Manual Handling Hazards in University Libraries

By THE UNIVERSITIES SAFETY ASSOCIATION WORKING GROUP ON MANUAL HANDLING IN LIBRARIES*

* Enquiries should be addressed to Dr David Veale, University Safety Officer University of Warwick, Coventry CV4 7AL.

Abstract

A Working Group of the University Safety Association was formed in 1998 to address concerns about manual handling issues in libraries. The Group consisted of library staff, health and safety advisers, occupational health nurses and an ergonomist. Discussions resulted in the production of a guidance document. The Group also developed a questionnaire as a tool for investigating the extent of work related upper limb disorder (WRULD) cases associated with manual handling in libraries. The questionnaire was sent to university libraries and 54 completed questionnaires, partially or fully suitable for analysis, were received from 39 different institutions. 3943 staff members in 137 libraries were represented.

26% of libraries reported at least one diagnosed or putative WRULD case. 75 cases were reported in total: an incidence of 18 cases per 1000 staff per year. WRULD cases were associated with administration, receiving and processing acquisitions, issue desk activities, re-shelving books, and other activities involving manual handling. 21 WRULD cases were reported amongst library staff who re-shelved books, 27 cases amongst staff working at book issue & return desks and 7 cases attributed to other manual handling activities (postal delivery duties, moving books during an emergency, photocopying, use of trolleys, processing new acquisitions and use of compact shelving).

The study demonstrated that WRULD injuries associated with a variety of manual handling operations were potential hazards in the library environment and that there is a need to take proactive measures to reduce the risk of injury.

Key words

Manual handling, university libraries, work related upper limb disorder, musculo-skeletal injury.

Introduction

Library staff perform a number of manual handling operations as part of their work. Examples are:

- book issue and return;
- re-shelving returned books;
- pushing book trolleys;
- moving book return boxes; and

- manual operation of movable stacks.

Although the weight of objects handled is not normally large, some repeated operations may involve the exertion of undesirable force, the use of uncomfortable handgrips and the adoption of static or awkward postures. The policy of some libraries of employing dedicated staff (e.g. for re-shelving books) may severely restrict the opportunities for job rotation and variation. Some staff may thus be at risk of developing work related upper limb disorder (WRULD) injuries of various types.

The Universities Safety Association is a body to which most UK Universities belong. It exists to provide an organisation for the exchange of information on all aspects of health, safety, environmental health, training and related topics (see http://www.kingston.ac.uk/hasweb/about.htm). Following concerns raised by a number of institutions, the Association set up a Working Group in 1998 to address manual handling issues in university libraries. The Group consisted of library staff (including a nominated representative of the Standing Conference of National and University Libraries, SCONUL), health and safety advisers, occupational health nurses and an ergonomist. 19 institutions were represented and the total membership was 32. The Group carried out discussions by a dedicated e-mail mailbase and occasional meetings. A guidance document, *Manual Handling in Libraries* (USA 2000) was produced and published as a special edition of the Universities Safety Association Digest in April 2000. Appendix A contains a list of Working Group members.

The questionnaire

Although there was evidence of WRULD cases associated with manual handling in a number of university libraries, the Group wanted to obtain more quantitative evidence of the size of the potential problem and decided to develop a questionnaire. This was originally drafted by Mr Bill Leslie (Safety Officer, Coventry University) and modified slightly after e-mail comments from the Group. The questionnaire was sent to University Libraries and University Health and Safety Advisers using e-mail mailbase groups to which Group members had access.

In the preamble to the questionnaire, WRULDs were described as encompassing a range of conditions affecting the soft tissues of the hand, wrist, arm, shoulder and neck and, typically, affecting tissues connecting muscles to bone (particularly the tendons), muscles and other soft tissues. Symptoms were described as prolonged fatigue, cramp, swelling, aching pain, tenderness, numbness or loss of ability to use the affected part. Risk factors were identified as the need to exert undesirable force, the use of an uncomfortable handgrip, the adoption of static or awkward postures and continuous repetitive work without sufficient rest and recovery. The HSE booklet *Work Related Upper Limb Disorders – A Guide to Prevention* (HSE 1990) was cited as a reference.

