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STUDIES ON NURSING AIDES' WORK

A study on nursing aides' work in a geriatric hospital

1. Energy requirements
2. The lifting burden
3. The incidence of back symptoms
4. The psychological perception of the work
5. The relationship between back symptoms and the psychological perception of the work

by

OVE DEHLIN

Göteborg 1978

E R R A T A

Paper I, p. 147 right, line 3, five should be two

p. 151, ref. 10, Nordgren should be Nordgren, B.

Paper II, p. 72, ref. 8, Nachemsson should be Nachemson

Paper IV, p. 84, ref. 10, Johansson, B. should be Johnsson, B.

Paper V, p. 4, ref. 6, Olsson, T. should be Olson, T.

p. 5, ref. 10, Industrial Medicine should be Ind Med Surg

ref. 15, Postgrad Med should be Postgrad Med J

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This thesis is based on the following papers:

I O. Dehlin, G. Grimby and A. Svanborg: Work load in nursing aides. Scand J Rehab Med 6: 145–151, 1974

II O. Dehlin and B. Lindberg: Lifting burden for a nursing aide during patient care in a geriatric ward. Scand J Rehab Med 7: 65–72, 1975

III O. Dehlin, B. Hedenrud and J. Horal: Back symptoms in nursing aides in a geriatric hospital. Scand J Rehab Med 8: 47–53, 1976

IV S. Berg, L. Dahl, O. Dehlin and B. Hedenrud: Psychological perception of nursing aides' work. Scand J Rehab Med 8: 79–84, 1976

V O. Dehlin and S. Berg: Back symptoms and psychological perception of work. Scand J Rehab Med 9: 61–65, 1977

These papers will be referred to by their Roman numerals.

CONTENTS

GENERAL INTRODUCTION

The number of elderly individuals in Sweden and their proportion of the population has increased during recent years and is still increasing. Thus the number of persons aged 65 or more is estimated to increase from about 1.1 million in 1970 to about 1.4 million in 1985, i.e. from about 14 % to about 17 % of the total population. The number of persons aged 80 years or above will increase relatively more and for an even longer time (87, 89).

The age structure of the population has a great impact on the demand for medical care (87, 88). The demand will thus increase in Sweden during the next 20–30 years and the increase will be particularly marked within geriatric medicine and in the institutional long-term care sector. To meet these future needs there are plans to increase the number of beds in long-term care medicine. In 1976 there were about 40400 beds in long-term care medicine and this figure included beds in geriatric clinics, at other departments and in nursing homes (87). Care of elderly individuals with certain types of mental disorders will also be placed under the responsibility of long-term care medicine (88, 89). The total number of patient beds required for long-stay medicine has been estimated to correspond to 70–75 $^{0}/_{00}$ of the population of 70 years of age or more (89). There are plans to increase the number of patient beds in long-stay medicine, including the care of elderly individuals with certain types of mental disorders, to about 55000 in 1982 (87). In about 1985 the need will be about 70000 beds in long-stay medicine, according to estimates (87). From 1976 to 1985 between 11000 and 22000 new positions for ward staff in long-stay medicine will need to be created, in addition to the more than 20000 positions that already existed in 1976 (87). This expansion will make long-stay medicine an even broader medical speciality.

The increase in the number of patients needing long-term care, and home care as well, means that the resources available must be utilized as optimally as possible. Technical aids are necessary, and there is a need for better technical devices than those available today, e.g. more optimal patient lifts and aids for management of urinary and fecal incontinence (92).

The patients in long-term care medicine are old and as a rule they have several diseases and handicaps. This is reflected in the average nursing load (2, 48), which is great in geriatric nursing. The nursing load has increased markedly during recent years, as judged from experience at institutions like Vasa hospital, where changes in the nursing load have been measured continuously.

The staff turnover in geriatric nursing is great. At our hospital, for example, the turnover rate during 1974–1975 was 24 % for nurses, 23 % for practical nurses and 30 % for nursing aides. The total manpower requirement in nursing personnel is about 50 %

higher than the number regularly employed, owing to sick-leave, vacations, pregnancy, childbirth and leave to attend courses. Most nursing aides are nowadays women. The great turnover in staff, thus, has several causes but can largely be regarded as an expression of the non-optimal working conditions for nursing aides on the wards. A job should satisfy several needs to be perceived as attractive for the individual (33, 34, 78, 82). Within hospital work the work schedules often cover late evenings and weekends, thus interfering with the social life of the employee. The physical environment for people working in hospitals includes such factors as the temperature, which is often rather high, the humidity in e.g. the bath department, and noise due to crying patients etc. In an investigation carried out by the City of Gothenburg Hospital Board to find out why so many nursing aides quit their jobs, it was found that the physical demands of the job constituted a frequent cause, especially among the older staff (23). The physical demands on the nursing aides are usually important. Among these demands are the circulatory load and the lifting burden.

Ergonomic studies have long been performed in different occupations in industry, among handicapped persons and in housewives, to mention only a few groups (8, 36, 40, 74, 98, 103). Few ergonomic studies have been performed in nursing, and especially in geriatric nursing. Parallel to the present studies, Fordham and co-workers (3, 30) studied the cost of work in medical nursing on a general medical ward by determining the nurses' heart rate and oxygen uptake during work. They found the mean energy expenditure during nursing to be of the same magnitude as found in light industrial work.

The prevalence of low-back pain in female nurses as compared within female teachers has been studied by Cust et al. (25). They found no statistically significant difference in the prevalence of low-back pain between the two groups. Low-back pain starting at work, or because of work – "occupational low-back pain" – was significantly more frequent among the nurses, however, than among the female teachers. In that study, geriatrics was the medical speciality in which the greatest percentage of the nurses had acquired their low-back symptoms. Strain injuries and job-related back injuries have been reported to be common in hospital nursing personnel (29, 44). Magora (59–65) has studied the incidence of low-back pain in eight different occupations in relation to different background and environmental variables. The incidence of low-back pain in nurses ranked among the highest, together with heavy industry workers.

The psychological milieu of nursing has been studied for different categories of staff (13, 16, 84). In a study of job satisfaction in relation to communication within a hospital it was reported that the nursing aides had a lower level of self-fulfillment than registered nurses and doctors (1). In another study different categories of personnel in a hospital were investigated with respect to attitudes and perception of work (31). Nursing aides had in certain respects more negative attitudes towards their work compared with other categories of staff at the hospital. In both studies the nursing aides had a greater perceived need for information compared with other categories of staff (1, 31).

The psychological milieu of nursing also has an impact on the patients' comfort (17, 66, 90, 93). This factor is of the greatest importance in long-stay institutions where the ambition is not only to provide good medical care but also to create an individualized milieu. The importance of a good nursing milieu, both for the efficiency of the care and for the prevention of accidents, is obvious.

In view of the increasing importance the geriatric nursing sector will have, and in view of the non-optimal working conditions that are to be found on the wards, as reflected by e.g. the high turnover rate among the staff, it was thought important to perform a study of common ergonomic problems among nursing aides in long-term care medicine.

In the present studies five different aspects of ergonomic problems during nursing aides' work in long-term care medicine have been examined. The energy requirements during full-time nursing work have been determined by following the heart rate in a group of nursing aides, and for four special work operations their oxygen uptake was measured. The studies were performed both during day-time work and in night staff.

