Manual handling activities and risk of low back pain in nurses

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Abstract

***Objective*—To investigate the risk factors for low back pain in hospital nurses, with particular emphasis on the role of specific nursing activities.**

***Methods*—A cross sectional survey of 2405 nurses employed by a group of teaching hospitals was carried out. Self administered questionnaires were used to collect information about occupational activities, non-occupational risk factors for back symptoms, and history of low back pain.**

***Results*—The overall response rate was 69%. Among 1616 women, the lifetime prevalence of back pain was 60% and the one year period prevalence 45%. 10% had been absent from work because of back pain for a cumulative period exceeding four weeks. Rates in men were generally similar to those in women. In women back pain during the previous 12 months was weakly associated with height, and was significantly more common in those who reported frequent non-musculoskeletal symptoms such as headache and low mood. After adjustment for height and non-musculoskeletal symptoms, significant associations were found with frequency of manually moving patients around on the bed, manually transferring patients between bed and chair, and manually lifting patients from the floor. In contrast, no clear increase in risk was found in relation to transfer of patients with canvas and poles, manually lifting patients in and out of the bath, or lifting patients with mechanical aids. Confirmation of these findings is now being sought in a prospective study of the same population.**

***Conclusions*—This study confirms that low back pain is highly prevalent among nurses and is associated with a high level of sickness absence. People who often report non-musculoskeletal symptoms were significantly more likely to report low back pain. Specific manual handling tasks were associated with an increased risk of back pain; however, no such association was found with mechanised patient transfers.**

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Several studies have indicated an unusually high prevalence of back disorders in nurses,[1-3] and this is widely attributed to the manual handling that the job entails. Nurses are frequently required to undertake heavy lifting, often with a bent or twisted posture, and biomechanical investigations have confirmed that such tasks generate high spinal stresses.[4 5] Strategies to control the hazard include the elimination or modification of activities that carry the highest risk, but first the levels of risk associated with different tasks must be assessed. Biomechanical evaluation contributes to the assessment, but epidemiological evidence is also required. We report a survey in which the risk of back symptoms in nurses was examined in relation to a range of lifting tasks.

Methods

The study population comprised the 2405 hospital based nurses employed by Southampton University Hospitals Trust. The Trust provides in patient facilities in most clinical specialties other than psychiatry. It is also a centre for undergraduate medical and nursing education, but nurses in training are not employed by the Trust and were excluded from the study.

Each member of the study population was sent a postal questionnaire asking about various non-occupational risk factors for back complaints including age, height, reproductive history, and smoking habits; about frequency of certain non-musculoskeletal symptoms; about details of his or her current job, and about lifetime and recent history of low back pain. Non-responders were sent a single reminder after a month.

The questions about non-musculoskeletal symptoms aimed to investigate whether psychological factors that influence reporting of other symptoms (particularly pain and psychological ill health) also affect the risk of reported low back pain. Subjects were asked to indicate how often (never, occasionally, or frequently) they experienced headaches, period pains, constant tiredness, low mood, and feeling tense or under stress.

Occupational details included a self reported estimate of the number of times the subject performed each of a series of specified patient handling tasks per average shift (for full list of patient handling tasks see table 4).

Low back pain was defined as pain lasting for longer than a day in an area (indicated in a diagram) between the twelfth ribs and the gluteal folds. Subjects were asked to exclude pain that only occurred in association with pregnancy, menstruation, or febrile illness. Sciatica was defined as pain radiating down the leg to below the knee.

The reproducibility of identical questions

about lifetime back pain and associated features has been assessed in an earlier study in the general population. Subjects were asked to complete the questions a second time, one year after their first response. The level of agreement was 91% for reported lifetime low back pain, 82% (minimum) for reported sciatica, and 87% for reported sickness absence.[6]

The validity of information on reported frequency of tasks handling patients was measured indirectly by comparing the responses of nurses of the same grade working on the same ward. Good agreement was found for task frequency, only 16% of reports differed from the modal reported frequency for each job.[7]

Associations between low back pain and risk factors were assessed by logistic regression. Risk estimates are quoted with 95% confidence intervals (95% CIs).

Results

Questionnaires were completed by 1659 nurses (a response rate of 69%), of whom 97% were women and 50% worked full time. The ages of responders ranged from 19 to 65 with mean 38 and median 36 years. All levels of seniority were represented from nursing assistant to senior clinical and administrative grades.

Table 1 Prevalence (%) of reported low back pain and associated disability

	Men (n = 43)*	*Women (n = 1616*)*
Low back pain, ever	56	60
Sciatica, ever	23	25
Low back pain lasting > 1 year in total	5	9
Cumulative lifetime sickness absence for low back pain > 4 weeks	9	10
Consulted a general practitioner because of low back pain, ever	29	40
Low back pain in past 12 months	39	45

*Answers to specific questions were missing for up to 36 subjects (one man and 35 women).

Table 1 shows the prevalence of reported low back pain and associated disability. Among women the lifetime prevalence of back pain was 60%, and 10% had been absent from work because of back pain for a cumulative period exceeding four weeks. The one year period prevalence of low back pain in women was 45%. Rates in men were generally similar to those in women, although fewer men had consulted a general practitioner about back problems.

Because of the small number of male responders, further analyses were restricted to women. Table 2 shows the associations of low back pain in the past 12 months with height and with report of various non-musculoskeletal symptoms. Risk of back pain increased with stature, but the trend was weak and failed to reach significance. More striking was the relation to other symptoms. There was a strong association between reported frequent headache, period pains, fatigue, low mood, or stress and reported low back pain.

Table 3 shows the relation of low back pain to certain other non-occupational risk factors. After adjustment for age, height, and report of non-musculoskeletal symptoms, all of the associations were weak and none was significant.

The occupational risk factors studied included hours worked (full time or part time), shifts worked (days, nights, or both), and grade (nursing assistant or higher). Analysis, with logistic regression, showed no association between any of these factors and the risk of back pain. Back symptoms in the past year were reported less frequently than the average by paediatric nurses, but otherwise there were no clear patterns by department. Associations were found, however, in relation to the frequency of certain lifting activities (table 4). In particular, risk increased with frequency of manually moving patients around on the bed, and was significantly raised in nurses who manually transferred patients between bed and chair and

Table 2 Association of low back pain in the past 12 months with height and report of non-musculoskeletal symptoms in female nurses

Risk factor	*With back pain* n*	*Without back pain* n*	*Each risk factor examined separately OR (95% CI)*	*Risk estimates mutually adjusted OR (95% CI)*
Height (cm):				
⩽157	160	223	1	1
158–163	187	231	1·1 (0·9–1·5)	1·2 (0·9–1·6)
164–166	119	124	1·3 (1·0–1·8)	1·4 (1·0–2·0)
167–170	161	180	1·3 (0·9–1·7)	1·3 (1·0–1·8)
⩾171	104	113	1·3 (0·9–1·8)	1·3 (0·9–1·9)
Headache:				
Never or occasionally	566	760	1	1
Frequently	156	100	2·1 (1·6–2·7)	1·7 (1·3–2·3)
Period pain:				
Never or occasionally	521	686	1	1
Frequently	181	149	1·5 (1·2–2·0)	1·4 (1·0–1·8)
Fatigue:				
Never or occasionally	480	682	1	1
Frequently	244	171	2·0 (1·6–2·5)	1·4 (1·1–1·9)
Low mood:				
Never or occasionally	629	818	1	1
Frequently	94	38	3·2 (2·2–4·8)	2·0 (1·2–3·1)
Stress:				
Never or occasionally	545	740	1	1
Frequently	176	115	2·1 (1·6–2·7)	1·3 (1·0–1·8)

*Answers to specific questions were missing for up to 70 women. All risk estimates were adjusted for age in quintiles.

who had sometimes to lift patients up from the floor. These associations persisted when risk estimates were adjusted for height and report of non-musculoskeletal symptoms. In contrast, no clear increase in risk was found in relation to transfer of patients with canvas and poles, manually lifting patients into and out of the bath, or lifting patients with mechanical aids.

Table 3 Association of low back pain in the past 12 months with non-occupational risk factors in female nurses

Risk factor	With back pain n	Without back pain n	Risk estimate† (a) OR (95% CI)	(b) OR (95% CI)
Current participation in regular sport or exercise:				
No	211	276	1	1
Yes	511	572	1·1 (0·9–1·4)	1·2 (0·9–1·5)
Number of children:				
0	297	293	1	1
1–2	294	374	0·8 (0·6–1·0)	0·9 (0·6–1·1)
3 +	128	183	0·7 (0·5–1·0)	0·8 (0·6–1·1)
Cigarette smoking:				
Never	409	509	1	1
Ex	203	219	1·2 (1·0–1·5)	1·2 (0·9–1·5)
Current	109	131	1·0 (0·8–1·4)	1·0 (0·8–1·4)
Previous fall or road traffic accident leading to hospital admission:				
No	654	786	1	1
Yes	68	73	1·1 (0·8–1·6)	1·1 (0·8–1·6)

*Information was missing for up to 122 women; †(a) adjusted for age (in quintiles) and height (classified as in table 2) (b) adjusted for age (in quintiles) and for height and report of non-musculoskeletal symptoms (classified as in table 2).

Table 4 Association of low back pain in the past 12 months with occupational activities in female nurses

Activity: frequency in an average working shift	With back pain* n	Without back pain* n	Risk estimate† (a) OR (95% CI)	(b) OR (95% CI)
Transfer a patient on canvas and poles:				
0	450	547	1	1
1–4	197	228	1·0 (0·8–1·3)	1·0 (0·8–1·3)
5+	43	41	1·3 (0·8–2·1)	1·3 (0·8–2·1)
Manually transfer a patient between bed and chair:				
0	168	274	1	1
1–4	227	257	1·5 (1·1–1·9)	1·4 (1·1–1·9)
5–9	128	123	1·7 (1·2–2·3)	1·8 (1·3–2·5)
10+	152	157	1·5 (1·1–2·1)	1·5 (1·1–2·1)
Transfer a patient between bed and chair with a hoist:				
0	531	669	1	1
1–4	120	109	1·4 (1·0–1·8)	1·3 (1·0–1·8)
5+	21	26	1·0 (0·5–1·8)	0·9 (0·5–1·8)
Manually move a patient around on the bed:				
0	84	137	1	1
1–4	169	246	1·1 (0·8–1·6)	1·2 (0·8–1·7)
5–9	167	175	1·5 (1·1–2·2)	1·6 (1·1–2·3)
10+	270	260	1·7 (1·2–2·3)	1·7 (1·2–2·4)
Manually lift a patient up off the floor:				
0	438	567	1	1
1+	230	231	1·3 (1·0–1·6)	1·3 (1·0–1·6)
Lift a patient from the floor with a hoist:				
0	611	738	1	1
1+	58	63	1·1 (0·8–1·6)	1·0 (0·7–1·5)
Manually lift a patient in or out of the bath:				
0	569	679	1	1
1+	102	120	1·0 (0·7–1·3)	1·0 (0·7–1·3)
Lift a patient in or out of the bath with a hoist:				
0	426	554	1	1
1–4	222	212	1·3 (1·0–1·6)	1·2 (1·0–1·6)
5+	24	32	0·9 (0·5–1·6)	0·8 (0·5–1·5)

*Information was missing for up to 213 women; †(a) adjusted for age (in quintiles) and height (classified as in table 2) (b) adjusted for age (in quintiles) and for height and report of non-musculoskeletal symptoms (classified as in table 2).

Discussion

The prevalence of back symptoms recorded in this survey cannot be compared directly with those found in most other studies because of differences in the method of investigation, the definition of back pain, and the age structures of the populations studied. In a postal survey of 1495 women from eight areas of Britain that used an identical question to ascertain back pain, lifetime prevalence varied from 45·2% at age 20–29 years to 63·7% at ages 50–59 years, whereas one year prevalences were in the range 27·0–43·7%.[8] The prevalences that we recorded in our study were higher (despite a higher response rate), which supports the view that nurses are at an increased risk of back disorders. Particularly notable was the high proportion of nurses who had taken more than four weeks off work because of back trouble (9% of men and 10% of women), which emphasises the burden that the problem places both on the nurses and employers.

Of the non-occupational risk factors for back pain that we examined, non-musculoskeletal symptoms showed the strongest associations with back pain. This may reflect differences in perception of back pain rather than an increased risk of physical damage to the spine, but without good objective measures of spinal pathology, the distinction cannot be tested. The finding accords with those of other studies that have shown that people who are depressed or dissatisfied with their work are more likely to complain of back symptoms.[9–12] In particular, one longitudinal study has shown that depression predicts the onset of subsequent back pain, and that the association therefore is not explained simply by the occurrence of depression secondary to back trouble.[13]

In female nurses back pain was also weakly associated with height. Other studies of back pain and stature in women have produced inconsistent results. Surveys in Sweden,[14] Denmark,[15] and Britain[16] have failed to show a relation, but an analysis of back symptoms in a British longitudinal study did suggest an association, with a relative risk of 1·5 in the tallest 20% of women compared with the shortest 20%.[17] If there is a relation between height and back pain in women, then it does not seem to be as strong as in men, and would not justify selective exclusion of tall women from entry to the nursing profession.

In contrast with other studies, we found no relation of back pain to reproductive history,[3 10 18] smoking,[11 19 20] or severe trauma.[21]

Of the occupational activities studied, manually moving patients around on the bed, transferring patients between bed and chair, and lifting patients up from the floor were associated with increased risk of back pain, and the associations persisted after adjustment for height and report of non-musculoskeletal symptoms. In contrast, no association was found with lifting or transferring patients with a hoist or with canvas and poles. In general, this pattern of risk is consistent with biomechanical evaluation,[4] but

interpretation must take into account several limitations of the study design.

Firstly, the response to the questionnaire was only 69%. Although comparable with the response rate in other surveys of this type, this leaves open the possibility that the responders were unrepresentative. In particular, nurses whose work was most physically demanding may have been more handicapped by back disorders and therefore more inclined to participate in the study. This would tend to exaggerate associations with occupational activity. Also, errors may have occurred from biased recall of symptoms or activities. Nurses with back pain may have been more aware of the lifting requirements of their job and reported tasks differently from those who were pain free, and nurses with heavier jobs may have been more conscious of their symptoms and had a lower threshold for reporting back pain. Again, this would inflate risk estimates. On the other hand, people with back symptoms may have been selected out of the most physically demanding jobs. This bias would tend to obscure associations between back pain and lifting.

Because of the potential for such biases, the findings require further testing with a prospective study design where activities are ascertained in people who are pain free, and they are then followed up to assess the subsequent incidence of symptoms. It may also be important to distinguish chronic or recurrent back symptoms from new episodes of low back pain. The quality of information about recurrence of symptoms obtained in a cross sectional study is likely to be compromised by poor recall. We are currently following up this population of nurses, with the aim of overcoming some of these methodological difficulties. The question of recurrence rate will be considered specifically in the ongoing prospective study.

Meanwhile our findings have important implications for the assessment and reduction of risk to nurses from manual handling activities. Particular attention should be given to techniques for moving patients around on hospital beds and for bed to chair transfers. The results of this study support the use of hoists as a means of risk reduction. In Southampton nurses have for some years been instructed to use the shoulder (Australian) lift to move patients around on the bed.[22] Now, the use of turning sheets and other such aids is being encouraged. Also, greater use is being made of hoists to assist lifting and transfer of patients.

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