Recipients of the questionnaire were told that the Universities Safety Association had identified a trend whereby library staff in several institutions appeared to be suffering from work related upper limb disorder (WRULD) injuries. They were requested to complete the confidential questionnaire, giving details of any reported WRULD injuries (whether or not they resulted in time off work). Other manual handling injuries (such as books dropped on hands or arms struck by trolleys) were specifically excluded. Recipients were asked to

complete all questions and to send the questionnaire to the University Safety Officer at the University of Warwick for analysis. A contact address was given if people required clarification or assistance in completing the questionnaire**.** Copies of the questionnaire can be found at http://www.warwick.ac.uk/services/safety-office/libhand.htm.

Response to the questionnaire

56 completed questionnaires were received. Two contained insufficient data for analysis and were not included in the study. 35 institutions submitted single questionnaires and four submitted 7, 7, 3 and 2 questionnaires respectively. Some questionnaires contained data on several libraries in the same institution. Questionnaires were received from 28 Universities in England, six in Scotland, three in Wales and one in Northern Ireland. One response was anonymous. Most questionnaires received gave a contact address for further enquiries and, in a number of cases, these were required before the analysis could be completed.

Staff numbers

The 54 questionnaires included in the study gave details of 137 libraries. A total of 3943 staff were represented (of which some would have been part time). The average number of staff per library was 29. Numbers in individual libraries ranged from one to 213.

Number of Staff with WRULD

Respondents were asked to give numbers of staff that had suffered WRULD injuries from handling operations and asked to distinguish between medically diagnosed cases and conditions, which resembled WRULD but had not been confirmed as such. The preferred reference was given as the previous 12 months. Two questionnaires did not answer this question and were not included in the analysis.

In 41 questionnaires the reference period was either stated as 12 months or was not stated and assumed to be 12 months. These questionnaires represented 2800 staff in 105 libraries (average 27 staff per library). 24 of these libraries (23%) reported a total of 46 WRULD cases (six diagnosed and 40 putative). Ten questionnaires representing 25 libraries and 804 staff (average 32 staff per library) used a reference period other than 12 months. These ranged from three months to ten years (total 1343.5 person/years). Ten libraries (40%) reported a total of 29 WRULD cases (14 diagnosed and 15 putative). One other questionnaire (representing 157 staff in five libraries) recorded a putative WRULD case but did not state a reference period and was not included in the following table. The overall incidence from combining data for all reference periods (4143.5 person/years in total) is shown in Table I.

Combined reference periods			
	Diagnosed WRULD	**Putative WRULD**	**Total WRULD**
Cases Reported	20	55	75
Cases per 10^3 staff per year	4.8	13.3	18.1

Table I Incidence of WRULD amongst library staff

Overall, therefore, 35 out of 135 libraries (26%) reported at least one diagnosed or putative WRULD case. The average number of staff in libraries reporting cases was 60. The largest

number of diagnosed cases reported by a single library was six, the largest number of putative cases was five and the largest number of total cases was eight. It became clear, however, from answers to subsequent questions that the likely causes of WRULD in a number of cases were activities (such as work with display screen equipment) other than manual handling.

Activities associated with WRULD in libraries

Respondents were asked to allocate staff to 13 different task groups. Where staff undertook two or more tasks, they were to be allocated to the different groups in proportion to the time spent on each. Respondents were also asked to indicate the numbers of diagnosed and putative WRULD cases in each task group. Several respondents had difficulty completing this question and some said that it was difficult or impossible to allocate staff to the various groups. In the case of six questionnaires, the section was not completed and in a further ten cases the data was either incomplete or impossible to analyse. A summary of the replies from the remaining 38 questionnaires is given in Table II.

Work Activity	No. staff	Diagnosed WRULD	Putative WRULD	Total WRULD
Administration	201	6	3	9
Receiving & processing acquisitions	168	2	3	5
Cataloguing	168	$^1/_3$ *	1	$1^1/_3$
Issue desk activities	729	5	13	18
Shelving (dedicated)	366	1	5	6
Shelving (part time)	160	$1+^1/_2+^1/_3$ *	3	$4^5/_6$
Periodicals/serials management	105	0	0	0
Binding tidying duties	35	0	0	0
Shelf tidying duties	148	$^1/_2 + ^1/_3$ *	1	$1^5/_6$
Book drop maintenance	34	0	1	1
Media materials	16	0	0	0
Photocopier management	60	0	0	0
Other duties	580	1	1	2
Total	**2770**	**18**	**31**	**49**

* Owing to split duties, one case appears under "cataloguing", "shelving (part-time)" and "shelf tidying duties". A second case appears under both "shelving (part-time)" and "shelf tidying duties".