Geriatric nursing includes frequent and often heavy patient lifts that are not necessarily reflected in the mean heart rate during work. The load on the back during lifting depends on several factors, one of which is the weight of the burden to be lifted. Other factors are task variables, such as the size and configuration of the object, and human variables such as age, sex, physical fitness and work position. Yet other variables are the height, distance, rate and rhythm of the lifts to be performed (21, 27, 85). The weight of the burden a nursing aide is exposed to when giving lifting assistance to patients lying in bed with different kinds of handicap has been determined in this study by means of a force-plate.

The population of female nursing aides on day-time duty on the wards of Vasa hospital has been subjected to three further studies; a study of the incidence of back symptoms, an investigation of the womens' psychological perception of their work and a study of the relationship between back symptoms and psychological perception of the work.

A problem when studying the incidence of back symptoms is the validity and reliability of the diagnoses used (95, 96), especially when the data obtained are compared with results from others studies, where the methods and the definitions of the symptoms may differ. In this study of the incidence of back symptoms in nursing aides in long-term care the same methods and the same definitions of the symptoms have been used as those earlier used in studies of other occupations than nursing in Gothenburg (42, 45, 95). Certain comparisons between the different materials are thus possible.

Psychological factors have a great influence on the individual's general adaptation to his or her work (51, 78, 82). The nature and contents of the work affect the satisfaction of individual needs at the place of work. To study nursing aides' psychological perception of their work a special questionnaire was constructed. An association between medical symptoms and low job satisfaction has been demonstrated in different kinds of work (32, 38, 56, 91, 99, 102). In the present study nursing aides with cervical, thoracic and low-back symptoms were compared with nursing aides without such symptoms using the questionnaire that measures the individual's psychological perception of her work.

STATISTICAL METHODS

Standard methods were used for the calculation of the mean (M), the standard deviation (S.D.), the linear correlation coefficient and the linear regression. The hypothesis of no differences in the means was tested with Student's t-test in paper I (heart rate values and isometric muscle strength) and in papers IV and V. The hypothesis of no differences in proportions between groups was tested with the chi-square test in paper III. In paper IV the factor analysis was performed according to the principal component method with Varimax rotation of the factors. The reliability of the scales was computed according to Cronbach's alpha. Product-moment correlations and multiple stepwise regression were used to relate the overall satisfaction with the job to the seven psychological scales.

Differences were considered significant for p-values of 0.05 or less. In paper V only one-tailed tests of significance were used, in accordance with the specific hypothesis of that study.

ENERGY REQUIREMENTS DURING NURSING AIDES' WORK ON LONG-TERM CARE MEDICINE WARDS

Introduction

The daily work load for nursing aides includes many different tasks. Some work operations are relatively static in character, such as feeding patients and holding patients in certain positions during e.g. lifting, while other activities are more dynamic, such as storing linen, cleaning the sluice and assisting patients when required. Yet other tasks are both static and dynamic, such as certain types of lifting, where static operations are interrupted by short fast movements. The work is rather intermittent in character owing to frequent interruptions because of unpredictable patient actions.

The oxygen uptake during work varies with the physical work load, provided that large muscle groups are used. There is an almost rectilinear correlation between heart rate and oxygen uptake during this type of work. Heart rate represents an acceptable indication of the all-day work load level during continuous physical work (6, 36, 57, 103). Measurement of the oxygen uptake during work is a more precise method of evaluating the work load but is often difficult to perform at the place of work, especially for prolonged periods. In this study the physical working capacity of a group of nursing aides was determined as regards the predicted maximum oxygen uptake and the maximum isometric muscle strength in six muscle groups. The nursing aides' heart rate was followed continuously during work on the ward and their oxygen uptake was determined for four specific work tasks.

Aims

- to characterize a group of nursing aides as regards physical work capacity by determining their predicted maximum oxygen uptake and the maximum isometric muscle strength in six muscle groups,
- to study the energy requirements of full-time nursing aides' work by continuous registration of heart rate and measurement of oxygen uptake for four work operations,
- to compare the energy demands during nursing with data from the literature concerning other types of work.

Material

All regularly employed nursing aides on two ordinary wards of the hospital were invited to participate in the study. All of these eighteen women, with a mean age of 35 ± 13 years (M ± S.D.), agreed to participate. They were all used to the work and were apparently healthy. For measurement of the maximum isometric muscle strength three more nursing aides were included. Thus the total material in this part of the study comprised

21 women aged 32 ± 13 years (M ± S.D.). The participating nursing aides did not differ from other regularly employed nursing aides at the hospital as regards age or length of employment.

Methods and discussion of the methods

The study took place on two wards at the hospital under normal working conditions. Heart rate during work was recorded by telemetry. The equipment did not obviously interfere with work performance. Different work shifts were studied and the type of work performed was recorded in parallel with the heart rate.

At first the nursing aides were tested under standardized conditions on an electrically braked bicycle ergometer at two submaximal loads both before and after the work shift. As the results of the bicycle ergometer tests before and after the work shift did not differ, the test before the work shift was excluded. The calibration of the bicycle ergometer was checked during the course of the investigation. The maximum oxygen uptake was predicted from the heart rate at the submaximal loads, after correcting for age (100). This type of determination entails certain sources of error. Heart rate declines with age and the standard deviation for maximum heart rate in different age-groups is ± 10 beats/min (105). In the prediction of the maximal oxygen uptake from heart rate at submaximal loads the standard error is up to 15 % (S.D. 15 %) in moderately trained subjects (105). The mechanical efficiency may vary by ± 6 % on a bicycle ergometer from the average value of 23 % (105). There are also exceptions to the rule of a rectilinear relationship between heart rate and oxygen uptake. For example, the oxygen uptake may increase relatively more than the heart rate as the work load becomes very heavy (105). Nervous effects on the heart rate may arise owing to fear, excitement or emotional stress. The influence on the heart rate of nervous factors is reduced at heavier work loads, however.

Oxygen uptake during work was measured for four work operations using the Douglas bag method. The bag was carried in a harness on the subject's back. The oxygen was analyzed according to the micro-Scholander method and the error for a single determination as estimated from duplicate determinations was ± 3 % of the mean value (37).

Isometric muscle strength (handgrip bilaterally, elbow flexion and extension bilaterally, knee extension bilaterally and trunk forward flexion and backward extension) was determined with the technique and technical equipment described by Höök and Tornvall (50). Measurement of muscle strength is a volitional process and requires good cooperation. The importance of such factors as body posture, the sequence of testing, the effect of repeated tests and the disposition of the subject has been discussed by Tornvall (94). He found a variation coefficient for duplicate determinations at about 1.5 hours' interval of from 3.2 % to 11.4 %, the highest value being recorded for trunk backward extension. The values obtained in that study showed a linear relationship to increasing

loads, with a deviation of less than ± 3 % from the actual weights, and the variations at calibration controls were of the same magnitude. Errors due to the measuring technique are small compared to the individual differences (94).

Results and discussion of the results

Aerobic work capacity. Heart rates at submaximal work loads and predicted maximum oxygen uptake for the nursing aides did not differ from values found in a large group of Swedish women in different age-groups (100) used as a reference material in different studies.

