors available)	<b>PRO:</b> Handle on truck allows baker to push bowl without twisting or bending	<b>CON:</b> <ul style="list-style-type: none"> <li>The bowl needs to be lifted onto/off of the truck; it is not lifted by the truck</li> <li>Wheels/casters need to be maintained</li> </ul>
	<b>Approximate Cost:</b>	\$350 plus S&H	
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://www.globequipment.com/Commercial-Kitchen-Equipment/Cooking-Equipment/Mixers/Truck-Hl60">http://www.globequipment.com/Commercial-Kitchen-Equipment/Cooking-Equipment/Mixers/Truck-Hl60</a>		



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## Dining Product Recommendations

Task: Lifting and Tilting Large Mixing Bowls  
Equipment: Automatic Mixing Bowl Lifter

	<b>Criteria:</b>	Automate lifting and tipping heavy mixing bowls	
	<b>Application:</b>	Lifting and tilting large mixing bowls in bakery and pot washing area	
Make	Model	Comments (Pros and Cons)	
Picard	LP280 Bowl Lift Series	<b>PRO:</b> <ul style="list-style-type: none"> <li>Eliminates lifting heavy mixing bowls</li> <li>Only one person needed to use machine</li> <li>Rechargeable, long lasting 12-volt battery. Lifts 50 to 60 times before recharging.</li> <li>Built-in battery charger or use direct power.</li> <li>Fit 60, 80 and 140-quart Hobart bowls</li> <li>Telescoping mast allows for transport through doorways</li> <li>Stainless steel</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Staff require training to use equipment and recognize benefits</li> <li>Switch is in a vulnerable location and can easily be broken off</li> <li>Requires storage space and electric outlet for charging</li> <li>Staff may perceive using the equipment takes more time</li> <li>Mats should be removed in bakery so that lifter does not get stuck (provide shoe insoles for cushioning)</li> </ul>
	<b>Approximate Cost:</b>	\$5000	
	<b>For more information:</b>	Mike Williams, UCLA <a href="mailto:mwilliams@ehs.ucla.edu">mwilliams@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.picardovens.com/commercial-ovens/products/Other-Products/lp-280-picard-bowl-lift.aspx">http://www.picardovens.com/commercial-ovens/products/Other-Products/lp-280-picard-bowl-lift.aspx</a>		



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## Dining Product Recommendations

Task: Providing ice to beverage dispensers

Equipment: Automatic Ice maker

	<b>Criteria:</b>	Automate the process and eliminate material handling (loading, unloading, lifting, carrying containers filled with ice cubes)		
	<b>Application:</b>	Providing ice to beverage dispensers		
<b>Comments</b> (Pros and Cons)				
<b>Make</b>	<b>Model</b>	<b>PRO:</b>	<b>CON:</b>	
Hoshinzaki	KMD-850M_H	<ul style="list-style-type: none"> <li>Air cooled, water cooled, remotely cooled models</li> <li>Completely automates the provision of ice</li> </ul>	<ul style="list-style-type: none"> <li>Must be sufficient room above dispenser to install</li> <li>May not be able to keep up with high volume and may need manual loading of ice at peak times</li> </ul>	
		<b>Approximate Cost:</b>	\$6,700.00	
		<b>For more information:</b>	Brian MacDonald, UCSC <a href="mailto:Bmacdon1@ucsc.edu">Bmacdon1@ucsc.edu</a>	
<b>URL:</b>	<a href="http://www.hoshizakiamerica.com">http://www.hoshizakiamerica.com</a>			
<b>Comments</b> (Pros and Cons)				
<b>Make</b>	<b>Model</b>	<b>PRO:</b>	<b>CON:</b>	
Follett	Symphony Series	<ul style="list-style-type: none"> <li>Ice is automatically made above machine, saving staff exertion and time</li> </ul>	<ul style="list-style-type: none"> <li>If machine is heavily used, may still need to be manually filled with ice to meet high demand</li> </ul>	

	<b>Approximate Cost:</b>	\$4,950
	<b>For more information:</b>	Janice Fletcher, UCSDMC <a href="mailto:jfletcher@ucsd.edu">jfletcher@ucsd.edu</a>
<b>URL:</b>	<a href="http://www.follettice.com/products/productDetails.aspx?pcId=8&amp;pscId=33&amp;plId=24">http://www.follettice.com/products/productDetails.aspx?pcId=8&amp;pscId=33&amp;plId=24</a>	

# Storeroom



## Risk Services Best Practices Bulletin

### Dining - Storeroom

*Presented by Office of the President Risk Services – May 2012*



Throughout the UC system, dining staff are among the occupational groups most at risk for injury. The high frequency and severity of injury is due to the physical nature of the work that often involves awkward postures, repetitive tasks and forceful exertion.

The following Best Practices are offered to guide those responsible for supervising and/or ensuring the health and safety of dining service workers who work in storerooms.

#### **Best Practices**

Develop vendor contracts to optimize work flow, reduce weight of products, and minimize number of times a product is handled by staff. Include provisions that specify vendors to:

- Schedule deliveries to reduce volume of materials delivered at one time, avoid busy work times, and reduce congestion
- Transport products to desired location in the storeroom, receiving area or alternative areas close to the storeroom
- Deliver products pre-sorted and organized for placement in specified locations using consistent procedures throughout all campus facilities
- Sort and stage products when possible
- Limit size of packaging of heavy items such as rice and meats to reduce the weight. Nothing should exceed 50 pounds.
- Identify weight and volume of products on invoices
- Coordinate vendor delivery training to promote an efficient and consistent process

Develop SOPs (Standard Operating Procedures) to standardize work practices, reduce waste, and optimize work flow

- Create consistent ordering processes to decrease stock rotation and minimize waste. Include input from executive chef, cooks and storeroom manager.
- Maintain consistent storeroom floor plan and storage procedures (i.e. organize products based on type, frequency of use, or recipe)
- Maintain consistent work procedures between dining facilities to optimize utilization of staff, and promote consistent vendor delivery practices

Organize storerooms to reduce lifting and postural demands on staff

- Provide adequate space to store products and allow use and storage of material handling equipment.
- Select shelving appropriate for products stored (**see product recommendation sheet**)
  - Provide durable, height adjustable shelving with lockable casters
  - Select depth of shelving to match size of products stored on shelf
  - Provide flat shelves to facilitate sliding of heavy bags, and lipless shelves to eliminate need to lift heavy products over lip
  - Provide corner shelving to optimize space and improve ability to reach products
  - Use specialty racks for products such as cans
- Store products based on type of product, weight, and frequency of use
  - Place lighter products on top and bottom shelves
  - Place heavy materials in the middle section of shelving (between chest and knee level) and at least 12 inches from the floor
  - Date items to facilitate ease of rotation of products when necessary (try to limit over-ordering of products to limit need to rotate)
  - Label shelves to improve organization and ability to retrieve products
- Store items in boxes in which they are received when possible. Cut off top of boxes to access products.
- Limit height of beverage and milk cases to avoid lifting above shoulder level
- Use material handling equipment and procedures to eliminate or reduce lifting demands on staff
  - Use electric forklifts, pallet jacks, hand trucks and carts to transport products to storeroom (**see product recommendation sheet**)
  - Use automated lifters to move product within the storeroom (**see product recommendation sheet**)
  - Provide doors and aisles that allow use of electric forklifts, pallet jacks and hand trucks for moving material into and around storerooms
  - Utilize ladders, step stools, and promote use of two person lifts for items above shoulder level (**see product recommendation sheet**)
  - Label heavy items with two person lift signage
- Provide employees with appropriate PPE (Personal Protective Equipment) for tasks (i.e. freezer jackets and gloves, aprons and safety glasses). Train staff in application, use and storage of PPE (**see product recommendation sheet**).

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## Equipment

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Selecting the most appropriate equipment is an important decision. Prior to purchasing:

- Contact the campus ergonomist to help with the selection process
- Include dining staff in the selection process
- Arrange for demonstration of product by manufacturer or distributor
- Refer to the Ergonomics Recommended Product Sheet for applications and recommendations

- Pilot the preferred equipment for a minimum two–week trial period

During the pilot period, consider the following:

- Adjustability, size and weight of equipment to accommodate wide range of body types
- Appropriate sized casters and swivel design to allow for easy rolling and maneuverability
- Location of controls and ease of operation
- Storage and transporting needs
- Equipment maintenance and replacement parts
- Battery life and charging time
- Need for back-up equipment

## **Training**

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Initial training should be provided for new employees within the first 30 days of hiring and annually thereafter. Training is best provided in small groups with the involvement of supervisors, leads, ergonomists and vendors.

Training should include:

- Hands-on performance of job tasks and related activities
- Equipment use, maintenance, storage, safety procedures and use of personal protective equipment (PPE) as required
- Instruction on safe postures and body mechanics
- Verbal and/or written materials to accommodate non-English speaking workers

## **Work and Staffing Guidelines**

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Work and staffing guidelines ensure that employees are adequately trained and assigned reasonable workloads. Guidelines include:

- Staff levels that provide adequate coverage to complete assigned work tasks
- Staff levels to avoid overtime.
- Back-up staffing to accommodate unplanned absences
- Back-up staffing for scheduled storekeeper absences
- Identify staff with authority to enter storerooms to manage flow of personnel and supplies.
- Schedule deliveries based on loading dock usage, staffing, size of storeroom and volume of supplies used. Avoid scheduling deliveries during peak work times
- Incorporate frequent rest breaks into work schedule.
- Organize work to promote task and job rotation to limit repetition and fatigue
- Organize work and placement of supplies to avoid double moving of items.
- Consider use of multi-person chain to move products to shelves.
- Mandate team-lifting concepts to lift and move heavy items.
- Promote pre-shift stretching/exercise program to warm up muscles to prepare for work
- Implement and support a work hazard notification system to identify ergonomic problems

## ***References***

- 1) Birchfield, John C. and Sparrowe, Raymond T. (2003). *Design and Layout of Foodservice Facilities*. Hoboken, New Jersey: John Wiley & Sons, Inc.
- 2) Eastman Kodak Company. (2004). *Kodak's Ergonomic Design for People at Work*. Hoboken, New Jersey: John Wiley & Sons, Inc.
- 3) Foodservice Research International. *An Investigation of Ergonomic Design and Productivity Improvements in Foodservice Production Tables*. Blackwell Publishing, 2005.
- 4) Kroemer, K.H.E. and Grandjean, E. (2005). *Fitting the Task to the Human, 5<sup>th</sup> Edition*. New York: Taylor & Francis.
- 5) Minnesota Department of Children, Families and Learning School of Food Service Musculoskeletal Injury Prevention Evaluation Tool, (2008).
- 6) Sander, Mark S. and Ernest J McCormick. (1993) *Human Factors in Engineering and Design, 7<sup>th</sup> Edition*. New York: McGraw-Hill.