Table II Association of WRULD with library activities

The task group with the highest incidence of WRULDs was administration (equivalent to 45 cases per 1000 staff). It is suspected that several of the reported cases in this group were due to display screen use rather than manual handling. Other activities associated with WRULDs included:

- receiving and processing acquisitions (30 cases per 1000 staff);

- issue desk duties (25 cases per 1000 staff) ;
- shelving (dedicated and part time - 21 cases per 1000 staff);
- cataloguing;
- book tidying; and
- book drop maintenance.
- In some cases staff undertook a variety of duties and it was difficult to ascribe WRULDs to any one cause.

WRULD injuries to shelving staff

Of the 54 questionnaires analysed, 40 (74%) reported using dedicated shelvers and 14 (26%) did not. 38 questionnaires stated the number of dedicated shelvers employed: the total was 519 or an average of 13.7 per questionnaire (range one to 50 shelvers). The average continuous period of time that dedicated shelvers worked without a break ranged from less than half an hour to over three hours with the most common period by far being $1^1/_2$ to 2 hours. 38 questionnaires stated the length of shift for dedicated shelvers: this ranged from $^3/_4$ hour to six hours with the average being 3.0 hours. Six questionnaires out of 40 (15%) reported a total of 8 WRULD injuries to dedicated shelvers as shown in Table III.

Questionnaire	Diagnosed WRULD	Putative WRULD	Continuous period w/o break (h)	Shift length (h)
A	-	2	$2 - 2\ ^1/_2$	3 - 4
B	-	2	$2 - 2^1/_2$	4
D	-	1	$1^1/_2 - 2$	2
E	-	1	$1^1/_2 - 2$	4
F	1$	-	$1^1/_2 - 2$	3
G	-	1*	3	3

$ Shelving duties aggravated a pre-existing, non-work related condition.
* Possibly from previous sports injury.

Table III WRULD cases in dedicated shelvers

46 out of 54 questionnaires analysed (85%) indicated that other library staff also undertook shelving duties. 43 questionnaires stated the number of other library staff involved: the total was 1219 or an average of 28.3 per questionnaire (range one to 104 shelvers). The average continuous periods of time that other library staff worked on shelving duties without a break varied from less than half an hour to more than $1^1/_2$ hours with the most common period being $^1/_2$ – 1 hours. Ten questionnaires out of 46 (22%) reported a total of 13 WRULD injuries (five diagnosed and eight putative) to other library staff undertaking shelving as shown in Table IV.

Questionnaire	Diagnosed WRULD	Putative WRULD	Continuous Period without break (h)
B	1	-	Up to $^1/_2$
C	-	1*	$1^1/_2$ - 2
D	-	1	1 - $1^1/_2$
H	2*	-	$1^1/_2$ – 2
I	-	1	Up to $^1/_2$
J	1	-	$1^1/_2$ – 2
K	-	3	1 - $1^1/_2$
L	-	1	Up to $^1/_2$
M	-	1	1 - $1^1/_2$
N	1	-	Up to ½

* These cases also appear in Table VI.

Table IV WRULD cases in other library staff undertaking shelving duties

WRULD injuries to book issue and return staff

28 out of 54 questionnaires analysed (52%) stated that dedicated book issue/return staff were employed (though two of these indicated that this was not their sole duty). In 27 questionnaires, which indicated numbers of staff involved, a total of 655 staff were reported or 24.3 per questionnaire (range 8 - 88 staff). The continuous period of time that dedicated book issue/return staff worked without a break varied from less than half an hour to over $2^1/_2$ hours (with 1-2 hours being commonest). In 15 questionnaires that stated that there was a maximum period that dedicated book issue/return staff were required to work: the average period was 4.0 hours (range 2 - 7 hours). Nine of the 28 questionnaires (32%) reported a total of 11 WRULD injuries to dedicated book issue/return staff as shown in Table V.

