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IDENTIFICATION AND DESCRIPTION OF HOSPITAL WORKERS WHO
HAVE SUSTAINED INDUSTRIAL BACK INJURIES

THE UNIVERSITY OF ARIZONA

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IDENTIFICATION AND DESCRIPTION OF HOSPITAL WORKERS
WHO HAVE SUSTAINED INDUSTRIAL BACK INJURIES

by
DeAnn Stirling

A Thesis Submitted to the Faculty of the
COLLEGE OF NURSING
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA

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ABSTRACT

This study investigated reported back injuries in hospital workers during a 16 month period. This study focused on two research questions: Which occupational groups within the hospital environment have the highest incidence of back injury? What are the individual characteristics of hospital workers who have sustained a back injury while working?

From a potential pool of 68 reported back injuries data were collected from 21 individuals. Back injuries were found to be more frequently reported by Registered Nurses (57.62%). Sixteen were female, five were male. Forty-six percent of the subjects were between 20 and 29 years of age and 47 percent were overweight. Sixty-two percent of the participants were taller than the national average for their sex. Six participants reported no training in lifting and handling, while fifteen had received training. Ninety percent of the injuries were related to lifting persons or objects.

Analysis indicated that the nursing related professions have a higher frequency of work-related back injuries than other occupational groups employed in the hospital environment. Of the individual factors investigated, only height was suggested as a possible predisposing characteristic related to the occurrence of back injury.

CHAPTER 1

INTRODUCTION

Hospitals, traditionally thought of as havens for the ill and injured, must also be recognized as a major industry with occupational health and safety hazards similar to those in many types of industrial and commercial establishments. In addition, the three million hospital workers employed in the United States (National Institute for Occupational Safety and Health, 1975) are exposed to other health and safety hazards which are unique to the health care environment.

Felton (1958), McCahn (1959), Conant and Stent (1970), and others have expressed concern for the health of hospital workers and have called attention to the inadequacy of employee health services in many hospitals. This concern is partially based on the fact that hospital employees are often injured at work. A five year study by the United States Department of Labor (1978) revealed that there were 253,600 reported occupational injuries to health service workers with a total of 114,706 lost workday cases.

Primary prevention of these accidents would seem important from both an economic and humanitarian point of view. The direct costs of accidents vary with Worker's Compensation premium basic rate and the individual hospital's injury experience. According to Mammen and Linden (1964), indirect costs of accidents are estimated to be in

the order of four times the amount of direct costs paid in basic premium rates. It does not seem necessary to discuss humanitarianism as it relates to hospitals since this is one of the prime reasons for a hospital's existence.

The Occupational Health Nurse has traditionally served as a provider of emergency care and medical services. However, with her skills, knowledge, and rapport with employees, the Occupational Health Nurse is in an excellent position to participate with safety departments in many preventative health activities.

The potential role that the Occupational Health Nurse can play in the prevention of back injuries in health services employees is the concern of this investigation. Although back injuries are not the highest in frequency of all possible injuries, they are second only to upper respiratory infections in compensation payments for sickness benefits in all industries (Rowe, 1969). The prevention of back injuries will serve not only to improve the health and productivity of health service employees, but will clearly demonstrate the Occupational Health Nurse's role in cost effectiveness.

Purpose of the Study

This study was designed to identify hospital employees with the highest incidence of reported back injuries that were sustained while working. They will be categorized according to occupational groups. The individual characteristics of age, sex, height, weight, previous back injuries, and prior training in lifting and handling

techniques were also investigated to determine a need for further study into their possible relationship to the occurrence of back injuries.

It is assumed that this data will assist in hospital program planning for the prevention of back injuries, and provide a basis for further research regarding job design; particularly in those occupations identified as having a high incidence of back injuries.

The concerns of this study can be stated in the following two questions:

1. Which occupational groups within the hospital environment have the highest incidence of reported back injury?
2. What are the individual characteristics of hospital workers who have sustained a back injury while working?

Significance of the Study

In a study of reported industrial injuries done by the National Institute of Occupational Safety and Health (NIOSH) in 1975, back injuries were reported fifth in frequency of occurrence by all hospitals in all regions of the United States. In mountain state hospitals (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming), they were reported second only to injuries to the hand as the most frequent type of injury. In a survey done by the Canadian Hospital Association (LeBourdais, 1977), "backstrains were identified in the majority of cases as the most frequent form of injury."

Individual studies of hospital injuries report similar results. Gordon (1967) reviewed accident reports over a one year period and

found injuries to the back and spine as the second most frequently occurring injury, accounting for over one half of the lost time accidents. Hefferin and Hill (1976), Mammen and Linden (1964), Mann (1967), and Hoover (1973) have done similar studies with corresponding results; back injuries are not the most frequent type of injury, but are consistently among the most disabling.

Although the exact incidence of back injuries is unknown, it is assumed to be high. This is a problem for hospitals in terms of insurance costs and replacing workers who are disabled. However, incurring a disabling back injury can also have a traumatic effect upon the individual, both physically and psychologically. Physical limitations, loss of income, and a change in body image are just a few of the possible consequences that the victim of a severe back injury must face.

Approaches to preventing back injuries are complicated because no single cause of back pain may be identified. Back pain may be associated with many types of physical disorders, such as congenital defects, lumbarisation or sacralisation of the vertebrae, Still's disease, Scheurman's disease, or Rheumatoid Arthritis (Keim, 1973). In addition, there is no definite proof that muscles, joints, discs, or ligaments can cause back pain (Nachemson, 1975). However, indirect evidence does point to the injured or diseased intervertebral disc as one of the main causes.

Specific causes for industrial back injuries are also difficult to pinpoint. They are often related to the pushing, pulling, or lifting of objects or patients. However, the extent to which physical

conditions influence the severity of the occurrence of back injuries is unknown.

Individual psycho-neurotic factors also may play a role in the reporting of compensable back injuries. Nordby (1981) suggests that 25% to 50% of all reported back pain includes a psychological factor as either a major cause or exclusive cause of disability. Magora (1973) found that workers who were not satisfied with their present occupation, place of employment, or social status; who felt that a high degree of responsibility and mental concentration was required of them; and who were tense and fatigued after work had a definitely higher incidence of reported back pain. According to (Ring 1979, 2), this psychological factor "makes it virtually impossible to determine causative factors with any acceptable degree of accuracy."

Despite problems in trying to prevent an injury when a specific cause cannot be identified, industry traditionally has attempted to do so through three methods. These methods include: 1) requiring preplacement screenings, 2) providing training in manual handling and lifting techniques, and 3) designing the job to fit the worker (Snook, Campanelli, and Hart, 1978, 478).

A good medical history has been suggested as the single most important fact in considering a person for employment on jobs requiring manual materials handling (Rowe, 1971). This suggestion would follow from data disclosing the recurrent nature of the episodes (Brown, 1975; Nordby, 1981). However, a medical history can be distorted to acquire a job.