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## Dining Product Recommendations

Location/Task: Storeroom

Equipment: Shelving/Racks

	<b>Criteria:</b>	Storage systems/racks for storage and retrieval of goods	
	<b>Application:</b>	Storage of variety of food supplies and stock	
<b>Make</b>			
<b>Model</b>		<b>Comments</b> (Pros and Cons)	
New Age Industrial (NAI)	1250	<b>PRO:</b> <ul style="list-style-type: none"> <li>Stores variety of can sizes (162 #10 and 216 #5)</li> <li>Facilitates retrieval and inventory of cans</li> <li>Mobile unit available</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Top shelves require reaching up to 72"</li> </ul>
	<b>Approximate Cost:</b>	\$1000.00	
	<b>For more information:</b>	Clyde Blackwelder, UCI <a href="mailto:cblackwe@uci.edu">cblackwe@uci.edu</a>	
<b>URL:</b>	<a href="http://www.newageindustrial.com/ProductDetail.aspx?ISC_Product=1250&amp;ISC_Category=Can Racks">http://www.newageindustrial.com/ProductDetail.aspx?ISC_Product=1250&amp;ISC_Category=Can Racks</a>		
<b>Make</b>			
<b>Model</b>		<b>Comments</b> (Pros and Cons)	
Metro	High Density Storage, Top-Track	<b>PRO:</b> <ul style="list-style-type: none"> <li>Overhead track facilitates cleaning of floors</li> <li>Requires less aisle space and facilitates ease of accessing products</li> <li>Increases storage space from 25-50%</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Requires more force to push versus standard shelving</li> <li>Lip design requires lifting of boxes/bags to retrieve</li> <li>Must limit weight loaded to promote ease of moving on tracks</li> </ul>
	<b>Approximate Cost:</b>	Cost dependent on size and design	
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	

<b>URL:</b> <a href="http://www.metro.com/catalog">http://www.metro.com/catalog</a>			
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
LogiQuip Health Storage Solutions	4-tier # A477CH 24x72x74 Chrome	<b>PRO:</b> <ul style="list-style-type: none"> <li>Shelves can be adjusted to custom sizes to accommodate products</li> <li>Wheeled shelves facilitate cleaning</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Heavy items more difficult to move on wires than solid shelves</li> </ul>
	<b>Approximate Cost:</b>	\$393	
	<b>For more information:</b>	Julie Archuleta, UCM <a href="mailto:jarchuleta@ucmerced.edu">jarchuleta@ucmerced.edu</a>	
<b>URL:</b> <a href="http://www.logiquip.com/productpdf.php?pid=215&amp;site=1">http://www.logiquip.com/productpdf.php?pid=215&amp;site=1</a>			
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
New Age Industrial Security Cages and Storage cabinets	# 97846	<b>PRO:</b> <ul style="list-style-type: none"> <li>Cage design facilitates transport of food without spillage</li> <li>Expensive items can be protected from theft</li> </ul>	<b>CON:</b> None reported
	<b>Approximate Cost:</b>	\$3,904.00	
	<b>For more information:</b>	Clyde Blackwelder, UCI <a href="mailto:cblackwe@uci.edu">cblackwe@uci.edu</a>	
<b>URL:</b> <a href="http://www.newageindustrial.com/ProductDetail.aspx?ISC_Product=97846">http://www.newageindustrial.com/ProductDetail.aspx?ISC_Product=97846</a>			
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Cambro Dunnage Racks	DSR300-600 (Slotted Top)	<b>PRO:</b> <ul style="list-style-type: none"> <li>Light weight</li> <li>Versatile; can be used for frozen, cold or dry stock</li> <li>Easy to clean</li> <li>Durable</li> <li>Elevates products 12" above floor</li> <li>Supports 1500-3000 pounds</li> <li>NSF approved</li> <li>Solid and vented racks are interchangeable</li> <li>Does not require assembly</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Not stackable</li> <li>Comes only in 2 colors</li> <li>Not mobile (no wheels)</li> <li>Requires 21" width storage space</li> </ul>
	DRS30-60 (Solid Top)		
	<b>Approximate Cost:</b>		
<b>For more information:</b>	Mike Williams, UCLA <a href="mailto:mwilliams@ehs.ucla.edu">mwilliams@ehs.ucla.edu</a>		
<b>URL:</b> <a href="http://cool.cambro.com/product_line.aspx?rrn=2&amp;plrn=92">http://cool.cambro.com/product_line.aspx?rrn=2&amp;plrn=92</a>			



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## Dining Product Recommendations

Task: Miscellaneous

Equipment: Personal Protective Equipment

	<b>Criteria:</b>	Insulated jackets and gloves	
	<b>Application:</b>	Use when working in cold storage environments	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Red Kap	Freezer coat JP70	<b>PRO:</b> <ul style="list-style-type: none"> <li>Available in multiple sizes from S-5XL</li> <li>Rated to 10°</li> <li>Washable</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Bulky</li> </ul>
	<b>Approximate Cost:</b>	\$100	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:cburt@ehs.ucla.edu">cburt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.redkap.com/view/heavyweight-parka/358279">http://www.redkap.com/view/heavyweight-parka/358279</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
FlexTech Work Gloves	HPPE/Nylon Work Gloves	<b>PRO:</b> <ul style="list-style-type: none"> <li>Good for handling boxes and food supplies</li> <li>Durable</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>None reported</li> </ul>
	<b>Approximate Cost:</b>	\$12	
	<b>For more information:</b>	Mike Williams, UCLA <a href="mailto:mwilliams@ehs.ucla.edu">mwilliams@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.hubert.com/pres63340/HPPE-Nylon-Work-Gloves-from-FlexTech.html">http://www.hubert.com/pres63340/HPPE-Nylon-Work-Gloves-from-FlexTech.html</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Atlas Thermal Gloves	Atlas Tem Res 282	<b>PRO:</b> <ul style="list-style-type: none"> <li>Keeps hands warm in cold storage</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Reduces hand dexterity</li> </ul>

		environments	
		<ul style="list-style-type: none"> <li>• No-slip grip palm and fingers</li> <li>• Liquid proof</li> <li>• Breathable</li> </ul>	
	<b>Approximate Cost:</b>	\$24	
	<b>For more information:</b>	Mike Williams, UCLA <a href="mailto:mwilliams@ehs.ucla.edu">mwilliams@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.showabestglove.com/site/content/pdf/productsheets/US_EN/TemRes%20282.pdf">http://www.showabestglove.com/site/content/pdf/productsheets/US_EN/TemRes%20282.pdf</a> <a href="http://www.grainger.com">www.grainger.com</a>		



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## Dining Product Recommendations

Task: Transporting Food Supplies to/from Storeroom

Equipment: Pallet Truck

	<b>Criteria:</b>	Battery operated pallet truck that can be used on loading dock and in storeroom	
	<b>Application:</b>	Lifting and transporting pallets of supplies between loading dock and storeroom	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Yale/Chase B827	MPB040-E (4000 pound capacity)	<b>PRO:</b> <ul style="list-style-type: none"> <li>Fork height range 3.25” – 8.25” allows use with dumpsters</li> <li>Low profile – easy to view tip of forks when approaching pallet</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Battery-operated; outlet must be available in storage area to recharge</li> <li>Requires room to turn</li> </ul>
	<b>Approximate Cost:</b>	\$4,850	
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://northamerica.yale.com/yna_product_details.asp?product=MPB040E&amp;page=yna_motorized_hand_trucks.asp">http://northamerica.yale.com/yna_product_details.asp?product=MPB040E&amp;page=yna_motorized_hand_trucks.asp</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Dayton	2LEB8	<b>PRO:</b> <ul style="list-style-type: none"> <li>Fork height range 3 – 7 11/16” works well in dock/ storeroom application</li> <li>Less expensive than Yale B827</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Battery-operated; outlet must be available in storage area to recharge</li> <li>Requires room to turn</li> </ul>
	<b>Approximate Cost:</b>	\$4,000	
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://www.grainger.com/Grainger/DAYTON-Hand-Pallet-Truck-2LEB8">http://www.grainger.com/Grainger/DAYTON-Hand-Pallet-Truck-2LEB8</a>		



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## Dining Product Recommendations

Task: Accessing Loading Dock

Equipment: Portable Steps

	<b>Criteria:</b>	Small profile, portable step system to access loading dock from ground level	
	<b>Application:</b>	Portable steps for use in loading dock bays without stairs	
Make			
Model		Comments (Pros and Cons)	
Dixie 4-Step Stand	59995Y	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Study 4-step stand with handrail</li> <li>• 25" width fits into dock bay space with room for trucks to use dock</li> <li>• Portable use built-in spring-loaded casters (53#)</li> <li>• Rear opening provides storage space inside unit</li> <li>• Supports 500# load</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• None reported</li> </ul>
	<b>Approximate Cost:</b>		\$300
	<b>For more information:</b>		Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>
<b>URL:</b>		<a href="http://www.dixiepolydrum.com/steps.html">http://www.dixiepolydrum.com/steps.html</a>	



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## Dining Product Recommendations

Task: Transporting Food Supplies to/from Storeroom  
Equipment: Battery Operated Transporters/Lifters

	<b>Criteria:</b>	Battery operated transporter/lifter with small footprint that is maneuverable in congested areas	
	<b>Application:</b>	Transporting and lifting supplies in areas with limited space and access	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Beyond Products	Mule 48” lift with platform 2A-1-16853-C	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Multi-functional lifter, stacker, transporter and workbench</li> <li>• Lifts up to 350 pounds</li> <li>• Small footprint (371 x 21w x 60h)</li> <li>• Collapses to store (131 x 22w x 60h)</li> <li>• Fork attachment available to handle crates</li> <li>• Good mobility</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Battery-operated, outlet must be available in storage area to recharge</li> <li>• Limited stability</li> <li>• Limited to 48” height</li> </ul>
	<b>Approximate Cost:</b>	\$2,000	
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://beyond-products.com">http://beyond-products.com</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Beyond Products	Mule 72” lift with platform 2A-1-16853-R	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Multi-functional lifter, stacker, transporter and workbench</li> <li>• Lifts up to 72”</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Battery-operated; outlet must be available in storage area to recharge</li> <li>• Larger footprint than</li> </ul>