Isometric muscle strength. Only one other group of women had been studied with the same technique. Compared to that group, comprising 40 female physiotherapy students, the nursing aides' values were significantly lower for all muscle functions studied ($p < 0.001$). The nursing aides were significantly older and shorter than the physiotherapy students (mean age 32 and 21 years, respectively; height 165 and 169 cm, respectively). Height corresponds to the maximum muscle strength in the second power (94). The age difference between the two groups was probably of minor importance compared to other factors (7). The physiotherapy students might be considered a selected group, fit for and interested in physical training, which mainly explains their greater maximum isometric muscle strength. Compared to a group of 23 young healthy females (19, 72) studied with a similar, but not identical, technique, the nursing aides showed statistically significant greater values for elbow flexion right and left ($p < 0.001$) and for elbow extension right ($p < 0.005$). The nursing aides showed significantly lower values compared to that material for knee extension right and left ($p < 0.001$) and for trunk forward flexion ($p < 0.05$). No statistically significant difference was found for handgrip right and left, elbow extension left or trunk backward extension. The muscle strength values for the nursing aides were fairly similar to values for women in the same age-groups with various occupations studied by Asmussen and Heebøll-Nielsen (7), using a similar technique.

Generally speaking, available data indicate that the nursing aides studied may be considered rather normal, both as regards average aerobic work capacity and as regards average maximum isometric muscle strength, compared to other women in corresponding age-groups.

Heart rate during work. The mean heart rate during whole-day work shifts varied between 78 and 110 beats/min. Heart rate during night duty differed from that during day-time work mainly because the work was less continuous and more sedentary 2–3 hours after midnight. Nursing involves much work with the arms. Arm work gives a higher heart rate at the same oxygen uptake compared to leg work on a bicycle ergometer (5, 104). The energy requirements during nursing may therefore be slightly overestimated.

The heart rate values found here during nursing aides' work were similar to those found in a study of nurses working on a general medical ward (3, 30), in housewives during domestic work (36, 101), among cabin personnel during regular air flights (55) and in people engaged in light industrial work (8, 74).

Oxygen uptake during work. The oxygen uptake during work, recorded for bed-making, washing a bedside table, walking with patients and storing linen showed average values of from 0.41 to 0.83 l oxygen/min. These energy requirements were similar to those found for housewives doing domestic work (101), for nurses on a general medical ward (3, 30) and for theatre nurses (58).

The relative work load, expressed as the percentage of the predicted maximum oxygen uptake, varied between 18 % and 28 % for the least energy-demanding task, namely walking with patients, and was greatest when storing linen, when the relative load varied between 36 % and 51 %. These values represent a considerable work load.

LIFTING BURDEN FOR A NURSING AIDE DURING PATIENT CARE ON A LONG-TERM CARE MEDICINE WARD

Introduction

Lifting of patients is a common work task in long-term care medicine. Manual lifts still prevail, at least in Swedish geriatric wards, despite the availability of mechanical lifts. Manual lifting of heavy objects often produces more pain in an already afflicted back (22, 68, 69, 77) and the lifting involved during nursing is considered a heavy load on the back by many nursing aides (paper III). A clear relationship between specific strain on the low-back and low-back symptoms has not been established.

Variables to consider when trying to determine the load on the body during lifting include task variables such as the weight and size of the patient; the height, distance, rate and rhythm of the lift; environmental variables such as temperature and humidity; human variables such as age, sex, physical fitness and work position during the lift (21, 27, 85). The weight of the burden and the distance of the burden in relation to the nursing aide's body determine the moment acting on the lumbar spine during the lift. The problem of maximum weights, and maximum permissible weights of burden during lifting have been studied under different, and often standardized, conditions (9, 43, 52, 53, 75, 76, 85, 86, 97). Few studies on the problem of lifting patients during nursing have been published (14, 49, 71).

Aims

- to study the weight of the burden a nursing aide is exposed to on a long-term care medicine ward when giving lifting assistance to patients with different handicaps during three types of lifts,
- to compare the values obtained with data from the literature as regards "recommended" maximum weights of burden.

Material

The study was performed on a general geriatric (long-term care) ward with 25 patients, 16 of whom needed substantial assistance during change of position in bed or to and from the bed. The patients' mean age was 81 ± 11 years (M ± S.D.) and their mean weight was 49 ± 12 kg. The patients' main diagnoses varied, sequele after cerebrovascular lesions being the most common diagnosis. The majority of the patients had severe physical handicaps. The low mean weight of the patients, which was in accordance with the findings from another study from Vasa hospital (35), was apparently mainly dependent on atrophy due to age and inactivity. Four patients had bed-sores.

Methods

A healthy twenty-year-old nursing aide, who was used to the work and to the patients, volunteered to be studied while giving lifting assistance to the patients. Three lifting operations were studied: sliding a patient up in bed towards the pillow and providing lifting assistance during transfer from the bed to a bedside chair and back. Both two-person lifts and one-person lifts were studied, according to the needs and customs of the specific patient. These lifting operations are types of lifts commonly performed in this kind of nursing.

Vertical and horizontal forces during the lifts were recorded by means of a force-plate (20), upon which the nursing aide was standing. Photographs of the lifts were taken simultaneously with the recording. The recording error was ± 1 mm on the recording Mingograf, which meant ± 4 kp for the vertical force and ± 1 kp for the two horizontal forces. The direction and magnitude of the resultant of the three perpendicular forces was determined but was considered less informative and is therefore not shown. Only forces with a duration of one second or more are shown. Acceleration forces were not measured. It should be emphasized that the vertical forces registered on the force-plate were floor-reaction forces, corresponding to the weight of the burden during the lift and not the load on the nursing aide's body.

Results and discussion of the results

The main interest was focused on the vertical forces acting on the force-plate. This force varied between 8 kp and 32 kp (one-person lift) and 32 kp (two-person lift) when sliding a patient up in bed towards the pillow. Lifting assistance to a patient during transfer from the bed to a bedside chair and back again entailed vertical forces from 16 kp to 48 kp (one-person lift) and between 8 kp and 32 kp (two-person lifts). The maximum registered forces on the force-plate were 44 kp and 48 kp and they were obtained when the nursing aide alone lifted a patient from the bed to the bedside chair and back again. That particular patient was unable to support her own weight at all as she had had both her legs amputated and had no prostheses. A mechanical lift was used for three of the patients during transfer from the bed to the bedside chair and back, but not for the bilaterally leg amputated patient. The horizontal forces, one perpendicular and one parallel to the bed, showed values from 0 to 21 kp. The nursing aide pushed against the patients with her arms and her body and against the bed with her knees and thighs, which explains the horizontal forces.

The duration of the lifts was short and most lifting operations were performed in less than 20 seconds. The time during which the vertical force was 20 kp or more was only a few seconds. All patients except one were able to support their own weight to some extent during the lifts. If the patient who could not support her weight at all during the lifts is excluded, there was a statistically significant relationship between the body

weight of each patient and the vertical force on the force-plate during transfer from the bed to the bedside chair. During transfer from the chair to the bed and during the lifting operation sliding a patient up in bed towards the pillow there was no significant relationship between the weight of the patients and the vertical forces on the force-plate. However, the results underline the importance of the patients' weight, despite their varying ability to support their own weight, for the weight of the burden the nursing aide is exposed to when giving lifting assistance from the bed to the bedside chair. Nursing aides on postoperative wards and on intensive care wards probably have to lift even heavier burdens as their patients are often unable to help at all during the lifts and because the patients are often heavier than the patients in this study. The results emphasize the importance of rehabilitation of the patients, quite apart from humanitarian aspects, as well as of avoiding overweight among the patients, to lessen the lifting burden during nursing.

