

Table 1 A summary of the research investigating the efficacy of manual handling training in healthcare personnel

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Scholey (1983) (UK)	4 Nurses working on two wards	Within subjects design. Workplace intervention	6 patients agreed to have patient handling tasks practiced on them. Nurses were given feedback and shown improved techniques following a baseline assessment. They were encouraged to practice the new methods.	The patient handling tasks were repeated 3 weeks following training. Intra-abdominal pressure and observations of nurses posture and technique were compared pre and post training.	Training was effective in reducing the back stress for 3 of the 4 nurses. Intra-abdominal pressure actually rose however in the fourth nurse post training. It was noted that it was difficult to evaluate the effects of training due to many uncontrollable variables in the clinical situation. The nurses' tasks were not identical on repetition even with the same patients.	45%
Stubbs et al. (1983) (UK)	2 Nurses	Within subjects design. Workplace intervention.	At baseline both nurses performed 8 patient transfers, nurse 1 then received intensive training from an instructor. Nurse 1 later instructed Nurse 2, following this both nurses received further instructions.	The same lifting tasks were conducted 15 weeks following training. Intra-abdominal pressure was measured during each training session and comparison made.	Little improvement, as assessed by intra-abdominal pressure occurred throughout the training, or during the follow-up session, on some occasions a decrement in performance was actually observed.	41%

Table 1 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
<p>Troup and Rauhala (1987) (Finland)</p>	<p>106 intervention participants, 93 controls. All participants were student nurses.</p>	<p>Between subjects design. Education intervention at a nursing school</p>	<p>The experimental group received a modified training program whereby they received 20 hours of theory and practical teaching on ergonomics and biomechanics regarding working postures and patient transfers. Follow-up lessons on ergonomics were also provided throughout their training. The control group received traditional training.</p>	<p>Participants were assessed on two standardised patient transfer tasks upon completion of their training.</p>	<p>The trained group scored significantly higher marks than the control group on the transfer tasks. The mean score however for the trained group was still in the ‘poor’ range according to the assessment criteria.</p>	<p>41%</p>
<p>Wood (1987) (Canada)</p>	<p>Nurses from two units within a hospital received the intervention, nurses from a third unit formed a control group. Participant numbers not given.</p>	<p>Within and between samples design. Workplace intervention.</p>	<p>Intervention nurses were followed by a physiotherapist and advice on safe lifting procedures was given. Nurses also attended a 1 hour classroom session on body mechanics and correct lifting techniques.</p>	<p>The number of wage-loss claims due to back injuries filed by nurses were compared, between the experimental and control groups, over a 1 year period following introduction of the intervention.</p>	<p>The number of wage-loss claims over a 1 year period post intervention was 5 for the intervention wards and 7 for the control ward. It was concluded that the intervention was not effective.</p>	<p>47%</p>

Table 1 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Videman et al. (1989) (Finland)	87 intervention participants, 113 controls. All participants were student nurses.	Educational intervention at a nursing school.	Nurses enrolled between 1981-82 received standard patient handling training, nurses enrolled between 1983-84 received adapted training based on principles of biomechanics and ergonomics.	Patient handling skills were assessed in a standardised environment upon completion of training. Prevalence of low back pain (LBP) 1 year after qualification was also assessed.	The experimental group scored significantly higher in the patient-handling skill assessment than the control group, however the skills were rated as comparatively low in both groups. Nurses whose patient handling skills were rated as poor or bad had a higher prevalence of injury during their first year as a qualified nurse. 54% of trained and 60% of controls reported LBP 1 year after qualification.	56%
Feldstein et al. (1993) (USA)	13 intervention participants from one medical centre, 15 controls from a different medical centre. Participants were nurses, nurses' aids and orderlies.	Within subjects design. Workplace intervention.	Educational programme. The intervention group received a 2 hour educational training session, which included instruction on proper body mechanics, specific techniques for patient transfer, one-to-one assistance, use of assistive equipment, identification of environmental hazards. Stretching and strengthening exercises were also taught. 8 hours of practical time were also given.	Reported back pain and back fatigue prior to the intervention and at one month post intervention. Patient transfers were also assessed pre and post intervention.	No significant differences in reported back pain and back fatigue were seen over the intervention in the intervention group. The intervention and control groups did not differ significantly on their questionnaire responses. The intervention group improved in their assessed quality of patient transfer, no change was seen in the control group.	59%