		<ul style="list-style-type: none"> <li>• Collapses to store (84hx27wx13l)</li> </ul>	<ul style="list-style-type: none"> <li>• 48" (45l x 32w x 84h)</li> <li>• Lifts 300 pounds versus 350 pounds</li> </ul>
	<b>Approximate Cost:</b>	\$4,900	
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://beyond-products.com">http://beyond-products.com</a>		



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## Dining Product Recommendations

Task: Transporting Food Supplies to/from Storeroom  
Equipment: Hydraulic Lift Transporter, Platform

	<b>Criteria:</b>	Hydraulic transporter/lifter with small footprint, that is maneuverable in congested areas	
	<b>Application:</b>	Transporting and lifting supplies in areas with limited space and access	
Make		Model	Comments (Pros and Cons)
Wesco Hydraulic Hand Cart		DPL-54-222	<b>PRO:</b> <ul style="list-style-type: none"> <li>Multi-functional lifter, stacker, transporter</li> <li>Lifts up to 750 pounds</li> <li>Small footprint (60.5hx22.5w x 37l)</li> <li>Does not require recharging</li> <li>Platform height range 5.75" to 54"</li> </ul>
		<b>Approximate Cost:</b>	\$1300
		<b>For more information:</b>	Mike Williams, UCLA <a href="mailto:mwilliams@ehs.ucla.edu">mwilliams@ehs.ucla.edu</a>
<b>URL:</b>	<a href="http://www.grainger.com/Grainger/WESCO-Hydraulic-Hand-Truck-3W220?Pid=search">http://www.grainger.com/Grainger/WESCO-Hydraulic-Hand-Truck-3W220?Pid=search</a>		



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## Dining Product Recommendations

Task: Storeroom

Equipment: Utility Step ladder

	<b>Criteria:</b>	<ol style="list-style-type: none"> <li>1. Load capacity 300 lbs.</li> <li>2. Foldable</li> <li>3. Models available with 2-4 steps</li> <li>4. Attached wheels can be used for easy transport</li> <li>5. ANSI type 1A</li> </ol>	
	<b>Application:</b>	To place and pull pots/pans from vertical shelving taller than 60 inches	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Little Giant	10310B – 3 steps	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Ladder height is 27 inches</li> <li>• Non-slip material on each step</li> <li>• Large step size to support entire foot</li> <li>• Sturdy</li> <li>• Rear wheels to aid in rolling the ladder</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes time to unfold and set into place</li> <li>• Heavy</li> </ul>
	<b>Approximate Cost:</b>	\$150 each	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://www.littlegiantladder.com/">http://www.littlegiantladder.com/</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Little Giant	10210B – 2 step	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Ladder height is 18 inches</li> <li>• Non-slip material on each step</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes time to unfold and set into place</li> <li>• Heavy</li> </ul>

		<ul style="list-style-type: none"> <li>• Large step size to support entire foot</li> <li>• Sturdy</li> <li>• Rear wheels to aid in rolling the ladder</li> </ul>	
	<b>Approximate Cost:</b>	\$100 each	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b> <a href="http://www.littlegiantladder.com/">http://www.littlegiantladder.com/</a>			
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Little Giant	10410B	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Ladder height is 36 inches</li> <li>• Rear wheels to aid in rolling the ladder</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes time to unfold and set into place</li> <li>• Heavy to lift</li> </ul>
	<b>Approximate Cost:</b>	\$200 each	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b> <a href="http://www.littlegiantladder.com/">http://www.littlegiantladder.com/</a>			

# Food Transportation



## Risk Services Best Practices Bulletin

### Food Transport: Catering and Patient Tray Distribution

*Presented by Office of the President Risk Services – May 2012*



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Throughout the UC system, dining staff are among the occupational groups most at risk for injury. The high frequency and severity of injury is due to the physical nature of the work that often involves awkward postures, repetitive tasks and forceful exertion.

The following Best Practices are offered to guide those responsible for supervising and/or ensuring the health and safety of these dining services workers.

#### **Best Practices**

---

Minimize **lifting and carrying** in food transport and catering by applying ergonomic practices and considering proper use of ergonomic equipment

- Use motorized vehicles or carts to transport heavy items such as food and catering equipment over long distances
- Use vehicles with automatic hydraulic lift gates
- For transport from dock or other locations to event locations, use task-appropriate carts (**see product recommendation sheet**)
- Provide height-adjustable equipment for lifting tasks so that loads can be moved at a height that minimizes bending at the waist (**see product recommendation sheet**)
- When height-adjustable equipment is not available, select material handling equipment that minimizes lifting and lowering of heavy loads and bending/reaching in conjunction with lifting
- When placing or retrieving items on/off transits or tiered carts
  - Use designs that optimize access and minimize lifting, carrying, and awkward postures associated with storage and retrieval
  - Store heavy or frequently accessed items between mid-thigh and shoulder height. Storage of lightweight or rarely used items above and below this range is acceptable.
  - Bulk packages of supplies transported by mechanical devices can be stacked and stored as needed. However, once packages are opened and removed manually, placement on shelves/racks should follow the recommendations listed above

- Labels on shelves help to quickly and easily identify materials to be lifted or carried
- Avoid closely spaced shelves/racks as they limit visual and hand access
- When manually handling catering and food supplies, ensure there is sufficient space to turn around and prevent twisting
- Use proper body mechanics and ergonomic lifting techniques (See **Safe Manual Material Handling Information Sheet, Appendices C and D**)

Minimize exerted force when **pushing or pulling** loads by applying the following ergonomic practices and considering use of ergonomic equipment

- Plan transport of food/equipment on carts or dollies in advance by mapping out pathways with fewer inclines, traffic, and obstructions. Reduce the distances that loads are moved to a minimum.
- If long trips are required, use vehicles to transport food and equipment. Position vehicles as close to delivery sites as possible.
  - Heavy hand carts or trucks, such as catering carts, may have to be pushed and pulled across pavement and gravel between buildings. They may also be pushed up ramps between buildings. A battery powered pusher can be provided to help move the items and reduce excessive stress on the workers back and shoulders.
  - For pushing, handhold height should be between elbow and hip height, since elbow and hip heights vary from person to person, there is no single recommended handhold height for pushing. If an adjustable height horizontal handle or continuous vertical handles are provided, the height range should be 36 to 44 inches.
  - In many cases, oversized loads may be light enough to carry, but block vision or may be difficult to hold. In such cases, position loads on transport carts to allow for unobstructed view or use mechanical assistance or seek help from a co-worker.
  - With heavy loads, inclines, or obstructed vision, transport in teams with one individual pushing the cart and the other guiding the cart
- Specifications for casters and wheels:
  - Modifying the casters or wheels on a handcart or truck (usually by increasing the diameter) is an effective way of improving cart handling. In choosing to place larger casters on a cart or truck it is important to determine if the increased height of the modified equipment will create additional problems for handling materials on and off it or for interfacing it with other equipment.
  - Sometimes a different caster design of the same diameter is preferable. Crowned treads may be preferable when the cart has to be maneuvered in tight places. Pneumatic wheels are less appropriate for carts or hand trucks that carry heavy weights and remain sitting while loaded for several hours at a time. The weight tends to flatten out the tires, making the starting forces very high.
  - Implement a preventative maintenance program for carts, wheels and casters
  - Select wheel size and type consistent with the specific task and terrain
  - Ensure casters are rated for the weight being transported. Consult with your vendor for caster specifics regarding selection.

- Locking brakes may be needed if heavy loads are moved on sloped surfaces
- Seek assistance when pushing on a slope or incline
- Specifications for handcart and truck handles:
  - Use swivel casters on one end of the cart and place the handle at that end too.
  - If an adjustable T-handle is used (as on hand pallet trucks/jacks) it should have a horizontal extension of 8 inches to protect the handler's feet from being struck by the pallet during pulling transfers
  - For carts with horizontal handles, consider use of adjustable handles to accommodate different user heights.
  - Fixed horizontal handles should be at of height of 36 to 44 inches above the floor.
  - Recommended vertical handle height range is 36 to 50 inches.
  - The recommended distance between handles on each side of a cart or truck is 18 inches. Wider separations place strain on smaller, weaker shoulder muscles.
  - Handles should have a minimum of 5 to 6 inches of clearance for the gloved hand, preferably 8 inches. Handles should be at least 6 inches long and 1 to 1.5 inches in diameter for a comfortable grip.
  - Apply ergonomic grips on cart handles to reduce required grip force applied when pushing or pulling
  - Another approach is a handhold system that offers continuous vertical handles that can be grasped anywhere along their length or a series of handholds at a height range of 36-50 inches.
- Cart Specifications:
  - Trucks or carts longer than 4 feet or wider than 3 feet are difficult to maneuver in standard aisles. A large truck or cart will also make handling of items into shelves or other areas difficult with extended reaches required.
  - Cart height should not exceed 50 inches. This enables shorter handlers to see over them during operation.
  - Shelf heights in carts and trucks should be at a height of 20 to 45 inches for heavy or frequently used items
  - Hand and wheel/caster breaks should be provided on carts and trucks that are transported on sloped floors or have to be aligned with equipment in the workplace

Other ergonomic considerations include, but are not limited to, the following:

- Equip loading docks with hydraulic lifts for unloading catering items from smaller motorized vehicles (**see product recommendation sheet**)
- Organize the motorized vehicle (large or small) for ease of loading and unloading of carts, bins, or chests
- Ensure items are secured by using straps or other methods of restraining items

- Consider implementing a color-coding system of racks, carts, and bins to improve organizational and retrieval process
- To improve grip, use storage bins, chests, containers, and trays with built-in/cut-out handles or lips

## **Equipment**

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Selecting the most appropriate equipment is an important decision. Prior to purchasing:

- Contact the campus ergonomist to help with the selection process
- Include dining staff in the selection process
- Arrange for demonstration of product by manufacturer or distributor
- Refer to the Ergonomics Recommended Product Sheet for applications and recommendations
- Pilot the preferred equipment for a minimum two-week trial period

During the pilot period, consider the following:

- Adjustability, size and weight of equipment to accommodate wide range of body types
- Appropriate sized casters and swivel design to allow for easy rolling and maneuverability
- Location of controls and ease of operation
- Storage and transporting needs
- Equipment maintenance and replacement parts
- Battery life and charging time
- Need for back-up equipment

## **Training**

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Initial training should be provided for new employees within the first 30 days and annually thereafter. Training is best provided in small groups with the involvement of supervisors, leads, ergonomists and vendors.