Various recommendations have been put forward for the maximum burden of weight during lifting (9, 27). A serious drawback of such recommendations is that they include only one aspect of the lifting problem, i.e. the weight of the burden, and disregard the other circumstances under which the lift is performed. However, the weight of the burden is often easy to determine and may be used as a guide in connection with other factors of importance for the load on the body during lifting (21, 27, 85). Recommendations for permissible burdens for women have varied between 15 kp and 23–29 kp for women aged 20–35 years, according to the type of lift (43, 53). The International Labour Organization (ILO) has suggested permissible maximum weights of 15–20 kp for women and even lower for girls below 18 years of age (52). For special work operations lower maximum weights have been prescribed (e.g. 10 pounds for women when moving up or down a stairway more than 5 feet (California, 1947 Supplement to the Labour Code (52). On the basis of the maximum back muscle strength, formulae have been proposed for maximum loads and for permissible single and repeated lifts (9). Poulsen and Jörgensen (75, 76) have demonstrated a significant correlation between maximum isometric back muscle strength and maximum load for men and women when lifting from floor to table height and from table height to head height. The lifts were performed under "optimal" conditions and the volume of the burden was small. The maximum weight in that study for an average 25-year-old woman, height 160 cm, when lifting from floor to table height was found to be 45 kp, the maximum permissible single lift 31 kp and the maximum permissible repeated lift 22 kp. When lifting from table height to head height the corresponding values were 23, 16 and 12 kp, respectively. These recommended permissible weights for single and repeated lifts were exceeded several times in this study. Moreover, the lifts in this study were often performed under unfavourable conditions, with a great distance to the burden, i.e. the patient, and the body in a bent or twisted position. The problem of patient lifting is complicated by the fact that the patient's medical situation must be taken into consideration. The patient may

have pain in some parts of the body and may therefore need to be held in a special way during the lift. The patient may also make movements during the lift that influence the balance of the nursing aide. On the other hand, the patient may be able to assist during the lift and make the lift easier. It is important to know the patient – to know how he or she wants to be lifted and to what extent he or she is able to help during the lift.

The importance of using the so-called "correct" lifting technique is stressed during the training course for nursing aides and repeatedly thereafter (9, 68). This technique, with the legs bent and the back straight, exerts less strain on the intervertebral discs compared to the back-bent method (67) but is often difficult to practice during nursing. The energy expenditure is greater during lifting and carrying of weights with the back-straight method compared to the back-bent method or the free-style method (18) and the strain on the knee joints is also greater during lifting with the legs bent compared to lifting with the legs straight (21). It has been reported that there has not been any significant reduction of injuries due to lifting and handling over the past 30 years, during which the straight-back-bent-knees method has been advocated (18). There does not appear to be a simple answer to the question of the "correct" way of lifting at the moment.

BACK SYMPTOMS IN NURSING AIDES IN A GERIATRIC HOSPITAL

Introduction

A possible relationship between heavy physical work and a high incidence of back symptoms has been repeatedly reported (22, 60, 77). When the frequency of sick leave due to low-back pain is studied instead of the incidence of symptoms, there seems to be a difference between "heavy jobs" and "light jobs" (70, 73, 95) as people doing heavy work are unable to work when they have symptoms. An adequate and general definition of "heavy jobs" is, however, difficult to obtain. Factors such as the energy consumption during work, the number of muscles used in the work and the static load on the musculature and on other tissues are of importance when estimating the work load. A heavy job with respect to the back is often defined as a job which sometimes, e.g. in connection with manual lifting, results in a heavy strain on the back (83). However, what is considered light work with respect to the back for a person without back symptoms, might be experienced as heavy by someone suffering from back pain. The subjective assessment of a job as heavy or not by the person doing it is as important as more objective data on the job. Nursing is often considered a heavy job with respect to the back, owing to the amount of manual lifting involved (29, 44). In two studies in which the incidence of low-back symptoms in nursing personnel could be compared with that in people with other occupations a tendency was found towards more low-back symptoms in the nursing staff (25, 60).

Aims

- to study the incidence of cervical, thoracic and lumbar spine symptoms, with special reference to lumbar spine symptoms, in nursing aides in a geriatric hospital,
- to study individual differences and differences in the reported method of lifting among nursing aides with and without low-back symptoms,
- to compare the incidence of symptoms in nursing aides with that in other groups studied with the same methods.

Material and discussion of the material (paper III, IV, V)

All female nursing aides on day-time duty on the wards of the hospital were included in the study, i.e. all regularly employed nursing aides plus all those who at a certain date were temporarily employed. Nursing aides on sick-leave were included. The study was restricted to nursing aides on the wards. Thus, those working at the departments of occupational therapy and physical therapy were not included. Nursing aides on leave to attend courses or due to pregnancy or childbirth were not included. The total number

of nursing aides meeting these criteria was 273. 267 were interviewed, which made the participation rate 98 %. The mean age of the nursing aides was 29 ± 12 years (M ± S.D.). 41 % of the nursing aides had successfully completed an 8- or 23-week training course, which was not mandatory. As could be expected, there was a clear relationship between the age of the nursing aides and their length of employment.

To what extent the nursing aides studied here were representative of geriatric nursing aides in general cannot be stated. It may be assumed that the nursing aides, from many points of view, were a selected group of females compared to the general female population of the same ages. The turnover rate for nursing aides was high and it is possible that the nursing aides who quit the work after only a short period of employment differed from the nursing aides who continued in nursing. The nursing aides who did not continue in nursing might consider the job too much of a strain physically and mentally compared with the nursing aides who continued with the work. In an investigation carried out by the City of Gothenburg Hospital Board (23) to find out why so many nursing aides quit their jobs, it was found that the physical demands of the job constituted a frequent cause, especially in higher age-groups. Of the 267 nursing aides that took part in the present investigation, 33 (12 %) had been employed for less than three months and 50 (19 %) had been employed for six months or less. Thus the majority (67 %) of the nursing aides in this study had been employed for more than one year, which indicates that they were able to fulfill the requirements of the job and in many cases were also well adapted to it.

Methods and discussion of the methods (paper III, V)

The questions asked in the interviews about back symptoms were the same as previously used in studies in this city by Horal (45), Westrin (95) and Hirsch et al. (42). From all nursing aides a thorough medical history was taken as regards earlier and present back symptoms. There were also questions about the strain on the back, the lifts performed, the lifting technique usually employed for three lifting operations and the subject's weight and height.

Cervical spine symptoms were defined as pain or aching in the neck, with or without radiation symptoms. Thoracic spine symptoms were defined as pain or aching in the thoracic spine, with or without radiation symptoms. Low-back symptoms were divided into low-back insufficiency, lumbago and sciatica. Low-back insufficiency was defined as a sensation of tiredness, weakness, stiffness and sometimes also dull pain in the back. Lumbago was defined as localized pain or aching in the back with restricted mobility of the lumbar spine as a result. Sciatica was defined as radiating pain or aching from the back and down into the legs, or similar symptoms in the legs only. The questions asked were constructed in such a way as to avoid as far as possible other types of pain being included, e.g. referred pain from the abdomen, menstrual pain, pain from cystitis, stiffness and aching after physical training etc. Classification concerning the course of the disease, i.e. acute, subacute or chronic, was not performed as the aim of the study was

to determine the incidence of the disease in the nursing aide population. The reliability of the low-back anamnesis has been discussed by Westrin (96). The reliability of auto-anamnesis of low-back symptoms probably becomes lower when the symptoms lie far back in time and if they have only been slight. Westrin also found a correlation between the reliability of anamnesis and certain personality traits, e.g. between "asthenic" personality and "reliable" answers. The validity of diagnoses has also been discussed by Westrin (95).