Table 1 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Gundewall et al. (1993) (Sweden)	28 intervention participants and 32 controls. All participants were nurses and nurses' aids.	A normalised, randomised prospective design.	The intervention group performed a workout program for the back muscles designed to increase dynamic endurance, isometric strength and functional coordination, for 20 minutes 6 times/month for 13 months. No exercises were given to the control group.	Isometric back strength measured at the beginning and end of the study. The presence of low back pain, and the number of days off work because of LBP, recorded by participants throughout the study.	Training group participants increased their back strength by an average of 20% over the study; no change was seen in the control group. 1 training participant had been absent from work for 28 days due to LBP during the study, versus 12 participants from the control group who had been absent for 155 days in total. The training group also had significantly less LBP complaints and a lower pain intensity than the controls.	69%
Hellsing et al. (1993) (Sweden)	19 intervention participants, 33 controls. All were student nurses from two separate nursing schools.	Educational intervention at a nursing school.	The experimental group received extra education integrated into the 2 year programme, which comprised of an average of 2 hours of 'ergonomy' per week. The control group received the traditional training.	Students completed an assessment at the beginning, middle and upon completion of their education, and at 1 year follow-up. 5 nurses from each group were observed, conducting standardised work-tasks, during work on the ward at 4 months post course.	Observational assessment revealed that the experimental group knew how to 'work better' from an ergonomics point of view. The effect of the education on reported musculoskeletal pain was not obvious during the follow-up year.	73%

Table 1 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Best (1997) (Australia)	16 intervention participants, 19 controls. All participants were nurses working within 3 similar geriatric nursing homes.	Within and between subjects design, randomised, workplace intervention.	Intervention participants from 1 nursing home received a 32 hour training course in Manutention. Control participants from two similar nursing homes both received in-house basic training.	Responses on a questionnaire assessing the occurrence of back injuries completed pre and at 3 and 12 months post training. Lifting behaviour was also observed and injury statistics collected.	There was a trend for a decline in the incidence of back pain occurring in the nurses trained in Manutention, and an increase in back pain in the controls. Differences were not statistically significant and injury statistics did not support the decrease in pain data reported from the intervention group. Manutention lifts (n=2) were rated significantly better, in terms of posture and effort, than the non-Manutention lifts (n=2).	56%
Daynard et al. (2001) (Canada)	12 participants in a 'safe lifting' group, 12 participants in a 'no-strenuous lifting' group and 12 controls. All participants were unit assistants on hospital wards.	Randomised control trial. Workplace intervention.	The intervention groups received intensive education in back care, lifting technique, and patient assessment. The 'safe lifting' group received instruction on the use of equipment already available on the wards, whereas the 'no-strenuous lifting' group were provided with new assistive patient handling equipment.	Compliance with proper transfer technique and biomechanical analysis assessed during 5 patient handling tasks conducted post intervention.	Results showed greater compliance with interventions that incorporated new assistive patient-handling equipment, as opposed to those consisting of education and technique training alone. Participants who were untrained or non-compliant with interventions experienced significantly higher peak spinal loading. However, patient-handling tasks conducted with the aid of assistive equipment took longer than those performed manually. This, along with variations in techniques, led to increases in cumulative spinal loading with the use of patient-handling equipment on some tasks.	59%

Table 1 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Yassi et al. (2001) (Canada)	85 participants in a “safe lifting” group, 94 participants in a “no-strenuous lifting” group and 82 controls. All participants were nurses and unit assistants on hospital wards.	Randomised control trial.	The intervention groups received intensive education in back care, lifting technique, and patient assessment. The ‘safe lifting’ group received instruction on the use of equipment already available on the wards, whereas the ‘no-strenuous lifting’ group were provided with new assistive patient handling equipment.	Frequency of patient handling tasks, frequency and intensity of physical discomfort associated with handling tasks, and back and shoulder pain disability were compared at baseline and at 6 and 12 months post training. Injury and claim data were also collected.	The frequency of manual lifting tasks decreased significantly at 12 months follow-up in the “no strenuous lifting” group. No changes were seen in the control group or in the “safe lifting” group. Self perceived fatigue, back and shoulder pain, safety, and frequency and intensity of physical discomfort associated with handling tasks, improved in both intervention groups, with greater improvements seen in the “no strenuous lifting” group. Injury rates were not altered significantly in any group.	67%
Owen et al. (2002) (USA)	37 intervention participants, 20 controls. All participants were nursing personnel from two rural hospitals.	A quasi-experimental, independent samples design. Workplace intervention.	All participants reported their most stressful patient handling tasks, equipment to help with selected tasks was tested in a laboratory and implemented in the intervention hospital. Nurses were trained in its use.	Injury data collected 18 months prior to the intervention was compared with injury data collected 18 months post intervention.	In the experimental hospital injury rate decreased by 40% post intervention. Over a 5 year follow-up there were 26 injuries reported which occurred in relation to the specific tasks studied. It was estimated that if the number of injuries had continued at the same pace as found in the 18 month pre intervention period, the number would have accumulated to 67 by the end of the 5 year period. No changes were seen in the control hospital.	58%

Table 1 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Ore (2003) (Australia)	351 intervention participants, 351 controls. Disability service workers.	Between subjects design. Workplace intervention.	The experimental group undertook a 35 hour training course, involving assessment of manual handling (MH) tasks, training on special techniques, and on the use of assistive devices. The control group consisted of workers who received no training.	The number of MH injuries reported between 1 st July 1999-30 th June 2000 per 100 full-time equivalents (FTEs) (training took place between 1 st July 1998-30 th June 1999) and compensation claims.	Training in MH significantly reduced the risk by 42% with an average injury rate of 49.6 per 100 FTEs among the intervention group compared with 84.8 per 100 FTEs among the controls. The control group had an average compensation claims cost of \$11,354, while the intervention groups compensation claims cost was \$2,658.	81%
Hartvigsen et al. (2005) (Denmark)	140 intervention participants, 115 controls. All participants were home care nurses and nurses' aids.	2-year, prospective controlled study.	The intervention group were divided into groups of 8-12, one member of each group was educated as an instructor. Instructors had a minimum of 1 hour/week during 2 years to educate, supervise, and enforce messages about lifting techniques and body mechanics to all members of their group. The control group attended a one-off lifting course.	Questionnaire completed post intervention assessing the number of days with self reported LBP during the last year, number of episodes of LBP, and care seeking for LBP during the past year.	At follow-up, no significant differences were found between the intervention and the control group in terms of the number of days with LBP during the past year, the number of episodes with LBP during the past year and seeking of examination or treatment due to LBP during the past year.	73%

Table 2 Questionnaire-based surveys and audits on the effectiveness of prior manual handling training in healthcare workers

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
St-Vincent et al. (1989) (Canada)	39 hospital orderlies.	Observational. MH techniques used by orderlies were observed by 2 trained observers.	To determine whether orderlies used patient handling techniques taught during training.	Training consisted of 12 hours of courses given in the classroom. The classes consisted of theory and practical sessions. Training mainly focused on the teaching of basic principles which should be applied to all handling tasks, characteristic of the 'straight back/knees bent approach'.	The principles taught during training were seldom applied in the workplace. In horizontal handling, training is rarely applied whereas in vertical handling operations, some of the taught principles were more often used.
Wachs and Parker-Conrad (1989) (USA)	178 registered nurses.	Observational	Nurses employed in 4 community hospitals were observed whilst moving patients in bed. The proportion using the correct technique was the main measure.	No information provided.	Only 2% of the sample moved patients in the prescribed manner. It was hypothesised that over time nurses develop their own techniques for moving patients based on personal experience and unit or hospital norms, and that these techniques may not follow the principles of prescribed body mechanics taught in nursing schools.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Ellis (1993) (UK)	85 physiotherapy students, from 11 physiotherapy schools.	Postal questionnaire	The number of hours reported undertaking MH theory and practical training.	On average students reported 1.9 hours of MH theory training and 1.8 hours of practical training.	64% felt that they had been taught the basic principles, but further instruction was needed. 27% had subsequently experienced LBP.
Gladman (1993) (UK)	46 nurses who received traditional training in patient handling (group A) and 41 nurses who received a more research based course (group B).	Questionnaire	The number of respondents from each group reporting back pain.	Training received by Group A consisted of a 3 hour classroom based session early on in their nursing education, it included principles of safe lifting. Training received by Group B consisted of a 6 hour introductory programme, followed up 1 year later by a 3 hour update. Additional items taught included: biomechanics of the spine and ergonomics.	At follow-up, (26 months post training for group A, and 16 months for group B) 73% of group A and 92% of group B reported suffering from back pain at some point. 81% of all nurses surveyed reported suffering from back pain at some time. Both groups identified problems with the attitudes of qualified staff, the availability of lifting aids and the shortage of skilled assistance.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Kane and Parahoo (1994) (UK)	16 nursing students.	Questionnaire	A scenario was presented in the questionnaire to determine whether respondents would participate in a lifting exercise even when they 'knew' the lift selected by the staff nurse was unsafe.	No information provided.	50% of those surveyed indicated that they would conform to the decision of the staff nurse and use an unsafe lift. The reason for conforming was a strong desire to avoid negative reactions of the entire nursing staff.
Luntley et al. (1995) (UK)	22 anaesthetists.	Questionnaire	The number of respondents reported to have received MH training and the numbers of staff who lift patients.	0% surveyed had received training in lifting and handling or knew of the existence of a lifting and handling training officer. 73% reported lifting patients regularly.	14% had a history of back pain that had resulted in loss of time from work. It was concluded that training and planning of patient transfers in theatre is deficient.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Scott (1995) (UK)	85 nurses.	Questionnaire	The number of respondents reported to have received MH training.	65.4% of qualified nurses reported receiving some kind of MH training. 20% of auxiliary staff reported receiving no formal instruction. Training varied from one 30 minute slot in the ward to a full day outside of the working area.	Staff reported that they frequently made use of the principles taught, but most admitted sometimes employing the quickest method rather than the safe lifting and handling techniques taught.
Crawford and Weetman-Taylor (1996) (UK)	67 health care workers.	Questionnaire (n=67) and structured interview (n=16). Of those interviewed, 8 had received training in MH and 8 had not.	The perception of risk in relation to MH tasks, comparisons were made between individuals who had and who had not received MH training.	88% of individuals completing the questionnaire had received training in MH.	Of those surveyed, 93% had jobs that involved lifting and handling and 22% had received an injury due to this. Interview findings revealed that perceived levels of risk associated with MH differed between trained and untrained employees.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Hollingdale and Warin (1997) (UK)	168 nurses.	Questionnaire	The occurrence of back pain.	The majority of respondents had received training for 2 or more days within the past year.	59.5% of nurses surveyed reported suffering from back pain in the past year, and 36.9% had suffered back pain in the last 2 weeks.
Coleman and Brooke (1999) (UK)	36 patient transfers were observed across 6 adult theatre suits.	Observational	To describe the techniques used to transfer patients to and from the operating table and to identify the staff involved in patient handling.	Staff who most frequently acted as handlers were operating department assistants – 37% of whom had never received training in patient handling. Anaesthetists were involved in 26% of transfers, yet none had received any training. The majority of transfers involved 2 members of staff.	No injury data reported.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Kilgariff and Best (1999) (Australia)	All institutions which provide training to undergraduate nurses, allied health assistants, occupational therapy and physiotherapy students in Victoria, Australia were surveyed.	Questionnaire	The amount and type of manual handling and patient handling being taught as part of the course curricula.	Not given.	The results indicated that there were inadequate practical and theoretical hours allocated to MH skills and inadequate occupational health and safety education across courses.
Bewick and Gardner (2000) (Australia)	50 nurses' aids	A review of hospitals injury data along with a self-reported questionnaire.	MH knowledge was assessed by a series of drawings showing MH tasks being performed, respondents were asked to decide whether the lifting procedure shown in each picture was correct or incorrect.	All respondents had received training in MH, training covered back anatomy, function and care, posture, body mechanics, positive lifestyle habits and fitness, first aid, ergonomics principles, MH techniques and the use of mechanical aids. Training involved both theory and practice sessions.	62% of injuries reported in nursing aids were due to MH tasks. The group had a good understanding of proper body mechanics, and the majority surveyed reported using correct MH techniques. The high injury rates were attributed to the fact that mechanical aids were rarely used.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Spencer et al. (2000) (UK)	60 doctors involved in care of the elderly.	Questionnaire	The number of respondents reported to have received MH training and the numbers of staff who lift patients.	8% reported receiving formal MH training, 25% reported receiving informal training from nurses. 70% reported lifting or moving patients on their own at least once/week, 34% reported lifting on most days.	14% reported injuring themselves and 14% reported injuring patients during lifting. It was concluded that doctors frequently lift or move patients on their own and few have had any formal training in MH.
Dean (2001) (Australia)	2 'in-house' MH trainers from 2 separate residential aged care organisations.	Semi-structured interviews were conducted with the two MH trainers.	To identify factors which impact on the implementation and effectiveness of manual handling training for carers within health care settings.	Not reported.	Findings indicate that management style, time restrictions, peer culture and lack of awareness of the complexity of MH are significant issues which impact on the effectiveness of MH training.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Swain et al. (2003) (UK)	139 nursing students on the adult branch in one higher education institution.	Questionnaire	Students knowledge of correct patient handling techniques.	Students' knowledge of whether particular techniques were 'recommended' was rated as 'fair'.	16% of the sample had already taken time off work with back pain. 94% reported that they were frequently unable to use recommended techniques in practice, this was most commonly attributed to the influence of other nurses. Other reasons included unavailability of manual handling aids, lack of time, lack of staff and patient needs.
Massy-Westropp and Rose (2004) (Australia)	An audit of injuries was undertaken in a community health services agency.	Retrospective audit	The annual MH injury rate was compared prior to the incorporation of Manutention training with the injury rate during and following the introduction of this form of training.	Since 1993 clinical staff working at the health services agency received the Manutention method of MH training. Since 1999, all new staff undergo training for at least 2 days, and all have annual skills updates. Training program provided staff with 15 hours of MH training.	The annual rate of 54 MH injuries/100 paramedical aids for the pre Manutention period ('90 – '94) dropped significantly to 35 injuries/100 annually for the period ('95 – '03) following the introduction of Manutention. Days lost/injury also reduced in the 9 year period following the introduction of Manutention.