Training should include:

- Hands-on performance of job tasks and related activities
- Hands-on practice when new tools, equipment, or procedures are introduced to the workforce
- Equipment use, maintenance, storage, safety procedures and use of personal protective equipment (PPE) as required
- Instructions on ergonomic practices focusing on the following:
  - practicing neutral postures
  - safe lifting, carrying, and pushing techniques
  - proper body mechanics
- Verbal and/or written materials to accommodate non-English speaking workers as well as visual aids (e.g., pictures, charts, videos) of actual tasks in the workplace
- Sufficient opportunity for questions

## **Work and Staffing Guidelines**

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Work and staffing guidelines ensure that employees are adequately trained and assigned reasonable workloads. Guidelines include:

- Staff levels that provide adequate coverage to complete assigned work tasks
- Staff levels to avoid overtime
- Back-up staffing to accommodate unplanned absences
- Use of task and job rotation to limit repetition and fatigue
- Use of teams for heavy lifting and moving tasks
- Pre-shift exercises to warm up muscles to prepare for work
- Frequent rest breaks
- Implementation and support of a work hazard notification system to identify ergonomic problems

## References

- 1) Occupational Safety & Health Organization (OSHA). *Ergonomics eTool: Solutions*. <http://www.osha.gov>. Web. 12 January 2012
- 2) Centers For Disease Control and Prevention (CDC). Ergonomic Guidelines for Manual Material Handling. <http://www.cdc.gov>. Web. 12 January 2012.
- 3) Health and Safety Executive. *Getting to Grips with Manual Handling*. <http://www.hse.gov.uk> INDG143(rev2)September 2011. Web. 12 January 2012.
- 4) Applied Ergonomics 33, Jansen, Hoozemans, Van der Beek, Friggs-Dresen
- 5) United States Department of Labor, Occupational Safety, Ergonomics for the Prevention of Musculoskeletal Disorders, OSHA 3213-09N, 6. *Darcor, The Ergonomics of Manual Material Handling, 2012) pages 1-2.*
- 6) Eastman Kodak Company. (2004). *Kodak's Ergonomic Design for People at Work*. Hoboken, New Jersey: John Wiley & Sons, Inc.



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## Dining Product Recommendations

Task: Food Transportation

Equipment: Height Adjustable Mobile Carts

	<b>Criteria:</b>	Moving dining equipment or prepared food products
	<b>Application:</b>	Hydraulic stainless steel height adjustable mobile carts which can be moved out of the way when not needed
Make	Model	Comments (Pros and Cons)
Unidex	SS PH	<b>PRO:</b> <ul style="list-style-type: none"> <li>Multi-functional lifter, transporter, adjustable height work surface</li> <li>Standard load capacities of 250 and 500 pounds</li> <li>Large, stable platform (24x24) is standard but can be customized</li> <li>Adjustable height range 28" to 42" (some customization available)</li> <li>Large locking casters provide easy mobility over uneven surfaces.</li> <li>Custom drawers, extensions, lips and tool holders available</li> <li>Foot pedal folds up when not in use</li> <li>Design allows for foot rests for standing work</li> </ul>
		<b>CON:</b> <ul style="list-style-type: none"> <li>Expensive</li> <li>Takes up some space</li> <li>Not certified by NSF</li> </ul>
<b>Approximate Cost:</b>		\$2500 - \$5000 (depending on customization)
<b>For more information:</b>		<b>South:</b> Ginnie Thomas, UCSB

		<a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://www.unidex-inc.com/">http://www.unidex-inc.com/</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Carlisle	SBC1521 16"x29"x36" Fold N Go Folding Utility Cart	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Can be quickly unfolded and folded for storage</li> <li>• Holds up to 116 lbs. per shelf</li> </ul>	<b>CON:</b> None reported
	<b>Approximate Cost:</b>	\$330	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a>	
<b>URL:</b>	<a href="http://www.webstaurantstore.com/carlisle-sbc1521-16x29x36-fold-n-go-folding-utility-cart/271SBC1521%20%20BK.html">http://www.webstaurantstore.com/carlisle-sbc1521-16x29x36-fold-n-go-folding-utility-cart/271SBC1521%20%20BK.html</a>		



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## Dining Product Recommendations

Task: Food Transport

Equipment: Powered Hand Truck

	<b>Criteria:</b>	Powered hand truck designed for indoor, outdoor, and ramp use for transporting heavy containers																			
	<b>Application:</b>	Transport large, heavy containers																			
<table border="1"> <thead> <tr> <th>Make</th> <th>Model</th> <th colspan="2">Comments (Pros and Cons)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Wesco</td> <td rowspan="3">Cobra Pro</td> <td> <b>PRO:</b> <ul style="list-style-type: none"> <li>• Drive can be disengaged to be used in manual mode</li> <li>• Power drive works in 2-wheel or 4-wheel drive</li> <li>• 1200-pound capacity in 4-wheel mode, 600-pound capacity in 2-wheel mode</li> <li>• Converts easily from dolly to hand truck</li> <li>• Can be used indoors and outdoors</li> <li>• Can be used on a ramp up to 17.5 degrees</li> </ul> </td> <td> <b>CON:</b> <ul style="list-style-type: none"> <li>• Short battery life</li> <li>• Unit weighs over 100 pounds</li> <li>• Maximum capacity of 950 lbs in 4-wheel mode when used on ramps</li> </ul> </td> </tr> <tr> <td><b>Approximate Cost:</b></td> <td colspan="2">\$1300</td> </tr> <tr> <td><b>For more information:</b></td> <td colspan="2">Kristie Elton, UCR <a href="mailto:kristie.elton@ucr.edu">kristie.elton@ucr.edu</a></td> </tr> <tr> <td><b>URL:</b></td> <td colspan="3"><a href="http://www.wescomfg.com/html/hand_trucks/aluminum_cobrapro_convertible.htm">http://www.wescomfg.com/html/hand_trucks/aluminum_cobrapro_convertible.htm</a></td> </tr> </tbody> </table>				Make	Model	Comments (Pros and Cons)		Wesco	Cobra Pro	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Drive can be disengaged to be used in manual mode</li> <li>• Power drive works in 2-wheel or 4-wheel drive</li> <li>• 1200-pound capacity in 4-wheel mode, 600-pound capacity in 2-wheel mode</li> <li>• Converts easily from dolly to hand truck</li> <li>• Can be used indoors and outdoors</li> <li>• Can be used on a ramp up to 17.5 degrees</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Short battery life</li> <li>• Unit weighs over 100 pounds</li> <li>• Maximum capacity of 950 lbs in 4-wheel mode when used on ramps</li> </ul>	<b>Approximate Cost:</b>	\$1300		<b>For more information:</b>	Kristie Elton, UCR <a href="mailto:kristie.elton@ucr.edu">kristie.elton@ucr.edu</a>		<b>URL:</b>	<a href="http://www.wescomfg.com/html/hand_trucks/aluminum_cobrapro_convertible.htm">http://www.wescomfg.com/html/hand_trucks/aluminum_cobrapro_convertible.htm</a>		
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<b>URL:</b>	<a href="http://www.wescomfg.com/html/hand_trucks/aluminum_cobrapro_convertible.htm">http://www.wescomfg.com/html/hand_trucks/aluminum_cobrapro_convertible.htm</a>																				



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## Dining Product Recommendations

Task: Food Transportation

Equipment: Patient Care Food Delivery Cart

	<b>Criteria:</b>	Room service style food delivery for patient care		
	<b>Application:</b>	Transport of individually insulated dishware in food trays		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)		
Dinex Deluxe Tray Delivery Cart	DXTS Series	<b>PRO:</b>	<b>CON:</b>	
		<ul style="list-style-type: none"> <li>• Quietly rolls through hallways</li> <li>• Casters come in various upgrade packages</li> <li>• Easy to push and turn</li> <li>• Built-in bumper</li> <li>• Field-adjustable racks to fit different tray sizes</li> <li>• Comes in variety of configuration such as with doors with hinges in the middle of cart rather than at sides</li> </ul>	<ul style="list-style-type: none"> <li>• Should replace with large casters to raise the lowest shelf</li> <li>• Should use trays with handles</li> </ul>	
		<b>Approximate Cost:</b>	\$5,000	
		<b>For more information:</b>	Jason Barry, UCLA Medical Center <a href="mailto:JMBarry@mednet.ucla.edu">JMBarry@mednet.ucla.edu</a>	
<b>URL:</b>	<a href="http://www.carlislefsp.com/tray-delivery-carts/deluxe-tray-delivery-carts">http://www.carlislefsp.com/tray-delivery-carts/deluxe-tray-delivery-carts</a>			



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## Product Recommendations

Task: Food Transport

Equipment: Dock Lifts and Stationary/Mobile Lifters

	<p><b>Criteria:</b></p>	<p>Dock lifts and power lifts which assist with transport of carts and containers when lift gates are not an option. Designed for either permanent mounting in concrete or metal pad mobile lifts or to be used for multiple locations.</p>	
	<p><b>Application:</b></p>	<p>Lifts various container sizes with weight capacity from 350lbs. to 5,000-6,000 lbs.</p>	
<p>Make</p>	<p>Model</p>	<p>Comments (Pros and Cons)</p>	
<p>Superior Handling Equipment</p>	<p>Speed Lift SL-5000-A</p>	<p><b>PRO:</b></p> <ul style="list-style-type: none"> <li>• Eliminates manual lifting of containers for unloading materials</li> <li>• Equipped with automated folding ramps</li> <li>• On average, are three times faster in the maneuvering of the platform than most dock lifts</li> <li>• Can be anchored securely at grade level, thus there is no need for pits or bollards</li> <li>• Mobile and can also be transported to a new facility</li> <li>• Manufactured with dual controls allowing the individual to operate the lift from the platform, truck or ground</li> <li>• Come in a range of loading capacities</li> <li>• Other models have</li> </ul>	<p><b>CON:</b></p> <ul style="list-style-type: none"> <li>• Often requires transporting containers to permanent dock/loading sites vs. staging locations</li> <li>• Requires available space for placement/storage</li> </ul>

		greater weight capacity
	<b>Approximate Cost:</b>	Costs vary depending upon size and model. Please contact manufacturer for pricing information.
	<b>For more information:</b>	Julie McAbee, UCSB <a href="mailto:julie.mcabee@ehs.ucsb.edu">julie.mcabee@ehs.ucsb.edu</a>
<b>URL:</b>	<a href="http://www.superiorlifts.com">www.superiorlifts.com</a>	