Questionnaire	Diagnosed WRULD	Putative WRULD	Continuous Period without break (h)
E	-	1	1 - $1^1/_2$
J	2	-	1 - $1^1/_2$
M	-	1	$1^1/_2$ – 2
P	-	1	1 - $1^1/_2$
Q	-	2	1 - $1^1/_2$
R	-	1	2 - $2^1/_2$
S	1$	-	$1^1/_2$ – 2

T	-	1	$1^1/_2 - 2$
U	-	1*	$2 - 2^1/_2$

* could be due to display screen usage.
$ ascribed to winding mobile shelving.

Table V WRULD cases in dedicated book issue/return staff

40 out of 54 questionnaires (74%) indicated that other library staff also undertook issue/return desk duties. The total number of staff involved was 1036 or 25.9 per questionnaire (range two to 140 staff). The average continuous periods of time that dedicated book issue/return staff worked without a break ranged from under half an hour to over two hours (with 1-2 hours being commonest). 18 questionnaires stated that there was a maximum daily period staff could work at the issue desk: the average period was 3.1 hours (range 1-7 hours). Ten out of 40 questionnaires (25%) reported a total of 16 WRULD injuries as shown in Table VI.

Questionnaire	Diagnosed WRULD	Putative WRULD	Continuous Period without break (h)
C	-	1*	$1^1/_2 - 2$
D	1	1	$1^1/_2 - 2$
H	2*	-	$1 - 1^1/_2$
K	-	3	$1 - 1^1/_2$
L	-	1	Up to ½
T	-	1	$1^1/_2$- 2
V	1	-	$1 - 1^1/_2$
W	-	2	$1^1/_2 - 2$
X	-	1	$1^1/_2 - 2$
Y	-	2	$1^1/_2 - 2$

* These cases also appear in Table IV.

Table VI WRULD cases in other library staff undertaking book issue/return duties

Other duties which may have given rise to WRULD

14 questionnaires gave a positive response to a request for information on other duties that could have given rise to WRULD. Seven cases were attributed to manual handling. The putative causes were:

- postal delivery duties;
- moving boxes of books during an emergency (flood);
- photocopying;

- trolley use; and
- receiving and processing new acquisitions.

One respondent reported WRULD injuries to two staff, following the installation of compact shelving but as these were outside the reference period quoted by the library they are not included elsewhere in the analysis. A further 15 cases were ascribed to clerical work:

- use of display screen equipment (12 cases);
- cataloguing and classification (two cases); and
- typing catalogue cards and data input (one case).

Five cases could not be ascribed to a particular activity.

Other comments

Respondents were invited to make additional comments and these were received in 22 cases. Seven of the replies were about methodology or general issues. Some commented on the difficulty of attributing WRULDs to particular activity and two thought that the most likely cause of injury would be display screen use.

Four replies dealt with particular concerns, these included:

- emptying book bins;
- avoiding shoulder injuries from sliding books along shelves to create a gap;
- design and management of book drop boxes; and
- moving and stacking bulk deliveries.

The remaining replies dealt with good working practices. These included:

- giving all staff manual handling training before they start work;
- regular refresher training;
- giving staff a variety of duties;
- limiting periods of work for dedicated shelvers and issue desk staff;
- staff expected to follow safe systems of work with monitoring by supervisors;
- provision of suitable equipment (gloves, kick stools etc);
- trolleys fitted with large wheels and not loaded to capacity;
- reduction in trolley size;
- replacing equipment associated with WRULD injuries;
- job re-design in discussion with an ergonomics expert; and
- close liaison with and support from the university safety office.

One respondent mentioned using the publication *Battling with books* (Mason 1997).

The full text of the responses can be found at: http://www.csv.warwick.ac.uk/services/safety-office/libhand.htm

Conclusions

The use of questionnaires, such as the one used in this study, have a number of potential drawbacks, which include:

- a sample group which may not accurately reflect the situation in the sector as a whole;
- the inability to establish a conclusive association between a work activity and a medically diagnosed condition; and
- differences in interpretation of the questions by respondents.