Little emphasis has been placed on the physical examination as a predictor in the occurrence of back injuries. Troup (1979) suggested that tests of dynamic strengths of trunk-flexor muscles and of trunk-extensor measurements of lumbar mobility were likely to be of value because deficiency in these tests was more common in those with a previous history of back trouble. Harley (1972) found that special physical examinations was not a useful predictor of back injuries.

Currently there are divergent opinions on the value of pre-placement x-rays. In the experience of many industries, the exclusion of persons with certain physical deformities or pathologies has not reduced the reports of job-related back pain (Brown, 1976).

Becker (1955) has done much of the pioneer work in using x-rays to develop criteria to disqualify workers from heavy lifting jobs. In 1964, the American Industrial Medical Association (AIMA) expanded on Becker's work. Jobs of all types were categorized into four different classifications. Various physical conditions that may be detected by x-rays are listed in 33 different categories. Beneath each listed condition are job classes considered suitable for persons with the condition. The classification scheme for these recommendations are based on the following factors (AIMA, 1964, 377-378):

- A. The condition causes a weakening of the low back structure, resulting in an increased likelihood of acute injury or chronic degeneration.
- B. The condition is usually associated with low-back symptoms which will probably recur, regardless of type of work.
- C. The condition is associated with systemic disease which is usually progressive.

The AIMA suggests that x-rays "may have value as a screening technique in selection of persons for certain jobs--usually those requiring heavy work." The cost of these screening techniques is prohibitive in many industries. However, it is interesting to note that despite readily available facilities and professional personnel, the literature does not include an example of hospitals using preplacement screenings as a device for preventing back injuries. One possible explanation is that jobs requiring heavy lifting, other than nursing, have not been identified.

Another proposed method of reducing the incidence of back injuries is through training procedures based on manual handling and lifting techniques. T. McClurg Anderson developed a method that recommended lifts be executed with the legs, keeping the back straight and vertical (Glover, 1976, 48). David (1959) and Davies (1969) have also recommended this method. Brown (1973) recommended a dynamic or "free lift" which allows the back to be flexed while lifting. The kinetic method, which uses body momentum to reduce the demand on back muscles was recommended by Maxwell (1957). Davis, Troup, and Burnard (1965) emphasized the importance of proper training when the bent-knee method is to be used. They indicated that "untrained" subjects tended to raise the hips faster than the shoulders which places the back in an inclined position, possibly causing excessive forces of acceleration on the back. Troup (1964) agreed that in untrained subjects, the hips tended to raise first, converting the knees-flexed lift into an ordinary stooping lift.

Controversy exists as to whether or not training methods are useful in reducing the incidence of back injuries. Glover (1976, 47) has endorsed training procedures as "the only successful method of reducing the incidence of back pain." Kowal and Baust (1964) have demonstrated a reduction in the incidence of reported back injuries in a hospital over a five year period through the use of group training procedures. Similarly, Kosiak, Aurelius and Hartfiel (1966) reported a reduction in both the incidence and severity of reported back injuries after instituting a program in the 3M Company which combined preplacement screenings, in-service safety programs, and "medical management."

In contrast, Brown (1976) concluded in his annotated bibliography that "there is clear evidence . . . that there has not been any significant reduction in injuries due to lifting and handling, etc., over the past 30 years when the straight back, bent knees lifting method has been advocated." Studies done by Snook et al. (1978), and Dehlin, Hendenrud, and Horal (1976) supported this claim. In both, the conclusion was reached that instruction in manual handling techniques had no effect on the number of back injuries claimed. Worker compliance and motivation are variables which, no doubt, have a strong influence on the effectiveness of any educational effort.

Ergonomics, or designing the job to fit the worker, is one method of preventing back injuries about which there is little controversy. Chapanis (1975,1) defined ergonomics as a broad and complex discipline which applies "information about human characteristics,

capacities, and limitations to the design of human tasks, machines, machine systems, living spaces, and environments." The goal is to provide a safe, comfortable, and efficient living and working environment to increase production and decrease the number of work-related injuries.

In preventing back injuries through ergonomics, knowledge of the worker's capabilities and limitations in lifting, pushing, and pulling are of primary concern. Efforts also are made to exclude from the job certain tasks which may result in severe over-reaching, and severe extension and rotary trunk movements (Glover, 1976). Ergonomics involves engineering principles in evaluating correct floor-to-bench heights, seat-to-bench heights (which are different for men and women), environmental design, sequence of operations, and the sizes of aisles to prevent unnecessary physical effort.

A well designed job can reduce the worker's exposure to the hazards of manual lifting and has two other inherent advantages: 1) it reduces the company's reliance upon the worker to comply with established training procedures, and 2) reduces the medical and legal problem of selecting the worker to fit the job.

Snook (1978) has done seven manual handling studies over the past 15 years to develop criteria for maximum weights that can be lifted, pushed, or pulled by a certain percentage of the population without injury. Variables considered in his research and included in his criteria are as follows: sex of the worker, height of the worker, height of the object to be lifted, number of lifts in a specific time

interval, and the height from which and to which the object is to be lifted. He estimated that two out of three back injuries associated with heavy manual handling tasks can be prevented if the tasks are designed to fit at least 75 percent of the population.

There is no mention in the literature of the use of ergonomics to design the job to fit the worker within the hospital environment. This is not surprising when one considers the cost in the multitude of applications. Industry is only beginning to use biomechanical techniques in the designing of equipment for human use, despite knowledge of its benefits since before World War II (English, 1978; European Productivity Agency, 1958).

Conceptual Framework

The framework for this study was descriptive in nature, using an epidemiological perspective as a focus to direct the investigation. Traditionally, the epidemiological method of research is used to detect an association between the disease and a characteristic of the person who has the disease, or a factor in the environment. This provides an analytical method to explain and predict disease in the community and suggests areas of intervention. The components of the traditional epidemiological model are presented in Figure 1.

The epidemiological model includes three major concepts: host, agent, and environment. Within the model, these concepts are illustrated by a dynamic balance, or equilibrium state. Health is equilibrium, and disease is considered a failure of the system or a failure of the host to adapt to the system (Morse, 1982).

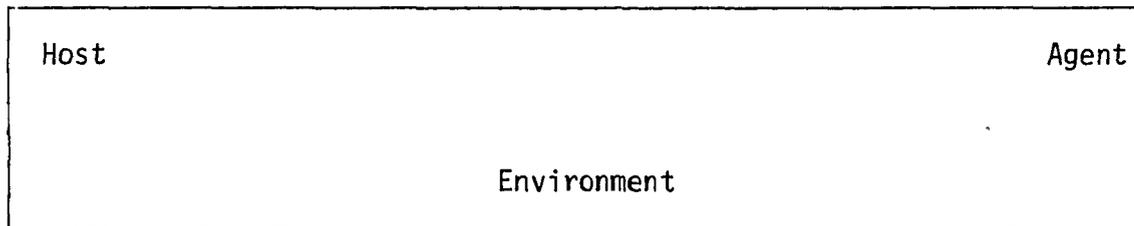


Figure 1. Components of the epidemiological model

Figure 2 shows an adaptation of the traditional epidemiological model that was employed in this study. In using the model in an occupational health setting, an attempt is made to find an association between the cause of the reported injury, the characteristics of the persons who are at risk for injury, and/or something in the environment which could cause and/or contribute to the severity of the injury.