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## Dining Product Recommendations

Task: Food Transportation

Equipment: Insulated Food Carriers

	<b>Criteria:</b>	Insulated food carriers to keep food at designated temperature	
	<b>Application:</b>	Transporting hot or cold food on various tray sizes	
Make	Model	Comments (Pros and Cons)	
Cambro Carriers with Camdolly	Carrier Model 100MPC and 200MPC with Camdolly CD100 and CD200	<b>PRO:</b> <ul style="list-style-type: none"> <li>Stackable</li> <li>Easy to maneuver</li> <li>Easily adjustable</li> <li>Holds a variety of food pans and tray sizes</li> <li>Keeps food at desired temperature (warm or cold)</li> <li>Certain models comes with a temperature indicator</li> <li>Molded-in handles</li> <li>Door opens a full 270°</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>Caster accessories sold separately</li> </ul>
	<b>Approximate Cost:</b>	\$200-\$300 (Camcarriers only) \$100 for Camdolly	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Kristie Elton, UCR <a href="mailto:kristie.elton@ucr.edu">kristie.elton@ucr.edu</a>	
<b>URL:</b>	<a href="http://cool.cambro.com/index.aspx">http://cool.cambro.com/index.aspx</a>		

Make	Model	Comments (Pros and Cons)	
Cambro Camcarts for Food Pan	UPC600, UPC800, UPC1200, UPC1600	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Comes with build in castors</li> <li>• Molded-in bumpers and handles</li> <li>• Keeps food warm or cold at desired temperature with</li> <li>• Full swing door</li> <li>• Holds a variety of food pans</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Not stackable</li> </ul>
	<b>Approximate Cost:</b>	\$700.00	
	<b>For more information:</b>	Cindy Burt, UCLA <a href="mailto:burt@ehs.ucla.edu">burt@ehs.ucla.edu</a>	
<b>URL:</b>	<a href="http://cool.cambro.com/index.aspx">http://cool.cambro.com/index.aspx</a>		

# Dishroom



## Risk Services Best Practices Bulletin

### Dining: Pot Washing

*Presented by Office of the President Risk Services – May 2012*



Throughout the UC system, dining staff are among the occupational groups most at risk for injury. The high frequency and severity of injury is due to the physical nature of the work that often involves awkward postures, repetitive tasks and forceful exertion.

The following Best Practices are offered to guide those responsible for supervising and/or ensuring the health and safety of these dining service workers.

### Best Practices

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Reduce the frequency of using awkward and forceful postures such as extended reaching, gripping, and forward bending associated with pre-soaking and scrubbing pots/pans with abrasive sponges.<sup>1</sup> This can reduce the risk of injury and increase productivity.

- Provide powered sink to circulate heated water to loosen and wash food particles from large pots and pans (**see product recommendation sheet**)
- Where power sinks are not available, pre-soak pots and pans to reduce repetitive, forceful scrubbing<sup>2</sup>
- Where needed, provide automated washing system for baking sheets and large pots and pans. Clean-in-place system for sump should exist.
- The length of the overhead hose should allow for the nozzle not to exceed 40 inches from the floor to reduce awkward reaching motions. The nozzle should provide a locking mechanism for the trigger to reduce repetitive and sustained squeezing.<sup>3,4</sup>
- For efficient cleaning, nozzle design should allow water flow rate of at least 1 gpm and to save water no more than 1.6 gpm<sup>5</sup>
- Use high temperature hoses which provide 80-150 psi to clean the dirty ware
- If hand scrubbing is necessary, scrub brushes with handles should be used to prevent forward bending and excessive gripping associated with the use of abrasive sponges.<sup>6</sup>
- To reduce bending forward at the waist, use a long handled cooking utensil with a curve at the end to help elevate pots and pans placed in the deep sinks.

- Mount holders on wall to support one gallon soap dispensing units near three compartment sinks **(see product recommendation sheet)**
- Dirty pots and pans should be transported to the sinks/washers on carts. Hand carrying should be avoided.
- Place vertical storage near pot/pan area to reduce carrying distance. Limit height of storage to 60" or provide step ladder for taller heights.<sup>7,8</sup> **(see product recommendation sheet)**
- Use a two-person lift when raising and lowering large, heavy items (such as large mixing bowl on wheels). See *Manual Materials Handling Best Practices Bulletin* for additional recommendations.

## **Equipment**

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Selecting the most appropriate equipment is an important decision. Prior to purchasing:

- Contact the campus ergonomist to help with the selection process
- Include dining staff in the selection process
- Arrange for demonstration of product by manufacturer or distributor
- Refer to the Ergonomics Recommended Product Sheet for applications and recommendations
- Pilot the preferred equipment for a minimum two-week trial period

During the pilot period, consider the following:

- Adjustability, size and weight of equipment to accommodate wide range of body types
- Appropriate sized casters and swivel design to allow for easy rolling and maneuverability
- Location of controls and ease of operation
- Storage and transporting needs
- Equipment maintenance and replacement parts
- Battery life and charging time
- Need for back-up equipment

## **Training**

---

Initial training should be provided for new employees within the first 30 days and annually thereafter. Training is best provided in small groups with the involvement of supervisors, leads, ergonomists and vendors.

Training should include:

- Hands-on performance of job tasks and related activities
- Hands-on practice when new tools, equipment, or procedures are introduced to the workforce
- Equipment use, maintenance, storage, safety procedures and use of personal protective equipment (PPE) as required
- Instructions on ergonomic practices focusing on the following:
  - practicing neutral postures
  - safe lifting, carrying, and pushing techniques
  - proper body mechanics

- Verbal and/or written materials to accommodate non-English speaking workers as well as visual aids (e.g., pictures, charts, videos) of actual tasks in the workplace
- Sufficient opportunity for questions

### **Work and Staffing Guidelines**

---

Work and staffing guidelines ensure that employees are adequately trained and assigned reasonable workloads. Guidelines include:

- Staff levels that provide adequate coverage to complete assigned work tasks
- Staff levels to avoid overtime
- Back-up staffing to accommodate unplanned absences
- Use of task and job rotation to limit repetition and fatigue
- Use of teams for heavy lifting and moving tasks
- Pre-shift exercises to warm up muscles to prepare for work
- Frequent rest breaks
- Implementation and support of a work hazard notification system to identify ergonomic problems

### **References**

- 1) Putz-Anderson, Vern., *Cumulative Trauma Disorders: A Manual for Musculoskeletal Disease of the Upper Limbs*, Taylor & Francis, pg. 22, 1988.
- 2) Occupational Health and Safety Agency for Healthcare in BC, *An Ergonomics Guide for Kitchens in Healthcare*, pg. 65, 2003.
- 3) The Eastman Kodak Company, *Kodak's Ergonomic Design for People at Work*, pg. 50, 2<sup>nd</sup> Edition, John Wiley & Sons, 2004.
- 4) Occupational Health and Safety Agency for Healthcare in BC, *An Ergonomics Guide for Kitchens in Healthcare*, pg. 52, 2003.
- 5) [http://www.epa.gov/WaterSense/docs/final\\_epa\\_prsv\\_study\\_report\\_033111v2\\_508.pdf](http://www.epa.gov/WaterSense/docs/final_epa_prsv_study_report_033111v2_508.pdf)
- 6) Occupational Health and Safety Agency for Healthcare in BC, *An Ergonomics Guide for Kitchens in Healthcare*, pg. 70, 2003.
- 7) Occupational Health and Safety Agency for Healthcare in BC, *An Ergonomics Guide for Kitchens in Healthcare*, pg. 72, 2003.
- 8) Humantech, *The Handbook of Ergonomic Design Guidelines*, pg. 84, 2009.



## Risk Services Best Practices Bulletin

### Dining: Dishroom

*Presented by Office of the President Risk Services – May 2012*



Throughout the UC system, dining staff are among the occupational groups most at risk for injury. The high frequency and severity of injury is due to the physical nature of the work that often involves awkward postures, repetitive tasks and forceful exertion.

The following Best Practices are offered to guide those responsible for supervising and/or ensuring the health and safety of these dining service workers.

### Best Practices

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- Automate transport of trays and dirty dishes into dish room, with tray accumulator or single belt return conveyor, to significantly reduce lifting and make it easier to unload dishes<sup>1</sup>
- When using a tray accumulator, the forward reach ( $\geq 2$ /minutes) from edge of break down area to the tray or dishes should not exceed 16 inches and the overhead reach to the top carriage should not exceed 58 inches.<sup>2,3</sup> When a redesign is not possible, consider adding a forward extension on the carriages and removing the top carriage.
- When automatic transport is not available, have customers break down dirty ware on a mobile tiered cart. In the case of patient trays in medical centers, remove trays from carts and place dirty ware at a height of 36 inches. Provide racks, mobile soak sinks, and other storage components near the employee and at a similar height.
- Implement a compost area for customers to scrape off waste when dropping off trays and dirty dishes to decrease highly repetitive motions
- Where composting is not available, provide running water with a garbage disposal or pulper in the dish room to reduce the forces associated with scraping<sup>1</sup>
- Establish an area for customers to place dirty utensils to reduce repetitive grasping
- Where presorting is not available, provide soak sinks for the dirty utensils that are the same height as the break down area to reduce bending over and lifting. Consider using half size racks to decrease the load being lifted. (see **product recommendation sheet**)
- Provide an adequate staging area with tables or storage racks to place all dirty items to reduce lifting from the floor
- Provide self-leveling glass/cup rack dispensers to reduce bending over when placing and grabbing the filled racks (see **product recommendation sheet**)

- 
- The length of the overhead hose should allow for the nozzle not to exceed 40 inches from the floor to reduce awkward reaching motions. The nozzle should provide a locking mechanism for the trigger to reduce repetitive and sustained squeezing.<sup>4,5</sup>
  - For efficient cleaning, nozzle design should allow water flow rate of at least 1 gpm and to save water no more than 1.6 gpm<sup>6</sup>
  - Use high temperature hoses which provide 80-150 psi to clean the dirty ware
  - Recess the under-counter hose holder to prevent it from protruding when the hose is being used
  - Provide adequate drainage in the floor for the daily amount of water and manual cleaning
  - Stacked dirty dishes, trays, silverware and racks of glasses and cups should be transported to the ware washing machine by using a conveyor, sliding them along the work surface or with a wheeled cart. Hand carrying should be avoided.
  - Clean ware should be removed from the dish machine by gripping with the majority of the hand versus just the finger tips
    - Stacking dishes on the edge of the machine can reduce sustained grasping
    - All ware should be placed on or in wheeled carts to provide for easy transport back into the dining commons<sup>3</sup>