Approximately 1.5 years after the present study 52 nursing aides, randomly selected from among all nursing aides who participated in the study of the incidence of the back symptoms and who were still working on the wards, were re-interviewed as regards cervical, thoracic and lumbar spine symptoms. Of the 156 answers obtained, 119 were the same as in the first investigation. 20 different answers were due to symptoms acquired after the first investigation. 17 out of the remaining 136 answers were different at the second investigation without the difference being due to symptoms acquired between the first and second investigation. The stability of the measurements was thus good.

The results obtained in this study are mainly compared with data from the studies by Hirsch et al. (42) and Horal (45), studies performed in the same city and using the same definitions of the symptoms.

Results and discussion of the results

Cervical spine symptoms were found in 22.8 %, thoracic spine symptoms in 19.9 % and lumbar spine symptoms in 46.8 % of the nursing aides. A comparison with the materials of Hirsch et al. (42) and Horal (45) showed both similarities and differences. Hirsch et al. (42) studied low-back symptoms in a Gothenburg female population, age-representative of the Swedish female population, whereas Horal (45) compared the clinical appearance of back disorders in an age-matched group of control subjects, who at a certain date had not been on sick-leave due to low-back symptoms, with that in a proband group that had. Thoracic spine symptoms were approximately as frequent in the present study as was found by Horal (45), in his control group, whereas cervical spine symptoms were less frequent in the present material than was found by Horal in his control group (38 %). Low-back symptoms were about as frequent in the present material as in that studied by Hirsch et al. (49 %) but the incidence is lower than that found by Horal in his control group (67 %). Lumbago and sciatica were less frequent in the nursing aides (18 % and 8 %) than in Horal's subjects (31 % and 15 %) and than found in the study by Hirsch et al. (19 % and 14 %). The incidence of low-back insufficiency in this study (40 %) was higher than that found by Hirsch et al. (23 %) and by Horal (21 %). Current cervical and thoracic spine symptoms were about as frequent among the nursing aides as was found by Horal (45) in his control group. Current lumbar spine symptoms were less frequent in the nursing aides (18 %) compared with Horal's control group (26 %). Among the 18 % of the nursing aides who had current low-back symptoms, insufficiency was the dominating symptom, being present in 46 out of 48 individuals.

Low-back insufficiency often produced relatively minor symptoms and usually permitted the person to continue nursing. The relatively low frequency of lumbago and sciatica among the nursing aides might indicate that a selection process had taken place. Women with earlier low-back symptoms might consider themselves less fit for geriatric nursing, and might therefore not primarily go in for this type of work. Nursing aides with severe low-back symptoms might already have resigned from nursing, where the staff turnover is high.

It has been estimated that 60 % to 80 % of the population have had low-back symptoms at some time (45, 47, 69), and several studies have indicated a somewhat higher incidence of low-back symptoms among persons doing heavy physical work compared with those doing light work (22, 47, 77). Comparisons between different studies are difficult owing to differences in the definitions of the symptoms and in the composition of the materials. The overall incidence of low-back symptoms in the nursing aides in this study was, however, fairly similar to that found in other occupational groups (47, 77, 102).

Nursing aides with low-back symptoms had a significantly higher incidence of cervical and thoracic spine symptoms than those without low-back symptoms. This was also found by Horal (45) and by Hult (47), as regards cervical spine symptoms. Differences in the frequency of different low-back symptoms between different age-groups were not so pronounced in this study as in the study by Hirsch et al. (42), which might be explained by the age composition and the method of selection used in the present study. Age and length of employment did not differ significantly between the groups with and without low-back symptoms, nor did weight or height, which is in accordance with the results reported by Westrin (95) and by Hirsch et al. (42).

When asked about the strain on their backs, 80 % of the nursing aides considered the work exerted a heavy or moderately heavy strain on their backs, while 20 % considered the strain on their backs to be only slight, or not heavy at all. Lifting of patients was considered the heaviest task by 73 % of the nursing aides, while 21 % considered bed-making, in a stooping position, to be the heaviest task as regards the strain on the back. No difference was found between nursing aides with different length of employment in nursing with respect to assessment of the nursing aide's work as a strain on the back. A significantly higher proportion of the group that had experienced low-back symptoms considered the work to entail a strain on the back, compared to the group without low-back symptoms. A similar relationship was also found by Magora (60) in his studies of low-back symptoms in eight different occupations.

All nursing aides on the wards had received instruction on "correct" lifting technique. This instruction strongly emphasized the importance of using the straight-back-flexed-knee method, as well as the importance of performing a patient lift as a two-person lift, when necessary. Three lifting operations, viz. turning a patient on one side in the bed, sliding a patient up in bed towards the pillow and giving lifting assistance during trans-

fer from the bed to a bedside chair, were related to the reported lifting technique (i.e. whether the nursing aide, as a rule, performed the patient lift alone or not and whether she, as a rule, performed the lift using knee action or derrick action). The nursing aides who had experienced low-back symptoms used the same lifting technique for the three lifting operations as did those without low-back symptoms. 70 % of the nursing aides performed, as a rule, the two first-mentioned patient lifts alone while 30 % of the nursing aides performed, as a rule, the last-mentioned patient lift alone. 65 % of the nursing aides reported that they performed the three lifts with their knees bent and body stooping. The remaining 35 % employed several different lifting postures. The results seemed to indicate that the lifting instructions given had not influenced the occurrence of low-back symptoms. The three types of lifts studied here should be analyzed further with respect to the weight of the burden, the distance of the patient in relation to the nursing aide's body and the nursing aide's body posture during the lift, before more definitive conclusions can be drawn as regards the importance of the lifting technique for the incidence of low-back symptoms.

PSYCHOLOGICAL PERCEPTION OF NURSING AIDES' WORK

Introduction

The importance to the individual of experiencing satisfaction with his or her job is obvious and has also been studied scientifically (4, 15, 34, 41). A person needs to experience self-fulfillment and self-respect, and it is important to be able to use one's knowledge and aptitudes in a way that both the individual him- or herself and the organization to which he or she belongs find meaningful. Security and a sense of belonging are other factors that are of importance for the individual's job satisfaction.

Patients' experience of nursing has been documented in several investigations and shortcomings in the psychological milieu during nursing have often been pointed out (17, 66, 90, 93). Different categories of nursing staff have been examined as regards their work perception (13, 16, 24) and in one study of attitudes towards the hospital environment among different categories of staff the nursing aides had more negative attitudes to their work environment compared to nurses (31). The lack of relevant information was also pointed out. In another study of communication within a hospital organization in relation to job satisfaction nursing aides had more difficulty in obtaining satisfactory information compared to nurses (1). Geriatric nursing might be considered psychologically demanding, in addition to the physical strain, owing to the severe disabilities and often chronic suffering of the patients. An investigation of the psychological perception of the work of nursing aides in geriatric (long-term care) medicine was therefore thought to be indicated.