However, they do have the advantages of being relatively rapid, easy to administer and giving an indication of a potential occupational health with the minimum expenditure of resources.

While it would be unwise to put too much emphasis on numbers and incidence rates, it does appear that a number of university libraries have, or have had, a significant problem with WRULDs among staff engaged in manual handling operations. Although in many cases the designation of injuries as WRULDs was putative, medical diagnostic confirmation was claimed in a substantial proportion of cases.

There does appear to be a link between shelving duties and WRULD with 8 injuries reported to dedicated shelvers and 13 to part-time shelvers. In at least 2 cases, however, staff had other duties involving manual handling and it would be difficult to determine the probable cause of injury. In the cases reported, there was no obvious link between the incidence of injuries and the length of work period without a break. There also appears to be a link between issue desk duties and WRULD with 11 injuries to dedicated staff and 16 injuries to staff undertaking book issue as part of their duties (which in some cases included shelving). Again, there was no obvious link between injury incidence and length of period without a break. The manual handling activities of book issue and return staff are similar to those of supermarket cashiers and the Health and Safety Executive study (HSE, 1998) is relevant. As well as injuries to the above categories of staff, seven further WRULD cases were associated with other manual handling activities. These findings clearly have relevance to libraries outside the higher education sector.

A number of control measures to reduce the risk of injury were suggested by questionnaire respondents. These could be grouped into:

- training and supervision;
- provision of suitable equipment;
- safe systems of work; and
- job variety and provision of adequate breaks.

Libraries clearly need to examine their activities carefully, identify areas of risk and take appropriate precautionary measures. This could have a fundamental impact on the way libraries are managed, affecting policies on:

- design of work areas and equipment;
- shelf heights and packing densities;
- aisle width;
- removal of infrequently used volumes from open shelves;
- storage position of heavy materials;
- binding policies (volume size of bound periodicals etc); and
- employment practices (use of dedicated staff etc).

Further library specific guidance is given in USA 2000, Mason 1997 and Herring & Wilson 1992. Useful general guidance is provided by Mital *et al.* 1997 and HSE 1990.

It is to be hoped that the application of relatively simple control measures will greatly reduce the risk to library staff from manual handling activities. If, however, problems prove to be more intractable, further and more detailed studies will be required. Techniques such as those described in McAtamney and Corlett 1993, HSE 1999, HSE 2000 and Mital *et al.* 1997 may be relevant.

Acknowledgements

Thanks are due to Allan Watson, Safety Adviser, University of Durham for setting up and maintaining the dedicated e-mail mailbase and to David Harrison, Director of the Health and Safety Unit, University of Birmingham for keeping a watching brief on behalf of the Universities' Safety Association Executive. Also to the many librarians who took time to answer our questions.

References

Health and Safety Executive, 1990**,** *Work related upper limb disorders – a guide to prevention,* HSG60, HSE Books, Sudbury.

Health and Safety Executive, 1998, *Musculoskeletal disorders in supermarket cashiers,* HSE Books, Sudbury.

Health and Safety Executive, 1999, *Evaluating change in exposure to risk for musculoskeletal disorders – a practical tool,* Contract Research Report 251/1999, prepared by the Robens Centre for Health Ergonomics; HSE Books, Sudbury.

Health and Safety Executive, 2000, *Musculoskeletal injuries from complex postures,* Contract Research Report 267/2000 prepared by Health, Safety & Engineering Consultants Ltd; HSE Books, Sudbury.

Herring, J and Wilson, P, 1992, *Library design guidelines,* Australian Services Union.

Mason, M, 1997, *Battling with books – Aspects of health and safety for library assistants,* Anglia Polytechnic University

McAtamney, L and Corlett, EN, *RULA -: a survey method for investigation of work related upper limb disorders,* Applied Ergonomics, 24(2), 91-99.

Mital A, Nicholson AS and Ayoub, MM, 1997, *A guide to manual materials handling (2nd edition),* Taylor and Francis, London.

Universities Safety Association, 2000, *Manual handling in libraries - a guide to reducing injuries from manual handling in libraries,* University Safety Association Digest (these guidance notes are temporarily out of print, enquiries should be addressed to Dr David Veale, University Safety Officer University of Warwick, Coventry CV4 7AL).

(3743 words)