## **Equipment**

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Selecting the most appropriate equipment is an important decision. Prior to purchasing:

- Contact the campus ergonomist to help with the selection process
- Include dining staff in the selection process
- Arrange for demonstration of product by manufacturer or distributor
- Refer to the Ergonomics Recommended Product Sheet for applications and recommendations
- Pilot the preferred equipment for a minimum two-week trial period

During the pilot period, consider the following:

- Adjustability, size and weight of equipment to accommodate wide range of body types
- Appropriate sized casters and swivel design to allow for easy rolling and maneuverability
- Location of controls and ease of operation
- Storage and transporting needs
- Equipment maintenance and replacement parts
- Battery life and charging time
- Need for back-up equipment

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Training should include:

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- Hands-on practice when new tools, equipment, or procedures are introduced to the workforce
- Equipment use, maintenance, storage, safety procedures and use of personal protective equipment (PPE) as required
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  - practicing neutral postures
  - safe lifting, carrying, and pushing techniques
  - proper body mechanics
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- Pre-shift exercises to warm up muscles to prepare for work
- Frequent rest breaks
- Implementation and support of a work hazard notification system to identify ergonomic problems

## **References**

- 1) Birchfield, John C., *Design & Layout of Foodservice Facilities*, 3<sup>rd</sup> edition, John Wiley & Sons, 2008.
- 2) The Eastman Kodak Company, *Kodak's Ergonomic Design for People at Work*, pg. 50, 2<sup>nd</sup> Edition, John Wiley & Sons, 2004.
- 3) Occupational Health and Safety Agency for Healthcare in BC, *An Ergonomics Guide for Kitchens in Healthcare*, pg. 52, 2003
- 4) Humantech, *The Handbook of Ergonomic Design Guidelines*, pg. 108, 2009.
- 5) Occupational Health and Safety Agency for Healthcare in BC, *An Ergonomics Guide for Kitchens in Healthcare*, pg. 52, 2003.
- 6) [http://www.epa.gov/WaterSense/docs/final\\_epa\\_prsv\\_study\\_report\\_033111v2\\_508.pdf](http://www.epa.gov/WaterSense/docs/final_epa_prsv_study_report_033111v2_508.pdf)



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## Dining Product Recommendations

Task: Pot/Pan Wash Area

Equipment: Utility Step ladder

	<b>Criteria:</b>	<ol style="list-style-type: none"> <li>1. Load capacity 300 lbs.</li> <li>2. Foldable</li> <li>3. Models available with 2-4 steps</li> <li>4. Attached wheels can be used for easy transport</li> <li>5. ANSI type 1A</li> </ol>	
	<b>Application:</b>	To place and pull pots/pans from vertical shelving taller than 60 inches	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Little Giant	10310B – 3 steps	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Ladder height is 27 inches</li> <li>• Non-slip material on each step</li> <li>• Large step size to support entire foot</li> <li>• Sturdy</li> <li>• Rear wheels to aid in rolling the ladder</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes time to unfold and set into place</li> <li>• Heavy</li> </ul>
	<b>Approximate Cost:</b>	\$150 each	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://www.littlegiantladder.com/">http://www.littlegiantladder.com/</a>		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Little Giant	10210B – 2 step	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Ladder height is 18 inches</li> <li>• Non-slip material on each step</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes time to unfold and set into place</li> <li>• Heavy</li> </ul>

		<ul style="list-style-type: none"> <li>• Large step size to support entire foot</li> <li>• Sturdy</li> <li>• Rear wheels to aid in rolling the ladder</li> </ul>	
	<b>Approximate Cost:</b>	\$100 each	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b> <a href="http://www.littlegiantladder.com/">http://www.littlegiantladder.com/</a>			
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Little Giant	10410B	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Ladder height is 36 inches</li> <li>• Rear wheels to aid in rolling the ladder</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes time to unfold and set into place</li> <li>• Heavy to lift</li> </ul>
	<b>Approximate Cost:</b>	\$200 each	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a> Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b> <a href="http://www.littlegiantladder.com/">http://www.littlegiantladder.com/</a>			



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## Dining Product Recommendations

Task: Storing and transporting trays & racks

Equipment: Self-leveling Tray & Rack Dispenser

	<b>Criteria:</b>	Self-leveling rack to raise and lower the racks and trays	
	<b>Application:</b>	Storing trays and empty/filled racks within dishroom; helps with transporting out to main dining area	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Lakeside	820 (Various models accommodate different rack sizes)	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>Eliminates bending over</li> <li>Open cantilever style fits popular size racks and trays</li> <li>Spring-loaded self-leveling platform</li> <li>Corner bumpers protect walls and furnishings</li> <li>Rolls easily on 4" heavy duty casters, 2 with brakes</li> </ul>	<ul style="list-style-type: none"> <li>Springs will eventually stretch or break and need to be replaced</li> <li>More expensive than other racks</li> <li>More time will be spent keeping them looking good</li> </ul>
		<b>Approximate Cost:</b>	\$1300 each
	<b>For more information:</b>	Ginnie Thomas, UCSB <a href="mailto:gthomas@housing.ucsb.edu">gthomas@housing.ucsb.edu</a>	
<b>URL:</b>	<a href="http://catalog.elakesidefoodservice.com/c-150-cantilever.aspx">http://catalog.elakesidefoodservice.com/c-150-cantilever.aspx</a>		



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## Dining Product Recommendations

Task: Washing pots and pans

Equipment: Powered Sink

	<b>Criteria:</b>	Powered sink system to soak baked on food particles from cooking vessels	
	<b>Application:</b>	Soaking pots and cook/bake ware, reduce amount of manual scrubbing	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Hobart	Turbowash II (Length of unit is from 6' to 18')	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>Minimizes manual scrubbing &amp; scraping</li> <li>Cleans sheet pans without using a rack</li> <li>Reduces wear and tear on pots</li> <li>Heated water helps to loosen baked food</li> </ul>	None reported
		<b>Approximate Cost:</b>	\$25,000 (depending on size)
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a>	
<b>URL:</b>	<a href="http://www.hobartcorp.com/Products/Warewashing/Powered-Sink/">http://www.hobartcorp.com/Products/Warewashing/Powered-Sink/</a>		



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## Dining Product Recommendations

Task: Soaking dirty utensils

Equipment: Mobile Soak Sink

	<b>Criteria:</b>	Mobile sink to place dirty utensils in to soak prior to placing through dish machine																											
	<b>Application:</b>	Placing dirty utensils in a mobile sink positioned at the same height as the break down area provides a convenient way to soak the utensils and reduce lifting from awkward heights																											
<table border="1"> <thead> <tr> <th>Make</th> <th>Model</th> <th colspan="2">Comments (Pros and Cons)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Aero-werks</td> <td>Half size mobile soak sink with 5" locking casters  (This is a customized product for UC Berkeley)</td> <td> <b>PRO:</b> <ul style="list-style-type: none"> <li>• Half rack size decreases weight being lifted</li> <li>• Rolls easily</li> <li>• Can be used to soak other items besides silverware</li> <li>• Designed to be same height as break down area</li> </ul> </td> <td> <b>CON:</b> <ul style="list-style-type: none"> <li>• Takes up extra floor space</li> </ul> </td> </tr> <tr> <td><b>Approximate Cost:</b></td> <td colspan="2">\$950 (includes freight)</td> </tr> <tr> <td><b>For more information:</b></td> <td colspan="2">Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a></td> </tr> <tr> <td><b>URL:</b></td> <td colspan="3"><a href="http://www.aero-werks.com">www.aero-werks.com</a></td> </tr> <tr> <th>Make</th> <th>Model</th> <th colspan="2">Comments (Pros and Cons)</th> </tr> <tr> <td>Eagle Group</td> <td>MSS2020</td> <td> <b>PRO:</b> <ul style="list-style-type: none"> <li>• Can hold a full size rack</li> <li>• One lever drain release</li> </ul> </td> <td> <b>CON:</b> <ul style="list-style-type: none"> <li>• Using full size rack may require lifting more</li> </ul> </td> </tr> </tbody> </table>				Make	Model	Comments (Pros and Cons)		Aero-werks	Half size mobile soak sink with 5" locking casters  (This is a customized product for UC Berkeley)	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Half rack size decreases weight being lifted</li> <li>• Rolls easily</li> <li>• Can be used to soak other items besides silverware</li> <li>• Designed to be same height as break down area</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Takes up extra floor space</li> </ul>	<b>Approximate Cost:</b>	\$950 (includes freight)		<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a>		<b>URL:</b>	<a href="http://www.aero-werks.com">www.aero-werks.com</a>			Make	Model	Comments (Pros and Cons)		Eagle Group	MSS2020	<b>PRO:</b> <ul style="list-style-type: none"> <li>• Can hold a full size rack</li> <li>• One lever drain release</li> </ul>	<b>CON:</b> <ul style="list-style-type: none"> <li>• Using full size rack may require lifting more</li> </ul>
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		<ul style="list-style-type: none"> <li>• 2 lockable casters</li> </ul>	<ul style="list-style-type: none"> <li>weight</li> <li>• 8 inch deep sink may require lifting through more water</li> </ul>
	<b>Approximate Cost:</b>	\$1,200 plus freight	
	<b>For more information:</b>	Mallory Lynch <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a>	
<b>URL:</b>	<a href="http://www.eaglegrp.com/LitLib/eg50.04.pdf">http://www.eaglegrp.com/LitLib/eg50.04.pdf</a>		



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## Dining Product Recommendations

Function: Storing 1-Gallon Sanitizer and Soap on Wall

Equipment: 1-Gallon Wall Unit

	<b>Criteria:</b>	Small wall unit to store sanitizer and soap on wall	
	<b>Application:</b>	Placing 1-gallon soap and sanitizer on wall to eliminate placing 5 gallon products on the floor	
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Autoclor	1-Gallon Wall Unit	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>• Lightweight and attaches directly onto wall</li> <li>• Holds two 1-gallon containers</li> <li>• Eliminates storing 5-gallon containers on floor</li> </ul>	None reported
	<b>Approximate Cost:</b>	Free when purchasing Autoclor sanitizer and soap	
	<b>For more information:</b>	Mallory Lynch, UCB <a href="mailto:mlynch@uhs.berkeley.edu">mlynch@uhs.berkeley.edu</a>	
<b>URL:</b>	None		
<b>Make</b>	<b>Model</b>	<b>Comments</b> (Pros and Cons)	
Ecolab	Wall-mount unit	<b>PRO:</b>	<b>CON:</b>
		<ul style="list-style-type: none"> <li>• Lightweight and attaches directly onto wall</li> <li>• Holds a 1-gallon container</li> <li>• Eliminates storing 5-gallon containers on</li> </ul>	None reported

		floor	
	<b>Approximate Cost:</b>	Free when purchasing Ecolab products	
	<b>For more information:</b>	Kristie Elton, UCR <a href="mailto:kristie.elton@ucr.edu">kristie.elton@ucr.edu</a>	
<b>URL:</b>	None		

# Appendices



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## Ergonomics Study of Dining Services 2011

### *Questionnaire: Identify Top At-Risk Tasks*

**Instructions:** Please complete the questionnaire by providing answers to the following questions. Your completed questionnaire can be returned to [kristie.elton@ucr.edu](mailto:kristie.elton@ucr.edu) by August 19, 2011. *Please note that your completed answers will be included in the final project report.*

**1. With respect to ergonomics, what are the top 5 at-risk tasks for your location’s dining service workers (1 being the most at-risk, 5 being the least)?**

- 1.
- 2.
- 3.
- 4.
- 5.