Aims

- to investigate the nursing aides' psychological perception of their work,
- to compare different groups of nursing aides as regards their psychological perception of their work in relation to age, length of employment and completion of the training course,
- to create an instrument for further studies, e.g. in connection with organizational changes.

Material

This study was performed in the same group of nursing aides as the study of the incidence of back symptoms (paper III). 233 out of 273 nursing aides participated in this part of the study, which made the participation rate 85.4 %. The mean age of the nursing aides was 28 ± 12 years (M ± S.D.). 43 % had successfully completed the training

course for nursing aides. There was a strong correlation between age and length of employment. 40 nursing aides declined to participate in the study for personal reasons. They did not differ significantly with respect to age, length of employment or completion of the training course from the participating nursing aides. It was not possible to analyse the non-participating nursing aides further in comparison with those who participated, e.g. from a psychological point of view, as the investigation was performed under conditions of strict confidentiality.

Methods and discussion of the methods (paper IV, V)

The study was performed by means of a questionnaire of Likert type consisting of 53 items with 5 possible answers to each item. After factor analysis (39), seven scales were obtained:

- relations with supervisors and workmates,
- perceived need for information,
- satisfaction with the work itself (is the job important, responsible, interesting and does it provide opportunities to use abilities and knowledge?),
- perceived need for education,
- perceived need for physical and psychic strength,
- perceived strain,
- adjustment to geriatric work (questions about the nursing aide's satisfaction with her working hours and whether she had considered applying for another job).

These scales cover important aspects of the psychological perception of nursing aides' work. Aspects related to suffering and death were not investigated as separate items but form part of the perceived strain and the perceived need for physical and psychic strength. Problems involving the nursing aides' experience of suffering and death among the patients are probably more easily evaluated during an interview than by a questionnaire. The reliability of the scales was high according to Cronbach's alpha, (24), with the exception of the scale perceived need for physical and psychic strength.

A problem of questionnaire studies is the response set (10), i.e. the tendency to reply either positively or negatively to all questions or to respond in a socially desirable way. This problem is difficult to overcome but can be minimized by reversing some of the items, as has been done in this study.

Results and discussion of the results

There was a pronounced perceived need for physical and psychic strength and perceived strain for all nursing aides. The perceived need for information and education was great and the adjustment to geriatric work was rather unsatisfactory. Relations with super-

visors and workmates and satisfaction with the work itself were relatively satisfactory for the whole group of nursing aides. The special working conditions on the wards, where the work tasks are often performed in groups of two or more nursing aides, provide opportunities for good interpersonal relations. Comparisons between 3 subgroups of nursing aides as regards age showed that the oldest group of nursing aides differed significantly in a positive way compared to the two younger groups as regards perceived need for information and adjustment to geriatric work. Compared to the youngest group of nursing aides, the oldest group showed a greater perceived need for physical and psychic strength. This might be explained by the fact that the ability to perform physical work decreases with advancing age. The older nursing aides may be considered a selected group who had stayed in geriatric nursing, were used to the work and had acquired a greater knowledge of the work, which might explain the differences compared to the younger nursing aides. For many of the younger nursing aides working on the ward may have been their first job. This may explain why they did not plan to stay in geriatric nursing but wanted to experience other specialities or occupations as well. Comparisons between nursing aides as regards length of employment (more or less than 3 years) showed differences similar to those found for different age-groups. This is explained by the close relationship between age and length of employment.

Despite daily meetings with the head nurse and weekly staff meetings, the nursing aides had a rather great perceived need for information about the patients and their care. This was most pronounced for the younger nursing aides. More information, given also in other ways than at present, is thus needed. This perceived need for information confirms the general impression of the difficulties in giving adequate information to all categories of staff. A perceived lack of adequate information for nursing aides as compared to other categories of staff has been reported in studies from other departments than geriatric units (1, 31). Nursing aides who had not passed the training course showed a significantly greater perceived need for education compared to the nursing aides who had passed the course. This shows the importance of urging all nursing aides to take the training course.

The psychological working environment in geriatric clinics, nursing homes and similar institutions presents special problems. The daily contacts with severely disabled and handicapped patients, with chronic suffering and death, may be regarded as a psychological strain by many nursing aides. The patient-staff relationship entails several elements that may cause anxiety, especially the experience of sickness and death. This anxiety can be more or less pronounced, depending on the emotional development and maturity of the individual. The experience of the patient-staff relationship may influence deeply lying psychological mechanisms, e.g. unconscious psychological defence mechanisms. This may create processes that consume much psychic energy and make the person experience nursing as a mental strain.

A hospital is often regarded as a rather hierarchic organization (54), which might influence the nursing aides' psychological perception of their work. Relations with supervisors and workmates were relatively satisfactory, however, and the nursing aides thought that different categories of staff collaborated well. The democratic process that has started in working life in Sweden, and which should mean a possibility for the nursing aides to influence their own working conditions, may have implications for the individual's psychological perception of her work.

The item "Taken as a whole, how do you like your present job?" can be regarded as a summed variable of the *overall satisfaction with the job* (46). Correlations between this item and the seven scales showed that the most important factor for overall job satisfaction was satisfaction with the work itself, i.e. responsibility and the opportunity to use one's aptitudes and knowledge in the job. Other important factors were (negatively) perceived strain, adjustment to geriatric work and relations with supervisors and workmates. Lack of job satisfaction may lead to poor adaptation, frequent short-term absenteeism, a high staff turnover rate and an increased risk of accidents (4, 15, 41). A multiple correlation analysis showed a considerable interaction between the different factors.

A comparison for nine single items (79) between the nursing aides, 2376 workers at SKF, Gothenburg (80), and 128 employees at Volvo, Gothenburg (81) showed that the nursing aides had a better work involvement and perceived better opportunities for using their aptitudes and knowledge compared to the workers at SKF, but they perceived more stress. The employees at Volvo perceived better contact and cooperation with supervisors, had a higher level of satisfaction with the work-group and were more satisfied with their pay than the nursing aides.

The psychological scale constructed for this study has been presented in detail elsewhere (11) and is intended to be used to follow changes on the wards, e.g. in connection with organizational changes. The scale has been used for that purpose in a study of the effect of muscle training upon the incidence of low-back symptoms among nursing aides and upon their psychological perception of their work (26).

BACK SYMPTOMS AND PSYCHOLOGICAL PERCEPTION OF WORK

Introduction

The work load during nursing aides' work on the wards of a geriatric hospital has been studied with respect to the energy demands, the lifting burden when giving lifting assistance to patients, the incidence of back symptoms and the psychological perception of the work (paper I, II, III, IV). The energy demands during full-time nursing were found to be similar to those in domestic work and work in light industry (74, 101). During some work operations the relative work load was heavy, e.g. during storing linen. The weight of the burden when giving lifting assistance to patients with different kinds of handicaps was great and the nursing aide was exposed to loads that often exceeded values recommended as maximum permissible weights for single and repeated lifts (52, 76). The incidence of back symptoms, especially in the lumbar region, in nursing aides was of about the same magnitude as has been found in studies of other groups in Gothenburg, using the same methods and definitions of the symptoms (42, 45). In a study of the psychological perception of the nursing aides' work there was a pronounced perceived demand for physical and psychic strength and a pronounced perceived strain, whereas relations with supervisors and workmates were relatively good. The nursing aides' *overall satisfaction with their job* was most closely related to the scales satisfaction with the work itself (i.e. whether the work is important, interesting and responsible), adjustment to geriatric work (i.e. satisfaction with the working hours and no plans to quit the job), relations with supervisors and workmates and (negatively) to the scale perceived strain. A strenuous job might lead to medical symptoms (12, 22, 47) and the strong (negative) relationship between the perceived strain and the overall satisfaction with the job is therefore not surprising.