Identification of the host, or hospital workers who are at risk of sustaining a back injury, was the primary intent of this investigation. In the past, the study of the incidence of reported back injuries in hospitals among health service workers concentrated on specific occupational groups, such as nursing personnel. Other studies present data reporting the occurrence of reported back injury without emphasis on identification of which groups have the highest frequency of this type of impairment.

Individual factors which may influence the host's ability to adapt to the system and thereby increase accident probability were also explored. Host factors included age, sex, weight, height, previous back injuries, and previous training in lifting and

Host or
Hospital
Workers
at Risk
of Sustain-
ing Back
Injury,
and Host
Factors
including:

age
sex
height
weight
previous injuries
previous training

Agent or Cause
of Reported Injury

Hospital Environment

Figure 2. Epidemiological model for the prevention of back injuries in hospital workers

handling techniques. Individual factors such as age and sex have been studied with varying results, and other individual factors such as height and weight usually are disregarded. The question of whether or not these individual factors can cause an imbalance in the system, thereby increasing the host's susceptibility to injury, has not been sufficiently answered in previous research.

Other factors in the environment which also can affect the dynamic balance in the model were not addressed in this study. It was felt that due to the many differences from one hospital environment to another, it would be more appropriate for the Occupational Health Nurse employed in his/her specific hospital to examine the variables which are unique to each setting.

The identification of hosts with high frequency rates of reported back injuries and the description of their individual factors will give direction to the Occupational Health Nurse for application to practice and further research in the prevention of back injuries within the hospital setting.

Definition of Terms

Back injury--any pain in the back severe enough to require reporting on a hospital accident form.

Hospital employee--any person employed by the hospital of any job description who has worked for the hospital at least six months.

Hospital accident form--any form used by the hospital to report accidents or injuries received by hospital employees while at work.

Occupation--any activity within the hospital for which there is a formalized job description.

Individual risk factors--age, sex, height, and weight of each employee reporting a back injury.

Assumptions

1. Persons working within a hospital setting, regardless of job description, are susceptible to back injury.
2. Information reported on the hospital accident forms is complete and correct.
3. All injuries reported occurred at work.
4. Information obtained on the questionnaires is truthful.

Limitations

1. Generalizations can be extended only to the two hospitals studied.
2. No indices are used to measure the degree of disability associated with the reported back injury.
3. The questionnaire was developed by the researcher and has not been tested for reliability or validity.
4. The stated weight of each participant is only an approximation.

CHAPTER 2

REVIEW OF THE LITERATURE

The literature was reviewed for studies on the incidence of reported back injuries among various occupational groups within the hospital environment. Research regarding the individual factors of age, sex, weight, and height, which may correlate with the occurrence of back injuries was also explored. The findings and conclusions of much of this literature are based on special samples of persons with back ailments who have come to the attention of clinics or insurance programs. In addition, these studies generally lack a comparison group of persons free of back pain.

Incidence of Back Injuries within the Hospital

The lifting of transporting of helpless or uncooperative patients is a routine task for most nurses employed in a hospital. Nurses often are involved in moving furniture and other types of hospital equipment. In hospitals that are understaffed, these arduous manual handling activities may be performed without sufficient assistance. In situations such as this, nursing personnel are particularly vulnerable to overexertion accidents which typically result in an injury to the back (U.S. Labor Statistics Bureau, Report Number 341, 1968).

In a study done at Wilmington Medical Center in Delaware, nursing accounting for 69 percent of all lifting injuries, although they comprise just over 43 percent of the entire working population in that hospital (Hoover, 1973). Gordon (1967) and Hefferin and Hill (1976) reviewed all types of injuries that were incurred by nursing personnel and reported that injuries to the back and spine accounted for 22 percent and 43 percent of all injuries respectively.

Nursing personnel are not the only occupational group who are at risk in sustaining injuries to the back. Douglass (1971, 556) suggested that "certain hospital job classifications invite attacks of pain in the back. As in other industries, stockroom, maintenance, and custodial workers are especially susceptible." In 1973, Hoover found that housekeeping was the only department, other than nursing, that incurred a significant number of back injuries. A study done by the Sentry Insurance Company (Ellis, 1976) implied that laundry workers are also at risk, as back injuries were the fourth most common injury sustained at work preceded only by injuries to the finger, hand, and arm.

The U.S. Labor Statistics Bureau (1968) conducted a national survey of 5,004 hospitals to investigate work injuries in hospitals. Overexertion accidents accounted for sixty-nine percent of the back injuries reported. The term "overexertion accidents" was not defined; however, it was stated that they were "typified by the use of either improper methods of lifting or working without adequate lifting

assistance when moving patients, hospital equipment, furnitures, and the like" (p. 7).

In this study, occupational groups were divided into three major divisions. The professional care division, which included registered nurses, practical nurses, nurse aides, and orderlies, had an overall overexertion frequency rate of 29.4 per 1000 employees. The plant maintenance and support group division had an overall overexertion frequency rate of 16.6 per 1000 employees. Occupational groups included within this category were repair and maintenance workers, carpenters, electricians, laundry machine operators, laundry workers, painters, plasterers, plumbers, and steam fitters. The administrative division (occupational groups within this division were not specified) had an overall overexertion rate of 26.7 per 1000 workers--a rate almost as high as in the professional care division!

Age

Physically, all systems are affected with aging, including the spinal column. In fact, after autopsy, degenerative changes can be seen in the intervertebral disc by middle age in most subjects (Vernon-Roberts and Pirie, 1977). Holt (1954) and Lawrence (1969) established an association between back pain and lumbar disc degeneration. Calliet (1962, 77) noted, however, that "the aging process itself need not cause back pain because of spinal degeneration."

Epidemiological studies of general populations which explore the relationship of age to back pain indicate that the prevalence of

back pain increases with age. Unfortunately, prevalence studies only indicate the numbers of persons experiencing pain at a given time and have not taken occupational differences into consideration. Nagi, Riley, and Newby (1973), in sampling a general population in Columbus, Ohio, found a marked increase in the prevalence of back pain after age 35. The ages of the population sampled were between 18 and 64.

Hirsch, Jonsson and Lewin (1969) studied the incidence of back pain in 692 Swedish females in three districts of Gothenburg. The age range was from 15 to 71 years. Back pain increased significantly up to the 55-64 year group; the group in which the highest frequency was reported. However, the frequency decreased after age 64.

Studies done in industry and surveys conducted by clinics and private physicians do not consistently show a strong correlation between increased incidence of back pain with increased age. Rowe (1969) conducted a study of 55 male workers with low back disability at the Kodak Park Works of Eastman Kodak. More than 70 percent of the patients were in the 30-40 year age range, 12 percent were in their twenties, and 13 percent were in their fifties. The predominance of back injuries in the 30-40 year age range could not be satisfactorily explained by the age distribution of the total male population nor by the activity level of the patient group.