**2. What interventions have you implemented for these at risk tasks and what was the outcome?**

Task	Intervention (with approximate cost)	Outcome
1		
2		
3		
4		
5		

**3. What other interventions are you currently considering?**

Task	Other Interventions
1	
2	
3	
4	
5	



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September 29, 2011

Dear UC Ergonomists-

The following is a questionnaire created by the Dining Services Project Team designed to collect information from all UC locations that will assist us with the Dining Services project. We are asking that each of you complete the attached questionnaire with information specific to your location. It is our team's goal to use this information to create the following documents: *design guidelines for dining areas, best practices bulletins, and recommended product lists.*

The questionnaire has five pages and each page contains a set of questions that addresses one of the top 5 at-risk tasks. These include:

1. Food Preparation (the repetitive tasks)
2. Manual Material Handling in the kitchen areas
3. Stockroom Duties
4. Transporting Food (catering, patient food distribution)
5. Dishwashing

As you complete this questionnaire, please consider the following:

1. The information is best communicated when you schedule an in-person meeting with dining services (in the dining area) to discuss the answers. We recommend that you meet with supervisors and/or managers to review SOP's and any design issues. We also recommend that you spend time with front-line employees to gain their perspective on the task issues.
2. While meeting with dining, please ask to see the equipment and tasks so that you can best understand how you want to record their feedback.
3. We are asking that you take the time to compile the answers in the attached questionnaire (electronic format). You may complete your answers following each question.
4. Please provide your answers in a *concise, bulleted* format.

We envision that this will take a significant amount of your time and appreciate your contribution to this project. The ease with which we can complete this project and the quality of the product is dependent on the information that we collect from this questionnaire. ***Completed questionnaires are due to Kristie Elton on or before October 25<sup>th</sup>.***

Thank you for your assistance with this project,

The Dining Services Project Team

## Food Preparation Areas

Describe (show me) the steps for the following tasks:

1. Scooping tasks
2. Stirring tasks
3. Chopping tasks
4. Cutting tasks
5. Peeling tasks
6. Cooking/baking tasks
7. Opening containers (cottage cheese, yogurt, etc.)
8. Sushi preparation
9. Other food preparation activities not listed

*Employees:* What do you find are the most difficult tasks to do?

1. What process changes have you implemented/ would you like to implement to make any of these tasks easier to perform?
2. What equipment or tool changes (i.e. automation) have you implemented (or would you like to implement) to make any of the tasks easier to perform (*either more efficient or less physically demanding on the worker*)? (Make/ model)
3. What have you tried that has not worked well?
4. Do you have height-adjustability in your food preparation areas? If so, please describe the equipment used or modifications made.
5. If you could re-design the work spaces to make these tasks easier what changes would you make?
6. What design changes have you implemented that have improved work flow, efficiency, or reduced injury risk?

## Manual Material Handling

Describe (show me) the steps for the following tasks:

1. Moving, lifting large mixing bowls
  2. Moving, lifting large beverage containers in/out of dispensers
  3. Loading/ unloading ice (drink dispensers and salad bars)
  4. Transporting pans in/from prep area, ovens, steamer rack, to serving areas
  5. Removing food from large kettles to serving containers
  6. Unloading food from tilt skillets to food containers
  7. Changing used fryer oil
  8. Loading and cleaning soft serve ice cream dispensers
  9. Moving small but heavy kitchen equipment (ex. waffle iron, rotisserie)
- 
1. What do you like or not like about the process? What could you do/ have you done to improve the process?
  2. Is there any equipment that you are using to make this task easier? (Make and model)
  3. Any other ideas that you have that you believe would help?
  4. What have you tried that has not worked? Why not?
  5. If you could re-design the work space to make any tasks easier, what changes would you make?
  6. What design changes have you implemented that have improved work flow, efficiency, or reduced injury risk?

## **Stockroom**

Describe (show me) the steps for the following:

1. How materials are delivered (ex. pallets, floor)
2. How materials are transferred from the loading dock into the storeroom
3. How materials move from the storeroom to the desired location

1. What do you like or not like about the process? What could you do/ have you done to improve the process?
2. Do you have a central storage area/commissary? How is that operation organized?
3. How do vendors assist storekeepers?
4. What is the most difficult part of your job?
5. If you could change something what would that be? How often do deliveries occur? What is the average weight/volume?

### ***Equipment***

1. What equipment do you use on the loading dock to move goods and how well does it work?
2. Is there any equipment that you are using to make this task easier? (Make and model)
3. What other equipment do you think will help you do your job? (Make and model)

### ***Organization***

1. How are the storeroom, cooler, and freezer organized? What is your standard process?
2. Do you have dedicated storeroom space for all materials?
3. Describe any problems with the locations of your storerooms, coolers, and freezers. Where should they be to make work easier for everyone?
4. Who accesses the storeroom and what are potential safety issues with these employees?
5. Could you change the organization of the storeroom, freezer, or cooler to make the task easier?
6. What other tasks do you find challenging? (ex: annual cleaning, re-arranging the stockroom, computer work)
7. If you could redesign the workspace to make any easier, what changes would you make?
8. What design changes have you implemented to improve workflow or reduce risk of injury?

## Food Transportation

Describe (show me) the steps for the following tasks:

### *Patient Food Distribution*

1. Load patient food trays (food/beverage/utensils) on/off of food carts or other transport devices for delivery.
2. Push/Pull carts or other transport devices to/from kitchen to patient rooms or other designated areas over various surfaces.
3. Carry/Deliver patient trays from cart to patient rooms or other designated areas.
4. Retrieve patient food trays and miscellaneous items and transport to dish room
5. Unload food carts in dish room (kitchen), general clean up

### *Catering*

1. Obtain/place prepared catered items (food, drinks, serving items, utensils) on carts, vehicles, etc.
  2. Push/pull carts/transport devices from prep area/kitchen to specified locations
  3. Unload catered items from carts, vehicles, etc.
  4. Carry, delivery and placement of catered items (food, drinks, serving items, utensils) at designated areas.
  5. Retrieval of catered items, clean-up or other related or additional tasks.
- 
1. What do you like or not like about the process? What could you do/ have you done to improve the process?
    - Medical centers: please investigate issues related to timeliness of patient food delivery
    - Please also consider if the food transported over long distances, uneven or varied terrain, inclines or stairs, etc.
  2. Is there any equipment that you are using to make this task easier? (Make and model)
  3. Any other ideas that you have that you believe would help?
  4. What have you tried that has not worked? Why not?
  5. If you could re-design the work space to make any tasks easier, what changes would you make?
  6. What design changes have you implemented that have improved work flow, efficiency, or reduced injury risk?

## Dish Washing

Describe (show me) the steps for the following tasks:

### *Dish Room*

1. Collecting, washing, cleaning dirty dishes and glassware (including use of an overhead hose)
2. Washing dishes by hand (for locations without a dish machine)
3. Collecting, washing, cleaning and sorting silverware
4. Placing dirty items in dish machine and retrieving clean items (if applicable)
5. Transporting dishes, glassware and silverware within the dish room
6. Transporting dishes, glassware and silverware outside the dish room

### *Pots and Pans*

1. Moving and lifting pots/pans to the sink
  2. Washing and scrubbing pots and pans (include using the overhead hose)
  3. Dispensing the cleaning solution into the sink
  4. Putting clean pots/pans away
  5. Transporting, loading, and unloading dirty pots/pans to/from pot washing machine (if applicable)
1. What do you like or not like about the process? What could you do/ have you done to improve the process?
  2. Is there any equipment that you are using to make this task easier? (Make and model)
  3. How have you reduced reaching and heavy lifting or lifting multiple items?
  4. Regarding dish room task #1, is the collection process on trays or tray-less?
  5. Regarding cleaning solutions:
    - Are the containers located on the floor or somewhere else?
    - Is the solution dispensed automatically or manually? If automated, which system are you using?
    - If you could re-design the work space to make this task easier, what changes would you make?
  6. Any other ideas that you have that you believe would help?
  7. What have you tried that has not worked? Why not?
  8. If you could re-design the work space to make any tasks easier, what changes would you make?
  9. What design changes have you implemented that have improved work flow, efficiency, or reduced injury risk?



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## Safe Manual Material Handling

Many jobs require frequent lifting, carrying, pushing, pulling, lowering and raising materials by hand. These job tasks are often referred to as manual materials handling. Staff who lift or perform other materials handling tasks may be at risk for back or other injuries. These injuries may be prevented by redesigning jobs and practicing safe lifting.