In studies of various kinds of jobs relationships have been found between impaired job satisfaction and medical symptoms (32, 38, 102). It has been assumed that symptoms in organs thought to be relevant for the performance of the job are more closely related to job satisfaction than symptoms in other organs (102). Nursing aides' work on long-term care medicine wards includes frequent and often heavy patient lifts and might be experienced as a strain on the back. It is therefore important that nursing aides are free from pronounced back symptoms. In this study the relationship has been studied between symptoms that were thought to be of importance for the performance of the nursing aide's work, i.e. back symptoms, and her psychological perception of her work.

Aim

– to study differences in the psychological perception of the work among nursing aides with and without back symptoms.

Material

This study was a continuation of two earlier studies on the incidence of back symptoms among nursing aides and the womens' psychological perception of nursing aides' work (paper III, IV). Of the 273 female daytime nursing aides on the wards at Vasa hospital, 233 participated in both studies, which made the participation rate 85.4 %. The 40 nursing aides who declined to participate did not differ from those who participated as regards age, length of employment or completion of the training course. It was not possible to investigate the nonparticipating nursing aides with respect to e.g. somatic or psychological factors, as the study was performed under conditions of strict confidentiality.

Methods

The psychological perception of nursing aides' work is built up of seven scales:

- relations with supervisors and workmates,
- perceived need for information,
- satisfaction with the work itself,
- perceived need for education,
- perceived demand for physical and psychic strength,
- perceived strain,
- adjustment to geriatric work.

The single variable overall satisfaction with the job was also used. Back symptoms were divided into cervical spine symptoms, defined as pain or aching in the cervical spine, with or without radiation symptoms, thoracic spine symptoms, defined as pain or aching in the thoracic spine, with or without radiation symptoms, and low-back symptoms, divided into low-back insufficiency, lumbago and sciatica. Low-back insufficiency was defined as tiredness, stiffness and sometimes also dull pain in the low back, lumbago as a localized pain that restricted motion of the lumbar spine and sciatica as a radiating ache or pain from the back down into the legs, or similar symptoms in the legs only. In this study the term "low-back symptoms" was used as a common name for all these kinds of symptoms. The seven scales that constituted the nursing aide's psychological perception of her work and overall satisfaction with the job were related to the presence or absence of cervical spine symptoms, thoracic spine symptoms and low-back symptoms. Comparisons were made between nursing aides with and without menstrual pain, between nursing aides who considered their low-back symptoms to be due to their work and those who did not, and between those who had developed their low-back symptoms after starting to work as nursing aides and those who had not developed low-back symptoms after starting their work. The significance of the duration of the low-back symptoms was investigated. The analyses included t-tests to examine mean score differences between different subgroups of nursing aides. In the light of earlier investigations (32, 38, 102) the hypothesis to be tested was that nursing aides with back symptoms had a lower level of job satisfaction as shown by the seven scales. Only one-tailed tests of significance have therefore been used (28).

Results and discussion of the results

Nursing aides with cervical spine symptoms, earlier and current, did not exhibit a different psychological perception of their work compared to nursing aides without such symptoms. Those who had current thoracic spine symptoms showed more negative relations with supervisors and workmates and a greater perceived strain compared to those without such symptoms. Nursing aides who had had thoracic spine symptoms had a lower level of overall satisfaction with their job compared to those who had not had such symptoms. Nursing aides who had had low-back symptoms, but who were free from symptoms when the study was performed, had more negative perceived relations with supervisors and workmates, a greater perceived demand for physical and psychic strength and a lower level of overall satisfaction with their job compared to nursing aides without such symptoms. Nursing aides with current low-back symptoms showed a lower level of overall satisfaction with their job compared to nursing aides without current low-back symptoms.

Nursing aides with menstrual pain showed a greater perceived demand for physical and psychic strength, greater perceived strain and a lower level of overall satisfaction with their job compared to nursing aides without menstrual pain. There was no difference between nursing aides with different durations of low-back symptoms in respect of the seven psychological scales. Nor was any relationship found between back symptoms and the scales satisfaction with the work itself, perceived need for education and adjustment to geriatric work.

Medical symptoms have been found to be related to job satisfaction also in other occupational groups (32, 38, 63, 102). It is possible that symptoms in organs thought to be relevant for the performance of the job are more closely related to job satisfaction than other symptoms, as was suggested in a study of building workers (102). The nursing aides might consider symptoms from the thoracic spine and from the lower back to be of greater importance for the performance of their job than symptoms from the cervical spine, which were unrelated to their psychological perception of their work.

Back pain was in this study only to a certain extent related to the psychological work situation, which is in agreement with the findings from other studies in which certain symptoms were related to certain psychological variables (32, 102). It is therefore concluded that the hypothesis that back symptoms in nursing aides are associated with a more negative psychological perception of their work is only partly true.

The relationships between back symptoms and the womens' psychological perception of their work might be explained in different ways. When several variables are tested against each other significant differences may occur by chance alone. The fact that it was the same variables that differed throughout between nursing aides with and without back symptoms indicates, however, that the differences obtained were not merely due to chance. The back symptoms might have developed first and led to an impaired

psychological perception of the work. The somatic symptoms might lead to difficulties in performing the work, with further deterioration of the nursing aide's relations with her supervisors and workmates, and so on. On the other hand, impaired relations with supervisors and workmates and a greater perceived demand for physical and psychic strength might lead to medical symptoms in the form of thoracic and low-back symptoms. Lastly, the somatic and the psychological variables might act at the same time and influence one another. For example, a factor that makes a person's relations with her supervisors and workmates less good than usual might strengthen or accentuate existing but slight back symptoms, or menstrual pain. The nursing aides who had developed their low-back symptoms after starting to work in nursing, or who thought their symptoms were due to their work, had a more negative psychological perception of their work in certain respects compared to nursing aides who had not developed low-back symptoms after starting to work in nursing or who did not think their low-back symptoms were due to their work. This might be an example of a mutual influence of somatic and mental variables on the individual's psychological perception of her work.

In Swedish geriatric (long-term care) institutions there is often a shortage of staff on the wards, which increases the work burden on the remaining nursing aides. This must also increase the stress felt during the work, especially in this section of medicine where shortage of staff is so common. Shortage of staff usually means that basic ward activities and hygiene are given first priority and that factors of importance for good personal relations between patients and staff receive lower priority, which must have a negative influence upon the nursing aides' psychological perception of their work.

Although the causality in the relationship between back symptoms and the nursing aides' psychological perception of their work is not proven, it is understandable, with knowledge of the working conditions on the wards, that low-back symptoms may cause impaired relations with supervisors and workmates, perhaps with a feeling of not being able to cope with one's duties when one's back hurts, or of not daring to perform heavy patient lifts for fear of getting backache. It is also understandable that nursing aides with back symptoms had a greater perceived demand for physical and psychic strength and experienced a greater perceived strain compared to nursing aides without back symptoms. However, leaving aside the question of the causality between the back symptoms and the woman's psychological perception of her work, the measures undertaken should aim at reducing the physical load of the nursing aide's work, including reduction of heavy patient lifts. Measures taken to improve working conditions on the wards in these respects may be expected to have a positive influence on certain aspects of the nursing aides' psychological perception of their work.