Cust, Pearson, and Mair (1972) studied the prevalence of low back pain among 911 nurses working in the Dundee General Hospitals. Teachers working in the same area also were surveyed to serve as a control group. The incidence rate of occupationally related back pain

of "trained nurses" increased gradually up to the age range of 31-45, where the rate peaked at 2.2 per 100 nurses. The rates then decreased slightly in all age groups except the 46-50 year age group which had a rate of 2.0 per 100 nurses. In contrast, the incidence rates of occupationally related back pain for teachers increased steadily with age, peaking in the 56-60 year age group. The hypothesis was suggested that predisposed persons who work in jobs which involve heavy lifting develop back pain earlier because of precipitating factors at work. Whereas, predisposed persons in jobs which require light work meet their precipitating factors throughout life and thus their prevalence of back pain slowly increased with the passage of time.

If the job demands of steel workers may be generally classified as "heavy," this hypothesis may be indirectly substantiated in a study conducted by Tauber (1970). The sample included 222 steel workers who were treated for complaints of occupationally related back pain. He found that employees of the 18 to 24 year age group had a considerably higher rate of back injury than among the other age groups, also the 25 to 34 year age group had a relatively higher rate of backaches than the next higher age groups. Backache cases occurred at a higher rate among the two younger age groups, both within their own age groups and within the total plant population, than among the three higher age groups.

Sex

Do men experience back pain more frequently than women? Is the risk of injury or the onset of disease, which may lead to sensations of pain in the back, dependent on the sex of the individual? According to Finneson (1973, 134), men are affected by pain in the back approximately twice as frequently as women. However, much of the literature investigating the relationship of back pain to the gender of the individual does not necessarily support this claim.

Referring again to a study investigating the prevalence of back pain in Columbus, Ohio, Nagi and his colleagues (1973) reported that a greater number of females (21 percent) experienced back pain as compared to males (14 percent). When age controls were introduced to eliminate the possibility of an increased report of back pain in women in connection with biological processes associated with menses, it was found that women over 50 years of age were still more likely than men to report back pain (26 and 17 percent, respectively). Women were also found to report back pain more frequently than men in all occupational differences.

Several surveys have been conducted by private physicians and clinics of their patient populations complaining of back pain. In all of these surveys, men have complained of back pain more frequently than women. Glass (1979) reported that of patients complaining of back pain, 70.3 percent were male and 30.5 were female. Similarly, Gurjiam and Webster (1948), in a study of 196 patients with back pain,

found that 35 percent were female and 65 percent were male. Strachan (1979, 49) surveyed patients reporting to a physiotherapy department with "back conditions sustained at work." Of those participating, 75 percent were male, 25 percent female.

Weight

The relationship of weight to the occurrence of back injuries has not been studied extensively. It is generally considered, however, that overweight is a predisposing and/or otherwise adverse factor in osteoarthritis of weight bearing joints and in back ailments (Lindahl and Lindwall, 1977). The underlying idea is that a joint or back disorder would be aggravated if the load on the structure was increased, and improved if the load were decreased.

In 1974, Gyntelberg studied the incidence of low back pain among 4,753 males residing in Copenhagen. His results indicated that low back pain occurred more frequently among subjects with normal weight, or those 10-20 pounds above normal weight. Low back pain occurred least frequently among subjects who were greater than 20 pounds overweight or more than 10 pounds underweight.

Hirsch and his associates (1969) compared mean values of body weight in groups with and without low back pain and found no significant differences between the two groups. Rowe (1969) compared a group of "normal" persons (no history of back pain) to a patient group and found no difference in the incidence of obesity between the two groups. It was suggested that more studies with larger groups are required

before the question of a relationship between weight and the incidence of back pain can be satisfactorily answered.

Height

Tauber (1970) found that of 222 male steel workers complaining of occupationally related low back pain, 82 percent were 5'11" or taller. These findings would seem important when compared to those of the National Center for Health Statistics (1965), which indicated that only 24 percent of the entire male population is 5'11" or taller. He explained that the involvement of a greater proportion of tall persons was probably related to angulation differences within the vertebral column, and suggested that this mechanical factor be studied further.

When mean values of body height were compared between groups with and without back pain, no significant differences were found between the two groups (Hirsch, et al., 1969). No difference was found in the incidence of persons over 73 inches tall, when a group of persons with a history of back pain was compared to a group without a history of back pain (Rowe, 1969). Clearly, the question of whether or not persons considered significantly taller or shorter than the general population are more susceptible to injuries to the low back continues to be a matter of debate.

Summary

Reported back injuries in hospital workers are well documented in various studies. The injuries have been reported by almost all occupational categories within the hospital environment, and are not

exclusive to any particular group. The variables of age, sex, height, and weight have all been studied with varying results. None of the individual factors reviewed have been clearly established as a predictor in the occurrence of reported back injuries.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter will include a description of the design of the study, the method of data collection, a description of the sample and setting, and an explanation of data analysis. The study was designed to answer the following questions:

1. Which occupational groups within the hospital environment have the highest incidence of back injury?
2. What are the individual characteristics of hospital workers who have sustained a back injury while working?

This was a descriptive study designed to identify hospital employees with the highest incidence of back injury. The individual factors of age, sex, height, weight, previous back injury, and previous training in lifting and handling techniques also were identified to explore their possible relationship as predisposing variables to the occurrence of back injury.

Method of Data Collection

Accident reports, filed over a sixteen month period from May 1, 1979 to September 30, 1980, were reviewed to identify employees with work-related back injury. Permission for record review was obtained verbally from the Occupational Health Nurse at one hospital, and from

the Safety Manager at another hospital. Once identified as having incurred a back injury at work, the employee was sent a letter of introduction by the researcher, which also explained the purpose of the study and assured the confidentiality of his/her name and responses. The letter of introduction is included in Appendix A.

A consent form (Appendix B) and self-addressed, stamped envelope were enclosed with the letter of introduction. The consent form was to be returned, indicating the employee's decision to participate or not participate. The employee understood that he/she had two options in completing the questionnaire: 1) it would be sent to his/her home with a stamped, self-addressed envelope, or 2) he/she would answer the questionnaire during a telephone interview.

Before they were mailed, a copy of the letter of introduction, the consent form, and the purpose of the study were submitted to the Human Subjects Committee of the University of Arizona for their approval. As of November 13, 1980, approval was granted with the understanding that the consent forms were to be kept in a permanent file at the College of Nursing.

The age, sex, cause of the accident, and occupation of the employee were determined from the information provided on the accident reports. Additional data that were provided by the participants included the following categories (Appendix C):

1. The height of the employee.
2. The approximate weight of the employee at the time of injury.
3. Length of employment in years and/or months.

4. The length of time that the employee had worked in the specific job in which he/she was employed at the time of injury.
5. Previous history of back injury.
6. Previous training received in correct manual lifting and handling techniques.
7. Whether or not training included instructions regarding lifting patients and/or objects.

The Sample and the Setting

The population for this study was composed of employees at two different hospitals who had reported a back injury within a sixteen month period, between the dates of May 1, 1979, and September 30, 1980. There was no intention to make comparisons between the data obtained from the different hospitals. The hospitals are located in two different cities in the Southwestern United States, with respective employee populations of 1,547 and 1,065. One hospital is located near a retirement community with facilities to accommodate 271 adult patients, the other is located in a metropolitan area, with facilities for 300 adult patients and 40 bassinets. Both of the hospitals had Occupational Health and Safety Departments. One hospital employed two registered nurses and one safety manager, the other had one registered nurse and two safety personnel in the Occupational Health and Safety Departments.

In order to be included in this study, the participant must have met the following criteria:

1. Employed at one of the participating hospitals for at least six months.
2. Reported a back injury which occurred while performing a job related activity.
3. Completed an accident report.

A total of sixty-eight of the hospital employees were found to have sustained a back injury while at work during the sixteen month period involved. Of these, twenty-two returned their consent form and indicated their willingness to participate in the study.

Two employees elected to provide data through a telephone interview. The remaining twenty participants completed and returned the questionnaire after they were mailed to them with stamped, self-addressed envelopes. Data obtained from the questionnaire of one participant was not included in the study because the participant did not meet the criteria of having been employed in the hospital for six months prior to sustaining a back injury.

Method of Data Analysis

Relative frequencies expressed as percentages were calculated for the variables of occupation, sex, weight, and height. Absolute frequencies could not be determined since data regarding total numbers of employees in each occupation were not available.

The number of years employed in the participants' specific occupation, number of prior injuries, previous training sessions and their content, and the cause of the current accident were presented

individually for each worker in two separate tables. One of the tables included all RN participants; the other included data pertaining to workers in all of the other occupations represented.

A statistical analysis using t-tests and Chi-square was not done. The lack of a control group that included non-injured employees compromised the validity of an interpretation of the findings using a statistical analysis.

CHAPTER 4

PRESENTATION AND DISCUSSION OF DATA

Back injuries have been identified as a serious type of occupational injury to which hospital employees of all job descriptions are not immune. The purpose of this study was to answer the following questions:

1. Which occupational groups within the hospital environment have the highest incidence of back injury?
2. What are the individual characteristics of hospital workers who have sustained a back injury while working?

The sample population was drawn from two hospitals located in different cities in the Southwestern United States. A total of sixty-eight hospital employees were identified as having sustained a back injury by completing an accident report while at work between May 1, 1979 and September 30, 1980. Workers were sent letters of introduction about the study and their confidentiality was assured (Appendix A).

Twenty-two workers (30.38%) indicated their willingness to participate, and of those, twenty-one met all the criteria for participation. To meet the criteria for participation the employee must have been employed for at least six months at the hospital where he/she sustained the back injury. The participant must also have sustained the

injury while performing a job related activity as reported on an incident report.

This chapter will include a description of the data obtained. A discussion of the results obtained also will be included.

Presentation of Data

Table 1 represents the distribution of the twenty-one participants by sex and job category. Sixteen (76.19%) of the subjects were female and five (23.80%) were male. The occupational categories represented included: Registered Nurse, Licensed Practical Nurse, Supervisor of Medical Records, Plumber, Nursing Assistant, Housekeeper, File Clerk, and a Urology Technician.

Registered Nurses were found to have sustained the majority of back related injuries by almost half (47.62%). All ten of the Registered Nurses were female. Other categories which were all female included: Licensed Practical Nurses, with two (9.52%) workers; Housekeeper, with one (4.76%) worker; and File Clerk, with one (4.76%) worker.

The only occupational category with both male and female participants was that of Nurse Assistant. Males and females were equally represented with two (9.52%) of each sex in the occupational category.

The remaining occupational classifications were comprised entirely of three males, with one (4.76%) in each job category. Those categories included one Supervisor of Medical Records, one Plumber, and one Urology Technician.

Table 1. Distribution of Hospital Workers with Reported Back Injury by Occupation and Sex

Occupational Title	Female		Male		Total Number in Occupation	Total Percent in Occupation
	Number	Percent	Number	Percent		
Registered Nurse	10	47.62	0	0	10	57.62
Licensed Prac. Nurse	2	9.52	0	0	2	9.52
Nursing Assistant	2	9.52	2	9.52	4	19.04
Housekeeper	1	4.76	0	0	1	4.76
File Clerk	1	4.76	0	0	1	4.76
Sup. Medical Records	0	0	1	4.76	1	4.76
Plumber	0	0	1	4.76	1	4.76
Urology Tech.	0	0	1	4.76	1	4.76
Totals	16	76.19	5	23.80	21	4.76

Table 2 presents a distribution of the twenty-one subjects according to their age in years and their sex. Ten year intervals were used to group subjects into categories. Workers in the 20 to 29 year old category outnumbered those in other categories with a total of nine (42.86%) workers. One third (33.33%), or six workers were in the 30 to 39 year old category; 19.05%, or four were in the 40 to 49 year old category; and one worker, or 4.76 percent of the participants was in the 50 to 59 year old category. There were no participants who were under 19 or over 60. The mean age of all participants was 33.38 years old.

Females were most heavily represented in the 20 to 29 year old group, with eight (38.10%) in that category. Only one (4.76%) male was in the 20 to 29 year old category. Three(14.29%) of the injured male workers were between 40 and 49 years of age. There was only one (4.76%) female in the 40 to 49 year old category. The 30 to 39 year old group had six (28.57%) female workers and one (4.76%) male worker. The only participant (4.76%) in the 50 to 59 years old group was female.

The distribution of twenty-one subjects by weight in pounds and sex is shown in Table 3. The weight of each worker was compared to the average for their weight and height as designated by the Society of Actuaries and Associated Life Insurance (1980). The workers were then categorized as to whether they were greater than twenty-one pounds above the average weight, eleven to twenty pounds greater than the average weight, plus or minus ten pounds compared to the average

Table 2. Distribution of Reported Back Injuries of Hospital Workers by Age and Sex

Age in Years	Female		Male		Total Number	Total Percent
	Number	Percent	Number	Percent		
Under 19	-	-	-	-	-	-
20-29	8	38.10	1	4.76	9	42.86
30-39	6	28.57	1	4.76	7	33.33
40-49	1	4.76	3	14.79	4	19.05
50-59	1	4.76	-	-	1	4.76
Over 60	-	-	-	-	-	-
Totals	16	76.19	5	23.81	21	100.00

Mean age = 33.38

Table 3. Distribution of Reported Back Injuries of Hospital Workers by Weight and Sex

Compared to Average Wt. in Pounds*	Female		Male		Total Number	Total Percent
	Number	Percent	Number	Percent		
+ 21	5	23.81	2	9.52	7	33.33
+ 11-20	2	9.52	1	4.76	3	14.29
+ 10	8	38.10	2	9.52	10	47.62
- 11-20	1	4.76	-	-	1	4.76
- 21	-	-	-	-	-	-
Totals	16	76.19	5	23.80	21	100.00

Mean weight = 154.76

*Using statistics provided by the Society of Actuaries and Associated Life Insurance.

weight, eleven to twenty pounds below the average weight, or greater than twenty-one pounds below the average weight.

Five of the females (23.81%) and two (9.52%) of the males, or 33.33 percent of the 21 workers were greater than twenty-one pounds above the average weight for their sex and height. Two (9.52%) females and one (4.76%) male were between eleven and twenty pounds above the average weight for their sex and height. The greatest number of workers (47.62%) were in the mid-range group of plus or minus ten pounds. Eight were females (38.10%) and two were males (9.52%). Only one worker (4.76%), a female, reported less than twenty-one pounds below the expected weight for her height and sex. The mean weight for all participants was 154.76 pounds. The mean weight for female subjects was 150.44 pounds. The mean weight for male subjects was 168.60 pounds.

In Table 4 the subjects were classified according to their height in inches and by sex. The participants' height was categorized by two inch intervals.

Two (9.52%) females were sixty to sixty-two inches tall and three (14.29%) females were 63-65 inches tall. There were no male workers within these categories.

The largest number of females (47.62%) were between sixty-six and sixty-eight inches tall, with ten in that classification. Two (9.52%) males were between sixty-six and sixty-eight inches tall. One (4.76%) female and two (9.52%) males were in the sixty-nine to seventy-one inch classification. None of the females, but one (4.76%) male was in the seventy-two to seventy-four inch category. The mean height

Table 4. Distribution of Reported Back Injuries of Hospital Workers by Height and Sex

Height in Inches	Female		Male		Total Number	Total Percent
	Number	Percent	Number	Percent		
60-62	2	9.52	-	-	2	9.52
63-65	3	14.29	-	-	3	14.29
66-68	10	47.29	2	9.52	12	57.14
69-71	1	4.76	2	9.52	3	14.29
72-74	-	-	1	4.76	1	4.76
Totals	16	76.19	5	23.80	21	100.00

Mean height = 66.66 inches

for all participants was 66.66 inches. The mean height for female subjects was 66 inches. The mean height for male subjects was 69.8 inches.

The remaining responses to the questionnaire which were provided by the participants and the cause of the accident which was obtained from accident reports are compiled in Tables 5 and 6. The subjects' responses were divided into two tables for ease of presentation. Table 5 includes the responses of participants who were Registered Nurses (N = 10), and Table 6 includes the responses of participants who were in other occupational categories (N = 11).

Tables 5 and 6 describe the occupation of each participant and the number of years they were employed in that occupation at the time of the accident. The number of years employed was rounded to the nearest year. History of prior back injury also was included. The number of prior back injuries was not specific but has been grouped into intervals of two injuries or history of prior injury. Similarly, previous training in correct lifting and handling procedures which the workers had received prior to their injury was grouped into intervals of two. No prior training has been indicated as "no." A simple code was developed to indicate whether the training was in lifting patients only, objects only, or in lifting both patients and objects. The cause of the accident obtained from the accident reports has been abbreviated and described for each worker in both tables.

All responses included in Table 5 are those of ten Registered Nurses. The longest period of time in which any of the Registered

Table 5. Raw Data Responses of Ten Registered Nurses with Reported Back Injury

Occupational Title	Years	No. of Prior Injuries	Training Sessions	Content of Training*	Cause of Current Accident
Registered Nurse	17	4-5	1	3	lifting patient
Registered Nurse	10	No	1	3	lifting patient
Registered Nurse	6	No	1	2	lifting object
Registered Nurse	3	1	1	3	lifting patient
Registered Nurse	3	No	2-3	3	lifting patient
Registered Nurse	2	2-3	>3	3	lifting patient
Registered Nurse	2	1	No	No	lifting patient
Registered Nurse	1	No	1	3	slipped on floor
Registered Nurse	1	No	1	2	lifting patient
Registered Nurse	1	No	No	No	lifting patient

*1 = objects only
 2 = patients only
 3 = both patients and objects

Table 6. Raw Data Responses of Eleven Hospital Employees with Reported Back Injury

Occupational Title	Years	No. of Prior Injuries	Training Sessions	Content of Training	Cause of Current Accident
Plumber	9	1	2-3	1	lifting object
Nursing Asst.	9	1	2-3	3	lifting patient
Nursing Asst.	1	>5	>3	3	slipped on floor
LPN	6	No	No	No	lifting patient
LPN	2	No	1	2	lifting patient
Nursing Asst.	2	No	2	2	lifting patient
Housekeeper	2	No	No	No	lifting object
Sup. Med. Records	2	No	No	No	lifting object
Nursing Asst.	1	No	>3	3	lifting patient
File Clerk	1	No	No	No	lifting object
Urology Tech.	1	No	No	No	lifting object

*1 = objects only

2 = patients only

3 = both patients and objects

Nurses was employed was seventeen years. One Registered Nurse was employed ten years and another six years. Three Registered Nurses were employed three years. Two were employed two years, and two were employed one year.

Six (60%) Registered Nurses had no history of prior back injury. One Registered Nurse, who was employed seventeen years, reported four to five prior back injuries. One Registered Nurse reported two to three prior back injuries, and two reported one.

Eighty percent of the Registered Nurses reported that they had received previous training in correct lifting and handling procedures. Six of them reported that they had received training one time. One reported that she had received training two to three times. Only one Registered Nurse had gone through training more than three times. Two Registered Nurses reported that they had not received training in lifting or handling techniques.

Six Registered Nurses reported that they had been instructed in proper methods for lifting both patients and objects. Two Registered Nurses reported that they had been instructed only in how to lift patients. As previously noted, two Registered Nurses received no prior instruction in lifting or handling techniques.

Ninety percent of the back injuries that were reported by Registered Nurses were sustained secondary to lifting. Eight back injuries were incurred while lifting a patient, and one was incurred while lifting an object. One of the back injuries reported by a Registered Nurse was attributed to slipping on a wet floor.

The responses of the workers described in Table 6 are those of various occupational titles. The titles include: Plumber, Nursing Assistant, Licensed Practical Nurse, Housekeeper, Supervisor of Medical Records, File Clerk, and Urology Technician. Two of the workers, a Plumber and a Nursing Assistant, had been employed in their occupations for at least nine years. A Licensed Practical Nurse had been employed for at least six years. The other Licensed Practical Nurse, a Nursing Assistant, the Housekeeper, and the Supervisor of Medical Records all were employed for at least two years. The two remaining Nursing Assistants, a File Clerk, and a Urology Technician all were employed for one year.

Only three of the workers described in Table 6 had sustained prior back injuries. One participant, a Nursing Assistant, reported a history of greater than five prior injuries and had received instruction in lifting and handling techniques more than three times.

Five of the workers described in Table 6, or almost half, reported no prior training in lifting or handling techniques. None of them had sustained prior back injuries. Two workers had received training in lifting objects only, and both were employed in non-nursing occupations. The only participant who had received training in lifting patients only was a Nursing Assistant, with a history of one prior back injury. Nursing Assistants were the only occupational group in Table 6 that reported prior training in both lifting patients and objects, and of them, only one did not report a prior back injury.

Relationship of Findings to
Review of the Literature

A wide variety of occupational groups within the two hospitals surveyed were found to be susceptible to back injuries. However, the professional care division, or nursing related occupations, were found, by far, to have the highest incidence of back injuries. Registered Nurses, Licensed Practical Nurses, and Nursing Assistants accounted for 76.19% of the 21 participants who had reported back injuries while working.

These findings would tend to support other studies done by Hoover (1973) and the U.S. Labor Statistics Bureau (1968), wherein nursing related occupations had a higher frequency of lifting and over-exertion injuries respectively. Of the sixteen participants in this study who injured their back while working in nursing related occupations, fourteen subjects, or 87.5 percent, were sustained while lifting patients or objects. It is possible that an ergonomic study of nursing functions potentially could reduce the frequency of back injuries in nursing personnel.

Sixteen (76.18%) of the workers who sustained back injuries at work in this study were female. In the literature review, Nagi, et al. (1973), using a control group in their investigation of the prevalence of back injuries in the general population, also found that women experienced back pain more frequently than men. In contrast, Glass (1970), Gurdjian and Webster (1948), and Strachan (1979) all found in their surveys that men reported back injuries more frequently than

women. It is speculated that the higher frequency of women reporting back injury in this study may be more closely related to the nursing profession's predominance of females, rather than a host factor that contributes to the occurrence of back injury. Clearly, further investigation with the use of a control group would be indicated to establish the relationship of gender to the predisposition of the occurrence of back injuries in hospital settings.

Findings related to the age of the participants who reported back injuries show a higher frequency in the 20 to 29 year old age group, with 42.86 percent in that category. Frequencies consistently declined within older age groups, with no injuries reported in workers over sixty years of age.

Differences were found in a prevalence study by Nagi, et al. (1973). In sampling a general population, they found a marked increase in the prevalence of back pain after age 35. However, it was not specified whether or not the pain was related to injury.

The results of this study would seem to be consistent with the hypothesis suggested by Cust, et al. (1973), which states that predisposed persons who work in jobs which involve heavy lifting develop back pain earlier because of precipitating factors at work. In their study of the prevalence of low back pain in nurses, the incidence rate of occupationally related back pain increased gradually up to the age range of 31 to 35. Teachers with occupationally related back pain were used as a control group in their study. Within the control group, frequency of back pain increased with age. It is interesting to note that

Tauber's study (1970) of steel workers with reported back injuries indirectly substantiated these findings, with a considerable higher rate of back injury among the 18 to 24 year age group.

Approximately half, or forty-eight percent of the subjects who sustained back injuries while working, were of normal weight. The same percentage of subjects were found to be greater than normal weight, with thirty-three percent greater than twenty-one pounds overweight. Only one subject was less than normal weight.

The data from this study is consistent with the data obtained by Gyntelberg in 1974. In his study of males residing in Copenhagen, the majority of subjects with back pain were of normal or greater than normal weight. Other studies done by Rowe (1969) and Hirsch, et al. (1969) found no differences in mean body weights of subjects with or without back pain. A possible relationship between the individual factor of weight and the occurrence of back injury cannot be suggested from the findings of this investigation.

When compared with U.S. Bureau of the Census Statistics (1982), data obtained from this investigation regarding the height of the subjects indicated that almost half (47.62%) of the females were taller than the national average of 63.55 inches for all ages. Sixty percent of the male subjects were taller than the national average of 68.92 inches. This suggests a possible relationship between height and the occurrence of back injuries and is supported by data obtained by Tauber in 1970. He found that eighty-two percent of the steel workers complaining of occupationally related back pain were taller

than the national average. Comparison studies of the height of persons with back pain and those without back pain have not shown any significant difference between the two groups (Rowe, 1969; Hirsch, et al., 1969).

One third (33.33%) of the participants in this study reported they had sustained prior back injuries, with approximately forty-three percent of those workers reporting more than one prior injury. Only one of the workers who reported prior back injury had not received training in lifting and handling techniques. The majority of subjects (73.43%) had received training at least once in manual handling and lifting techniques. Further, over ninety percent of the injuries that were reported were sustained secondary either to lifting patients or objects.

The large number of subjects who reported injury, despite prior training in lifting and handling techniques, supports claims by Brown (1976), Snook, et al. (1978), and Dehlin, et al. (1976) that numbers of injuries to the back are unlikely to be reduced by training methods. This suggests a need for further investigation into the effectiveness of training and/or the evaluation of training methods used in the hospitals that were studied.

Relationship of Findings to Conceptual Framework

An epidemiological model was adapted for the framework of this study. The three major concepts of the model as utilized for the purposes of this investigation included host, environment, and cause

of the reported injury. In this study the epidemiological model was used for the identification of potential courses of action intended to reduce the number and severity of reported back injuries.

Identification of susceptible hosts was a primary objective of the study. Registered Nurses, Licensed Practical Nurses, and Nursing Assistants were found to have the highest percentage (76.19%) of reported back injuries. The nursing related occupations should be a target group for further epidemiological studies of the occurrence of back injuries in hospital workers. The use of a control group is suggested for statistical analysis.

Host factors which were observed in this study included sex, age, weight, height, previous back injuries, and previous training in lifting and handling techniques. Analysis of the host factors indicated that reported back injuries in the two hospitals sampled occurred primarily in females (76.18%) whose ages were between 20 and 29 years (50%); who were generally (50%) of normal weight for their age and height; and whose height (62.5%) was from 66 to 68 inches. Previous back injuries had been sustained by thirty-three percent of the participants. Whether or not these host factors are significant predictors of a susceptible host could not be determined on the basis of this study. Of the host factors observed, height was suggested as the most likely predictor in the occurrence of reported back injuries.

Overexertion was cited as the most frequent cause of the injuries reported in the two hospitals studied. Ninety percent of the injuries reported were sustained secondary to lifting either patients

or objects. These findings indicated the need for an ergonomic study to investigate changes in routine or environment that could reduce the number of back injuries reported. Based on the findings of this study, the nursing related professions in particular could benefit from an ergonomic analysis with subsequent implementation of the findings.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Using an epidemiological model, this study investigated the occurrence of reported back injuries in hospital workers employed in two different hospitals in the Southwestern United States. The study focused on two research questions: Which occupational groups within the hospital environment have the highest incidence of back injury? What are the individual characteristics of hospital workers who have sustained a back injury while working? Individual characteristics, or host factors, that were examined in this study included the age, sex, height, and weight of the workers who had sustained a back injury while working. Data regarding the cause of the accident, length of employment, prior injuries, and prior training in lifting and handling techniques were also examined.

Accident reports filed between May 1, 1979, and September 30, 1980 from both hospitals were reviewed to identify susceptible individuals and to provide data regarding the cause of the reported injury. A questionnaire was designed for additional clinical information regarding host factors. Out of a possible sixty-eight individuals who reported an on the job accident, twenty-two questionnaires were completed. One subject who did not meet the requirements for participation was rejected.

Analysis of the data of occupational categories indicated that within the hospital environment back injuries occur more frequently in the nursing related professions. Registered Nurses, Licensed Practical Nurses, and Nursing Assistants were found to have sustained approximately seventy-six percent of the reported injuries. Other occupational categories that were found to be susceptible to back injuries included: Housekeeper, File Clerk, Supervisor of Medical Records, Plumber, and Urology Technician. Due to the limited sample size, a categorial statement implying that back injuries are limited to these occupational groups is unfounded.

A large number of females (76.19%), traditionally employed in the nursing related occupations accounted for the majority of subjects. As a result, answers to the second question that explored variables that might be related to the occurrence of back injuries are difficult to interpret. Analysis did show that back injuries occurred more frequently in females (76.19%) who were between twenty and twenty-nine years of age (50%). The female subjects were generally (50%) of normal weight for their age and height, and their height (62.5%) was from sixty-six to sixty-eight inches.

Of the five male workers who reported back injuries three (60%) were between forty and forty-nine years of age. Two (40%) of the males were greater than twenty-one pounds above the normal weight for their age and height and two (40%) were of normal weight for their age and height. Sixty percent of the males were greater than sixty-nine inches tall.

When comparing the workers without regard to gender, the majority (42.8%) were between twenty and twenty-nine years of age. Slightly more than forty-seven percent were greater than eleven pounds overweight for their age and height, and approximately sixty-two percent were taller than the national average for their sex. The large percentage of subjects who were taller than average suggests height as predisposing factor in the occurrence of back injuries.

Previous back injuries had occurred in one third (33.33%) of the workers. Overexertion injuries occurred most frequently with more than ninety percent of the injuries sustained secondary to lifting patients or objects. Seventy-one percent of the workers had received previous training in lifting and handling techniques, and of those, sixty percent had received training in both lifting patients and objects. Nineteen percent of the workers had received training in lifting patients only, and as would be expected, all were employed in nursing related occupations. Two workers (9.52%) had received training in lifting objects only: a Plumber, and a Housekeeper. Approximately seventy-one percent of the subjects had been employed less than three years.

Conclusions

Analysis of the data from the twenty-one participants disclosed that a large number (71%) of the workers had incurred an industrial back injury, despite previous training in lifting both patients and objects. This would suggest a need for further research regarding the

value of training in the prevention of back injuries. In addition, an ergonomic study of nursing tasks is indicated as having the greatest potential in reducing the number of back injuries sustained in the hospital environment.

Additional research is necessary to determine whether or not the findings of this study can be generalized to other hospitals or industries. A statistical analysis, using a control group of non-injured workers, would have been more useful in demonstrating individual characteristics that are related to the occurrence of back injuries in hospital employees, and would have provided validity to the findings.

The findings of this study indicated that the nursing related professions have a higher frequency of work-related back injuries than other occupational groups employed within the hospital environment. Of the individual factors investigated, only height was suggested as a possible predisposing characteristic related to the occurrence of back injury.

Recommendations

The researcher recommends the following:

1. A replication of this study:
 - a. To increase sample size.
 - b. To use a control group comprised of workers in occupations where heavy lifting is not routine.
2. Redesign of the questionnaire to collect more data regarding variables which may be significant, such as:

- a. The severity of the injury and the number of workdays lost.
 - b. Any other medical conditions that might contribute to back disability.
 - c. Psychosocial characteristics which may influence the reporting of back injuries.
3. Develop an ergonomic study of tasks in nursing related professions.
 4. Conduct a comprehensive study of the various training methods currently used to prevent back injuries to evaluate their effectiveness.
 5. Establish reliability of the data collection instrument.

APPENDIX A
LETTER TO SUBJECTS

Letter of Introduction to Be Sent to Each Employee
Who Has Sustained a Back Injury

1315 E. Drachman St.
Tucson, AZ 85719
Date

Dear

A study entitled "The Relationship of Selected Human Factors to the Occurrence of Low Back Injuries in Hospital Personnel" is being conducted in two hospitals in Arizona. Its purpose is to explore the relationship of the selected factors of age, sex, weight, and height to the occurrence of back injuries. These relationships have not been investigated before inasmuch as this kind of information is not available on accident report forms. It is hoped that the results of this investigation will lead to a more sophisticated educational program for hospital personnel.

You are being asked to participate in this study because accident reports filed at the hospital where you are (were) employed indicate that you sustained a back injury while at work between the dates of June 1, 1979, and May 31, 1980. If you choose to participate, it will take only five minutes or less of your time to complete a questionnaire with five items. All of the information will be treated with confidentiality. A code number will be assigned to eliminate personal identification. Participation in this study will have no influence on your job status and there will be no cost to you.

Enclosed is a self-addressed, stamped envelope. Please return the consent form and indicate your willingness to participate in the study. You have two options in completing the questionnaire: 1) I will mail the five item questionnaire to you to be completed and returned to me, or, 2) if you include your telephone number, I will be pleased to call you and get the information verbally.

If you have further questions regarding this study, please telephone me at 602-326-0545. Thank you for your time and consideration in helping with this project.

Sincerely,

DeAnn Sieh, R.N., B.S.
Graduate Student
Occupational Health
The University of
Arizona
College of Nursing

APPENDIX B
SUBJECT'S CONSENT FORM

Subject's Consent Form

To: DeAnn Sieh, R.N., Graduate Nursing Student at the University
of Arizona

From: (Subject's Typed Name)

I agree to participate in the study.

I do not agree to participate in the study.

Signed _____ Date _____

Witness _____ Date _____

If you have agreed to participate:

I would prefer to complete the questionnaire during a telephone
interview

My telephone number is _____.

I would prefer to return the completed questionnaire after it
has been mailed to me with a self-addressed, stamped envelope.

APPENDIX C

QUESTIONNAIRE

Questionnaire

Code number _____

1. Height _____ ft. _____ in.
2. Approximate weight when you hurt your back _____ lbs.
3. How long had you been employed at _____
when you hurt your back? _____ yr(s) _____ mo(s).
4. How long had you worked in the specific job in which you were employed at the time you hurt your back? _____ yr(s) _____ mo(s).
5. Had you sustained a back injury prior to June 1, 1979?
_____ yes _____ no.
6. If yes, how many times?
 1 time only
 2 to 3 times
 4 to 5 times
 more than 5
7. Did you receive training on correct lifting procedures at the hospital where you hurt your back? _____ yes _____ no.
8. If yes, how many times?
 1 time only
 2 to 3 times
 more than 3
9. If you received training on correct lifting procedures, did it include instructions regarding: (check both if applicable)
 how to lift and move patients? how to lift and move objects?

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