Table 2 continued

Author	Participants	Type of survey/methods	Outcome measure	Quantity of training	Effectiveness of training/injury data
Cornish and Jones (2006) (UK)	106 student nurses.	Questionnaire	Perceptions of MH training and experience of patient moving and handling in the clinical setting.	88% felt that they had received adequate training at University.	71% had been asked to participate in a MH procedure that they thought was wrong, and contrary to the 'no lift' policies in the Trusts, 74% had been asked to physically lift a patient without using necessary equipment. Less than 50% observed the use of hoists for picking up a patient from the floor and less than 40% observed safety checks of mechanical equipment and risk assessments in the clinical setting.
Hignett and Crumpton (2007) (UK)	16 healthcare organisations.	Behavioural data collected on 2 patient handling tasks (sitting-to-standing and repositioning-in-sitting) were collected using observations and interviews.	Whether a higher level of compliance with the RCN competencies (safety culture) would be found in hospitals where the knowledge and skills gained from MH training could be detected in staff MH behaviour.	No information provided.	In organisations with a more positive safety culture, the nursing staff demonstrated more complex decision-making about patient handling tasks and had lower levels of associated postural risk.

Table 3 A summary of workplace and laboratory based research investigating the efficacy of manual handling training in non-healthcare personnel

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Gross (1984) (USA)	11 males.	Within subjects design, laboratory based.	Surface EMG's of the erector spinae muscles were recorded every 10 seconds for a 60 second period while holding loads of 4.5kg, 9.07kg, 11.34kg and 13.6kg at abdominal level. The pitch and volume of the biofeedback monitor varied with the strength of the EMG signal.	Spinal stress, measured using the EMG, during static lifting was compared between the biofeedback and no feedback conditions.	In 45% of the trials a significant decrease (in muscle activity) was recorded with the use of the biofeedback. It was concluded that biofeedback of the erector spinae muscles using surface electrodes appears to be a useful tool for the reduction of spinal stress during static lifting	38%
Chaffin et al. (1986) (USA)	26 warehouse workers.	Within subjects design, workplace intervention.	A 4-hour training session was given to employees which emphasised correct lifting techniques.	The effectiveness of training was measured by videotaping lifting postures used by workers performing their jobs before and between 31-51 days after training.	Training had a beneficial effect on two of the 5 criteria used to judge lifting behaviours, a reduction in the prevalence of jerking the load during lifting was observed post training along with a reduction in the prevalence of inadequate gripping of the objects. It was concluded that a 4 hour training program had beneficial but minor effects on lifting techniques.	47%

Table 3 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Carlton (1987) (USA)	14 intervention participants, 16 controls. All participants were food services employees.	Within subjects design, workplace intervention.	The experimental group participated in a 1 hour body mechanics course, emphasising the straight back and bending of the hips and knees during lifting. Participants were videoed performing a number of lifts, and feedback was provided.	Performance on a lifting task conducted 2 weeks following training, in a simulated environment. Performance was also assessed in the working environment 3 weeks post training.	The experimental group performed significantly better on a novel task than the control group, however, there was no significant difference between groups in terms of performance in the work environment. It was concluded that learning did not transfer into the work environment.	63%
Nygaard et al. (1998) (Finland)	21 female store workers.	Within subjects design, workplace intervention.	Participants trained in lifting technique by a physiotherapist using the critical mental system method, training focused on the use of the legs as opposed to the back when lifting. Training consisted of a classroom and a practical session.	Working postures, goods handled and ratings of perceived exertion (RPE) were compared pre and post training.	After training participants bent their legs more when lifting. No significant changes in back postures were observed. RPE did not change.	48%

Table 3 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Rabinowitz et al. (1998) (South Africa)	10 male participants.	Within subjects, repeated measures design. Laboratory study.	Participants performed a lifting task during each visit, lasting 15 minutes. Lifting techniques used were either a squat lifting or a stoop lifting technique with or without an abdominal belt on each day.	Measurements of spinal shrinkage, heart rate and RPE were taken before and after each lifting task.	There were no significant differences in spinal shrinkage between the four lifting techniques. Heart rates were higher during the squat lift than the stoop lift. RPE were higher during the squat lifting session.	47%
Burt et al. (1999) (New Zealand)	50 participants lifted the 'experimental box', 51 participants lifted the 'control box'.	Independent samples design, laboratory study.	Participants were asked to lift a box, to help a courier. The experimental box contained symbols showing a safe lifting technique.	Lifting techniques were observed by 3 observers. Techniques were compared for participants lifting the experimental and control boxes.	The experimental box achieved significantly more 'bending of the knees', and a significant overall increase in the use of correct lifting techniques.	55%

Table 3 continued

Author	Participants	Study design	Intervention	Outcome measure	Results	QR
Jones et al. (1999) (UK)	24 pairs of participants, one of each pair received training and a guide book, the other received a guide book.	Paired samples design, workplace intervention.	The trained group attended a 2 day workshop covering MH, anatomy, biomechanics and back care, along with risk assessment. All participants were asked to review MH tasks in their departments.	All work was repeated by an ergonomist and participants' assessments were scored in comparison with the ergonomist. The trained and untrained groups were compared.	Both groups of participants appeared to be able to identify hazards though not necessarily prioritise the tasks. The trained group tended to score better in assessments although wide variation existed and the groups were not significantly different	45%
Lavender (2000) (USA)	293 warehouse workers from 7 companies.	Within subjects design, laboratory based.	Participants fitted with sensors from an electromagnetic motion measurement system called the <i>LiftTrainer</i> TM . Participants practiced a series of lifting tasks with biofeedback for 30 minutes.	Comparison of peak forward bending, twisting and side bending moments at the spine compared pre and post training.	Preliminary data is only presented and no statistical tests have been conducted. The author reported improvements in side bending and twisting moments following biofeedback training.	33%