### Layout of Work Area

- The layout of work areas can be arranged to prevent awkward postures such as bending, twisting, and over-reaching
- Work surfaces should be at waist height, or height-adjustable, to prevent bending
- There should be sufficient space to turn around and prevent twisting
- Materials should not be stored directly on the floor
- Frequently used and heavy items should be stored between knee and waist height
- Elevated platforms or step stools should be provided to reach items above chest level

### S.M.A.R.T. Lifting Technique

#### *Size up the load*

- Assess the size, weight, and shape. Remove obstacles from the load (such as loose wrapping materials).
- Assess whether the load actually needs to be moved
- Where is the load going to be placed? Remove obstacles from your path.
- Determine whether mechanical or human assistance is required



#### *Move the load as close to your body as possible*

- The whole hand should be used to ensure a firm grip

#### *Always bend your knees*

- Maintain balance
- Keep feet apart and in a comfortable position
- Minimize bending at the waist
- Bend your knees to a semi squat

#### *Raise the load with your legs*

- Lift smoothly, without jerking
- Maintain the normal curve of your spine throughout the lift

#### *Turn your feet in the direction that you want to move the load*

- Avoid unnecessary bending, twisting, and reaching
- Change direction by turning your feet and not your back
- To set down a load, squat down and keep your head up. Let your legs do the work



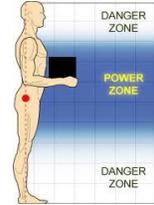
Move Close

Firm Grip

Bend your  
kneesLift with  
your legs

## The Power Zone

The power zone for lifting is close to the body, between mid-thigh and mid-chest height. Comparable to the strike zone in baseball, this zone is where the arms and back can lift safely with the least amount of effort. (See picture)



## Team Lifting

- Team lifts are appropriate if:
  - The load is too heavy for one person
  - The load is large, bulky, or oddly-shaped
  - If you feel uncomfortable lifting the load by yourself
- Whenever possible, team member should be of around the same height and build. If this is not possible, taller members should be at the back.
- Designate a lift leader, who:
  - Plans and coordinates the lift
  - Provides simple and clear instructions
  - Ensures that you lift and lower the load together
- Assess the weight of the load
- Follow the S.M.A.R.T. lifting technique
- The lift leader should ensure that all team members are comfortable once the load has been lifted. If not, the load should be carefully and immediately lowered.



## Overhead Loads

- Always use a stool or ladder to lift loads above chest level
- Test the weight of the load before removing it from the shelf
- Slide the object toward you, to the edge of the shelf
- Hold the load close to your body as you lower it

## Awkward loads

- Sometimes different lifting techniques need to be adopted to move awkward loads

### Over-sized or Odd-shaped

- In many cases, oversized loads may be light enough to carry, but block vision or may be difficult to hold. In such cases, use mechanical assistance or seek help from a co-worker.

### Long, light objects

- Support the load on your shoulder
- Keep the front end higher than the rear

## Pushing and Pulling

- Keep your back straight, avoiding excessive bending or twisting
- Use your legs to push or pull
- Keep the load as close to your body as possible
- When using mechanical aids to push and pull, the handles should be positioned at a height between the shoulder and waist
- When pushing on a slope or ramp, ask for assistance whenever necessary. Keep in mind that the incline can significantly increase the forces
- Uneven loads also require increased push and pull forces

## References:

Occupational Safety & Health Organization (OSHA). *Ergonomics eTool: Solutions for Electrical Contractors*. <http://www.osha.gov>. Web. 12 January 2012  
Centers For Disease Control and Prevention (CDC). *Ergonomic Guidelines for Manual Material Handling*. <http://www.cdc.gov>. Web. 12 January 2012.  
Health and Safety Executive. *Getting to Grips with Manual Handling*. <http://www.hse.gov.uk> INDG143(rev2)September 2011. Web. 12 January 2012.



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## Safe Manual Material Handling

### *For Management and Supervisors*

#### Identifying Hazards

Not all manual handling tasks are hazardous. A manual task becomes hazardous when it involves one or more of the following:

- Repetitive or sustained application of force (stirring viscous liquids)
- Repetitive or sustained awkward posture (bending, twisting, or over-reaching while cleaning grills)
- Repetitive movement (stocking several cases of canned foods)
- Prolonged positions (standing for long periods of time)
- Application of high force (moving/lifting cases of food)
- Tasks involving handling of unstable or unbalanced loads (carrying large or oddly-shaped loads such as an ice sculpture)

The following information is designed to help you minimize the hazards of manual material handling within your dining facilities.

#### Layout of Work Area

- The layout of work areas can be arranged to prevent awkward postures such as bending, twisting, and over-reaching.
- Work surfaces should be at waist height, or height-adjustable, to prevent bending
- There should be sufficient space to turn around and prevent twisting
- Materials should not be stored directly on the floor
- Frequently used and heavy items should be stored between knee and waist height
- Elevated platforms or step stools should be provided to reach items above chest level

#### Management Guidelines for Safe Lifting and Carrying

- Plan the workflow to eliminate unnecessary lifting
- Organize the work so as to gradually increase physical demands and work pace
- Slide, push or pull instead of carrying, whenever possible
- Reduce the distances that loads are carried to a minimum. Use equipment for longer distances.
- Minimize the vertical distances loads are lifted and lowered
- Avoid manually lifting or lowering loads from/to the floor
  - Store products and materials off of the floor
  - If needed, arrange for materials to be delivered on pallets and keep the materials on pallets during storage
  - Use mechanical assistance to lift or lower an entire pallet, rather than lifting and lowering the material individually
  - Arrange to have material off-loaded from vendor directly onto storage shelves
  - Use mechanical assistance whenever possible
- For loads that are unstable and/or heavy
  - Tag the load to alert workers
  - Test the load for stability and weight before carrying the load

- Use mechanical devices to lift
- Reduce the weight of the load by:
  - Putting fewer items in the container
  - Using a smaller container
- If necessary, repack containers so that contents will not shift and the weight is balanced
- Use team lifting only as temporary measures in lieu of measures identified above
- Reduce the frequency of lifting and the amount of time employees perform lifting tasks by
  - Rotating workers in lifting tasks with other workers in non-lifting tasks
  - Having workers alternate lifting tasks with non-lifting tasks
- Clear spaces to improve access to materials or products being handled. Easy access allows workers to get closer and reduces reaching, bending, and twisting.

## **Guidelines for Equipment Use**

### ***Equipment***

- Know your loads and buy equipment of appropriate capacity
- Choose equipment appropriate for the materials being handled, the layout of your workspace, and the tasks being performed
- Consider using powered equipment when required forces are excessive
- Select equipment with vertical handles so the workers' hands are in their power zone (between thigh and mid-chest height)
- Choose wheeled equipment which minimizes start forces and reduces rolling resistance
- Ground all electrically-operated equipment
- Ensure that equipment alarms and warning devices are audible and working properly
- Inspect and maintain equipment according to manufacturers' recommendations
- Follow all manufacturers' recommendations for proper equipment use

### ***Work Environment***

- Clear aisles and doorways for safe passage and maneuvering of equipment
- Set barriers that prevent employees from coming close to or beneath supported or moving loads
- In tight spaces, use equipment with four swivel casters or wheels, making loads easier to turn and control.

### ***Work Practices***

- Train employees on proper use of equipment and appropriate work practices
- Push and pull equipment using proper body mechanics
- To move heavy loads over long distances, either reduce the load or use powered equipment
- Inspect loads before loading or moving them

## **References**

Centers For Disease Control and Prevention (CDC). Ergonomic Guidelines for Manual Material Handling. <http://www.cdc.gov>. Web. 12 January 2012.

T.R. Waters, "Manual Material Handling", in: Physical and Biological Hazards of the Workplace (Second Edition). Edited by P. Wald and G. Stave. New York: John Wiley and Sons, 2002.

## Ergo checklist For Manual Material Handling Tasks

This checklist can be used as a tool to quickly identify potential risks with manual material handling tasks. “Yes” responses are indicative of conditions that present a risk of injury (especially to the lower back). The greater number of “yes” responses that are noted, the greater the potential risk.

Risk Factor	Yes	No
<b>General</b>		
Does the load exceed 35 pounds?		
Is the object difficult to bring close to the body because of its size, bulk, or shape?		
Is the load difficult to handle because it lacks handles or cutouts for handles, or does it have slippery surfaces or sharp edges?		
Is the footing unsafe? (e.g. slippery floor, incline, or uneven surfaces)		
Does the task require fast movement such as throwing, swinging, or rapid walking?		
Does the task require stressful body postures (e.g. stooping to the floor, twisting, reaching overhead, excessive side bending)?		
Does the task require working in extreme temperatures, with noise, vibration, poor lighting, or airborne contaminants?		
Does the task require working in a confined area?		
<b>Specific</b>		
Does the lifting frequency exceed 5 lifts per minute?		
Does the vertical lift distance exceed 3 feet?		
Do carries last longer than 1 minute?		
Do tasks require that require large sustained pushing or pulling forces exceed 30 seconds in duration?		
Do tasks require extended reaching that exceeds 1 minute in duration?		



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## Ergonomic Pilot Project Application

### *Dining Services*

UCOP Risk Services would like your help in reducing the ergonomic risk factors and risk of injury associated with:

- Material handling
- Food preparation
- Dish room tasks
- Transporting (catering and/or patient food distribution)
- Storeroom tasks

As an ergonomist, you can help reduce injury risk by working directly with your dining services staff to apply for a grant from UCOP. The grant is intended to fund a pilot initiative that will reduce ergonomic risks. There is a \$5,000 limit per location. You should establish a trial period for your pilot and be prepared to have the employee participants fill out the equipment effectiveness tool (provided) to help establish the effectiveness of the product(s) you select. Please email completed applications directly to Erike Young, Director of Environmental Health and Safety.

Date:	
To:	Erike Young, Director of Environmental Health and Safety University of California, Office of the President <a href="mailto:Erike.Young@ucop.edu">Erike.Young@ucop.edu</a>

APPLICANT INFORMATION	
UC Location:	
Ergonomist Name:	
Address:	
Phone Number:	
E-mail Address:	

## PILOT PROJECT

Identify which at-risk task you wish to address (see list above):

Name of the department piloting this project:

Provide a brief history of ergonomic interventions for this task at your location:

What recommended product would you like to test? (Please select from the Recommended Product Sheets):

Approximate Cost of product(s):

Quantity:



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## Ergonomic Equipment Satisfaction Survey

Your feedback is important to us. Please take a few moments to complete this form and return it to your supervisor.

Date: \_\_\_\_\_

Department: \_\_\_\_\_

Name of equipment being evaluated: \_\_\_\_\_

**Using the scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent**

1. How would you rate your overall satisfaction with this equipment?    1    2    3    4    5
2. Did you receive training on the proper use of this equipment?    Yes    No
3. If so, how well did the training prepare you to use this equipment?    1    2    3    4    5
4. To what extent will this equipment make it easier to do your job?    1    2    3    4    5

5. Please list the specific work activities where you used this equipment:

6. How often would/do you use the equipment?

Daily                       Frequently                       Seldom

7. Please indicate the features you liked on this equipment:

8. Please indicate the features that need improvement on this equipment:

9. Additional comments: