

ERGONOMIC INTERVENTIONS FOR A PUBLIC LIBRARY CIRCULATION COUNTER

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Abstract

With a range of both employee and patron heights and body dimensions, the typical fixed height design of library circulation counters often results in non-optimal working postures. The library assessed in this project underwent a major expansion in the early 1990's, resulting in increased usage of the facility and a concurrent increase in the number of materials processed by the employees working at the circulation counter. An increase in staff reports of repetitive strain injuries followed. Challenges included designing for a large range of staff member heights while addressing the needs of wheelchair library users, placement of scanning equipment for magnetic and non-magnetic media to optimize good working postures while minimizing risk of accidentally deleting information on magnetic media, and determining the appropriate size for the work triangle to optimize efficiency. Recommendations included the redesign of the area using height adjustable work surfaces, updated technology for scanning items, improved flooring, a smaller work triangle and improved work flow.

Key words: library circulation counter design

INTERVENTION ERGONOMIQUE AU COMPTOIR DU PRÊT D'UNE BIBLIOTHÈQUE PUBLIQUE

Résumé

En raison du large éventail de hauteurs et de dimensions corporelles des employés et de la clientèle, la hauteur fixe typique des comptoirs de prêts des bibliothèques municipales est souvent la cause de postures de travail non optimales. La bibliothèque évaluée dans le cadre de ce projet a connu une expansion importante au début des années 1990, ce qui a entraîné un usage accru des installations et, simultanément, un nombre accru de documents traités par les employés au comptoir du prêt. Le nombre de microtraumatismes répétés signalés par les employés a augmenté par la suite. Il fallait relever certains défis, notamment, concevoir des installations adaptées au large éventail de hauteurs des employés, répondre aux besoins des usagers en fauteuil roulant, placer un dispositif de balayage pouvant convenir aux ressources magnétiques et non magnétiques afin d'optimiser les postures de travail tout en minimisant le risque de suppression accidentelle des renseignements des ressources magnétiques et déterminer la taille appropriée du triangle de travail afin d'en maximiser l'efficacité. Parmi les recommandations formulées : aire de travail réaménagée et pourvue de surfaces de travail de hauteur réglable, appareils de balayage de pointe, meilleur couvreur-planer, triangle de travail plus petit et déroulement des opérations mieux organisé.

Mots clés : conception d'un comptoir de prêt de bibliothèque

INTRODUCTION

This paper reviews the concerns and recommendations resulting from the ergonomics assessment of a public library circulation area. The library evaluated has been experiencing continuing growth and in the mid-90s an expansion of the facility took place to increase the floor space by over 150%. While creating a more spacious and inviting atmosphere, the circulation area was poorly designed creating both work flow problems and physical discomfort for staff members. Complaints included foot, leg and back fatigue from standing and walking on hard flooring, wrist, arm and shoulder symptoms related to repetitive handling of items during check in and check out, neck discomfort related to viewing monitors at improper heights and shorter staff members raising their shoulders and elbows to work at counters too high for them, and back discomfort for taller staff bending to work at the counters. Some employees were observed wearing wrist braces and in 1998, a letter was received from WCB indicating that 3 loss time claims had been submitted as well as other no loss time claims. One individual was off for 2.5 years over a four year time span.

As a result of the claims and work flow problems, the staff initiated meetings to discuss the issue and used the booklet entitled "Ergonomic Design Guidelines for Libraries" (5) available from the Vancouver Public Library along with general ergonomics guidelines available in books and on the Internet to make some changes to the workstations. The staff also visited other libraries to view ways that these facilities dealt with similar problems. In the circulation area, these changes included using monitor blocks to raise the monitors, placing a complete set of supplies at each check out station, installing video openers on the counters, providing a chair at the inside book drop and using job rotation strategies. While these changes, improved the physical work environment, they did not address the larger issues of the work flow, working heights and repetitive manipulation of items and it was decided that further assessment and intervention was required.