GENERAL DISCUSSION AND CONCLUSIONS

There is already a shortage of staff in the geriatric nursing sector, i.e. in geriatric clinics, nursing homes, homes for the aged and similar institutions. This is a serious situation as the number of older individuals in Sweden will increase during the next 20–30 years and this will result in an even greater demand for staff in this sector. It is difficult to get staff today and it is difficult to keeping them. Geriatric nursing is usually considered to be a demanding occupation, which may explain the difficulties in getting and keeping staff. The present studies of nursing aides' work on geriatric (long-term care medicine) wards were therefore initiated to analyze certain common ergonomic problems during this type of nursing and to serve as a basis for changes on the wards aimed at improving working conditions for the nursing aides.

The results of the studies have shown that the average energy requirements during nursing aides' work are similar to those found in people engaged in light industrial work and in domestic work. Some special work tasks constituted a heavy work load from an energy point of view, however, especially for the older nursing aides. Certain work tasks in nursing might be heavy and tiring although they might not markedly influence the energy consumption during work. The weight of the burden when giving lifting assistance to patients with different degrees of handicap exceeded several times the recommendations given for maximum permissible weights for single and repeated lifts. The patient lifts were often performed with the body in a bent or twisted position. The incidence of back symptoms, particular in the lumbar region, in the nursing aides at Vasa hospital was fairly similar to that found in two studies from Gothenburg in other occupational groups in which the same methods and the same definitions of the symptoms were used.
The nursing aides studied were comparable to other women in the same age-groups as regards aerobic work capacity and as regards maximum isometric muscle strength in the six muscle functions studied, but they may be regarded as a selected group from other points of view, in contrast to the subjects of the other two studies. Also, the nursing aides who quit their jobs after only a short period of employment have not been especially investigated and it is possible that they had more back symptoms than those who stayed in geriatric nursing and constituted the majority of the group studied. The nursing aides' psychological perception of their work showed a pronounced perceived demand for physical and psychic strength and a great perceived strain. Relations with supervisors and workmates and satisfaction with the work itself were relatively good, while there was a fairly great perceived need for more education and information. As regards the relationship between the subjects' psychological perception of their work and back symptoms, nursing aides with thoracic or lumbar spine symptoms had more negative relations with supervisors and workmates and a greater perceived demand for physical and psychic strength compared to nursing aides without such symptoms.

To create as optimal working conditions on the wards as possible it is important to consider the selection of employees, their education for the job and the physical and mental strains of the job. The principles of selection for new employees in geriatric nursing, e.g. avoiding employing individuals with pronounced back symptoms, are important. The great perceived need for education among the nursing aides, especially among those who had not passed the training course, should be met by urging all nursing aides to take the training course. Continuous education of all nursing aides on the wards, comprising both certain aspects of geriatric medicine and ergonomic problems, is indicated. Especially among the younger nursing aides, there was a great perceived need for information, despite daily meetings with the head nurse and weekly staff conferences on the wards. More information is thus needed and it should perhaps be given in other ways than at present.

The close contact with suffering and death among the patients may create anxiety among the nursing aides. This anxiety may be more or less pronounced, depending on the emotional development and maturity of the individual. The nursing aides experienced more stress in the comparison with workers and employees at two factories in Gothenburg and one explanation for this may be the specific anxiety-creating elements in the nursing aide's work. The provision of more information to the nursing aides about problems related to suffering and death might decrease the anxiety-creating elements in the work and thereby reduce the great perceived need for psychic strength and the great perceived mental strain.

As regards the problem of patient lifts, mechanical lifts are available on all wards at the hospital but are not systematically used. It often requires more time to perform the lift mechanically than manually and some patients prefer to be lifted manually instead of mechanically. Mechanical lifts are sometimes also difficult to use owing to lack of space in some of the wards. Some nursing aides are also unfamiliar with the use of a mechanical lift, which emphasizes the importance of education. Better types of patient lifts than are available today are therefore needed. Systematic use of such patient lifts will decrease the lifting burden during nursing aides' work, but would influence the energy requirement during the work. These studies have shown that one of the most important factors for the work load on the nursing aides is the great lifting burden and one way to lessen that burden is a more systematic use of patient lifts. This should mean a decrease of the lifting burden at the cost of a slight increase in the energy consumption during work.

Proper selection of new employees for geriatric nursing, provision of adequate information to the nursing aides and measures aimed at decreasing the physical and mental strains of the job are important in order to create as optimal a working environment as possible. Another approach is to try to influence physical and psychological aspects of

the work by means of physical training. On the basis of the findings of the present studies, another study has been performed at Vasa hospital (26), where the effect of trunk and quadriceps muscle training on the psychological perception of the work and the subjective assessment of low-back symptoms was studied in three groups of nursing aides with lumbar spine symptoms. One group took part in the muscle training programme, another group were given a series of informal lectures and a third group served as a control group. The psychological perception of work, the subjective assessment of low-back symptoms and the muscle strength of each group were determined before and after the study period. Muscle strength increased significantly in the training group compared to the group given lectures, whereas the difference compared to the control group was less pronounced. After the study the training group showed a significant positive difference for the scales adjustment to geriatric work, perceived strain and perceived need for physical and psychic strength compared to the group given lectures and the control group. The subjective assessment of low-back symptoms was influenced only as regards the duration of the symptoms, which became shorter in the training group compared to the group given lectures, but not compared to the control group. It was thus possible to influence certain aspects of the women's psychological perception of their work by muscle training as performed here.

The present studies thus have shown that the lifting burden and the psychological demands constituted the greatest loads on the nursing aides, while the energy consumption during work was generally acceptable. It seems to be obvious that the two problem areas that must be concentrated upon are technical devices for patient lifting and measures to improve the psychological work situation on the wards. It is well known that many patients prefer to be lifted manually instead of mechanically but the present observations show that such psychological resistance among the patients must be overcome.

Shortage of staff is not uncommon on long-term care wards but certain ward activities, such as patient lifting, cannot be excluded despite the shortage of staff. Such conditions increase the burden of work laid on the remaining nursing aides and have a negative influence on the psychological work situation.

The psychological work situation must be improved by more information and education, perhaps given in other ways than at present. A combination of better technical devices, organizational changes on the wards and the provision of more education and information to the nursing aides should create better working conditions for the nursing aides. Organizational changes, e.g. smaller wards, team nursing, and patient treatment conferences with participation of all members of staff involved, should also be expected to improve certain aspects of the working environment on the wards.

Geriatric nursing will, however, always involve contact with tragic life-destinies which is bound to influence psychologically the person working on the ward. Against this background it is even more important that every possible effort is made to improve the work situation for the personnel in this mentally and physically heavy nursing sector.

The author had many discussions with the nursing aides during the performance of the studies and among the older nursing aides especially there were many who had found geriatric nursing work interesting and meaningful, despite the negative findings in the studies.

A more optimal working environment in a broad sense for the nursing aides would also result in an improved nursing environment for the patients.

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