A review of literature and internet search was largely unsuccessful in finding specific research around circulation counter design. The most complete document found for general guidelines was "Ergonomic Design Guidelines for Libraries" (5). The remaining literature that was available, tended to focus on individual workstations, similar to those found in office environments (1,2). An example of a height adjustable surface used for an information reference desk in a library was found but the station did not require the scanning and sensitizing equipment used in this application (3). Most of the Internet information has been set up by libraries and generally state that occupational repetitive strain type injuries have been increasing. A project completed at Cornell University surveyed 58 public libraries in 1990 with 44.7% of the responding 38 libraries reporting at least one employee with a repetitive strain type injury (4).

GENERAL DESCRIPTION OF CIRCULATION COUNTER JOB DUTIES

Five full time and four to six part time staff work in the adult services area, while two full time and two to three part time staff work in children's services. Shifts for the full time staff are from 8:30am to 5:00pm and from 12:30pm to 9:00pm. The main job duties include checking the holds and phoning patrons to let them know the books are in, checking out materials, checking in materials, manning the fiction desk (adult services only and not part of the circulation area), and assisting patrons. Two check out terminals and one check in area are set up in each of the adult and children's areas. Approximately 600,000 items are loaned from the library per year and each staff member working in the circulation area handles approximately 200 items per day.

The check in process involves collecting the items from the outside, adult services and children's services book drops and using a book truck, basket or carrying the items to transport them to the respective adult or children's services check in area. The items are then scanned using a wand and re-sensitized. The video, CD and cassette boxes are opened to check the contents, and the videos and cassettes are re-sensitized using a special re-sensitizer for magnetic media. Items are sorted as they are checked in and those from other libraries in the area system are placed in the appropriate bin located under the back counter. At the check out area, the patron places their items on the counter and provides his/her library card. The staff member scans the patron's library card, scans the bar code on each item and desensitizes the items. Scanning is done using a pen type wand and CD, video and cassette tape boxes are opened to check the contents. The security strips for videos and cassettes are on the item and therefore the video or cassette must be removed from its case to desensitize it. To assist in opening video boxes, case openers have been attached to the work surface. During the check out process, information on any patron fines or book holds will show on the computer screen. Payment for fines is collected and a cash register located on the back counter of adult services is used to provide change and issue a receipt.

CONCERNS IDENTIFIED

Work Triangle

The current layouts of the adult and children's services circulation areas are shown in figures 1 and 2 respectively. When the library expansion took place, a large circulation area was provided with too large of a work triangle. This resulted in more walking and carrying of materials than necessary.

Flooring

The most common complaint by the staff members concerned the flooring. Long periods of standing required in the circulation areas has resulted in foot, leg and low back muscle fatigue, discomfort and pain. The current flooring is carpet and underlay over cement.

Circulation Area Counter Heights

While the height of staff members working at the counter ranges from 4'10" to 6'2", the height of the check out counter is fixed at 40 inches from the floor. Unfortunately there is no single height for a work surface that will accommodate the variation in heights of these individuals. A countertop at "average" height will be too high for shorter individuals resulting in lifting of the shoulders and arms, and too low for those that are taller resulting in forward bending. Traditionally in ergonomics literature, it is recommended that the surface height be placed appropriately for the tallest person and then that the shorter individuals be raised on platforms. In this environment, this is not practical given the number of platforms that would be needed, the potential tripping hazard created and because the workstation is not dedicated to one staff member for any period of time.

Check in Process

Books are gathered from the inside book drop and carried, in stacks, approximately 12 feet to the check in area. A truck may be used to transport the items, however this is often not the case as it takes longer and requires an additional lift to move the items from the truck to the counter. A chair is now sometimes used when retrieving the books from the bin, however forward or side bending is still required. Wrist twisting type motions in combination with a pinch grip to grasp the wand are used to scan in the bar code. Grasping of the item in combination with one handed lifting of the item is used to turn the item over when necessary for scanning, and to move the item over the re-sensitizer sitting on top of the surface.

Finger manipulation is also required to open the CD, video tape and cassette boxes. The back counter surface where the check in is performed is too narrow resulting in the items being lifted from one side of the computer terminal to the other as there is no space to slide them in front of the terminal.

Check out Process

Similar wrist motions and grasping are required as for the check in process to use the wand to scan the library card bar code and the item bar codes, manipulate the items, and lift them onto the desensitizer sitting on the surface.

Monitor Heights

The monitors at the circulation desks are at a fixed height and cannot be easily rotated to allow patrons to view the screen when necessary. This is a problem primarily for the taller staff as they must bend their necks and/or backs forward to view the screen.

RECOMMENDATIONS

Flooring

Cushioned flooring, such as used in some weight rooms, was recommended. The flooring should be slightly compressible but still firm enough to allow the book trucks to be easily rolled over it.

Circulation Area Counter Heights

Height adjustable surfaces with a range of 36 to 45 inches (5th percentile female to 95th percentile male, floor to elbow height) from the floor were recommended for the check in and check out areas. Not only would this allow the surface to be adjusted appropriately for the staff member, but the surface could also be lowered to accommodate patrons using wheelchairs. The height adjustment should be easy to make and the surfaces should have the load capacity to support the required equipment. The design will need a telescoping panel such that there is no gap between the surface and the front wall (from the patron's perspective) when the surface is raised.

Check in/Check out Process

To both reduce the work triangle and decrease materials handling, it was recommended that a height adjustable surface for check in be placed immediately next to the adult book drop. There is no space for an additional surface next to the children's book drop and therefore it was suggested that the children's book drop be closed and that the adult and children's area staff rotate through the check in duty in the adult area. Use of a spring loaded base in the book drop to raise the items to a better height as they are removed was recommended.

For both the check in and check out processes, it was recommended that the sensitizers/desensitizers be counter sunk into the surface so that the items do not have to be lifted onto them. The staff were asked to trial various layouts to determine the best one considering reach distances and positioning of the book desensitizer to minimize risk of damage to magnetic media, before countersinking the equipment. Alternative scanning devices were also recommended. Devices that allow scanning and sensitizing/desensitizing at the same time are available, although quite expensive. Another alternative that was viewed in other libraries, was use of hand scanners that could be either left in their mounts with the books just moved under them, or could be held with the hand using a power grip.

Monitor Heights

Height adjustable monitor lifts, through fingertip control, that also allowed the monitors to be easily rotated for patron viewing, were recommended.

IMPLEMENTATION

A number of the recommendations were implemented in the fall of 2000. Height adjustable surface inserts were placed into the countertop at the 4 check out areas. These are easy to adjust through an electric motor with a toggle control. Interlocking safety matting was placed throughout the circulation area. Most sensitizers and desensitizers were countersunk, although there are a few remaining to be completed. A height adjustable surface was placed next to the adult book drop, however there has been resistance to the idea of using one book drop area for both the adult and children's areas. Pneumatic fingertip control monitor lifts were installed and hand held scanners with mounts were placed at the check out areas.

STAFF FEEDBACK AND DISCUSSION

A staff survey in March, 2001 indicated that all employees liked the flooring and the majority found the adjustable height surfaces worked well. Those employees who do not use the height adjustment reported that they were of average height and the former fixed height surface was appropriate for them. Countersinking the sensitizers/desensitizers and providing the mounted hand scanners has reduced awkward wrist postures and grasping. Ten employees specifically reported that their symptoms had been reduced or eliminated.

Continuing problem areas identified by the staff were lack of foot rails under the surfaces (these have been added since the survey), back counter used for children's check in is still fixed, 2 desensitizers need to be countersunk, remaining wand type scanners should be changed to hand scanners. In retrospect, it was also decided that that it would have been better to completely redo the full circulation counter rather than just cutting out the areas for the adjustable surfaces.

Given the materials handling and repetitive nature of the work performed by library staff, increasing consideration should be given to providing a flexible working environment. The changes instituted at this library have not only reduced the physical demands and increased comfort at work, but there has also been a noticeable increase in the number of wheelchair users (height adjustable computer stations, specialty keyboards, pointing devices and software were also implemented within the overall project) and positive comments from patrons on the changes.

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