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Does an individualized back education programme change nurses' knowledge and practice about back injury prevention

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**DOES AN INDIVIDUALIZED BACK EDUCATION
PROGRAMME CHANGE NURSES' KNOWLEDGE AND
PRACTICE ABOUT BACK INJURY PREVENTION.**

BY

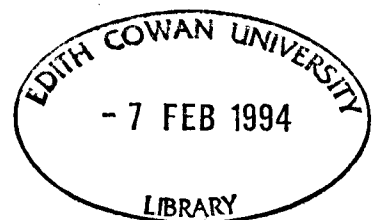
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A Thesis Submitted in Partial Fulfilment of the
Requirements for the Award of

Master of Nursing

at the School of Nursing, Edith Cowan University

Date of Submission : 1.9.1993



USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

Back injury has predominantly been a problem which has affected a large cross-section of nursing staff involved with direct patient care. While back injury prevention has been instituted in hospitals for sometime, the percentage of nurses with back injury remains high.

Within a major teaching hospital, a ward in which nurses suffered a high rate of back injuries was identified. Through an action research approach the researcher (who worked in the same area as the participants) developed and implemented an individualized back injury prevention programme. The 4 criteria by which the study was measured included, a reduction of back injuries, worth of the programme, behavioural change and cognitive knowledge acquisition. The participants who were involved in the study demonstrated that individual back education has a positive effect upon reducing the injury rate of nurses' back injuries.

The study also describes the importance of maintaining good communication skills and co-operation with the people involved or whose behaviour is being changed. Social Learning Theory was the framework from which the design and implementation of teaching was derived.

DECLARATION

"I certify that this thesis does not incorporate, without acknowledgement, any material previously submitted for a degree of diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text."

Diane Riley ✓

4th August, 1993.

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FIGURE

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Figure 1. Percentage of Participants' Back Injuries Before, During and After Implementation of the Back Injury Programme

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CHAPTER ONE

INTRODUCTION

1.1 The Problem

Back pain and injury are common and serious occupational hazards that affect the nursing profession (Cato, Olson and Studer, 1989; Jenson, 1987; McAbee, 1988; Stubbs, Buckle, Hudson, Rivers and Worringham, 1983). Australian studies (Arad & Ryan, 1986; Baines, 1989; Collins, 1990; Department of Occupational, Health and Safety, Western Australia (DOSHA), 1989; Worksafe Australia, 1989) have demonstrated that Australian nurses suffer from an unacceptably high rate of back pain and disability.

One in five nurses suffers a serious back injury each year, and one in twenty of these people require time off from work for a period of six months (Baines, 1989). In many instances the injured nurse needs to leave the profession or find alternative work within the profession which is classified as "non-heavy." This usually means that the clinically orientated nurse is forced to leave the "bedside" to find work in other areas such as management or education.

Apart from the obvious personal distress and impairment that individual nurses suffer following a back injury, the national Australian financial outlay for injuries of this nature is at least 1 billion dollars (Baines, 1989). In Western Australia alone, the yearly compensation payout for the five major teaching hospitals is 6.5 million dollars, with 3.5 million of these monies being paid out to the hospital involved in this current research study (Pollard, 1992).

1.2 Background

Findings such as these, which report the large sums of money needed to compensate occupationally acquired back injuries of nurses, have prompted Occupational Health and Safety experts such as Peter Honeyman (1992), a specialist in Occupational and Environmental Health at Sydney's Royal Alfred hospital, to condemn hospitals' lack of care of their staff. He stated that, "hospitals were hopeless at looking after the health and safety of their employees and could be compared to the wharves of the last century" (Honeyman, 1992, p. 40).

Both the Federal and State governments have been pressured by Occupational Health and Safety authorities into generating funds and finding ways to alleviate this national, work related problem (Pollard, 1992). When he was the Federal Minister of Health (1992), Brian Howe provided funds for Worksafe Australia to draft a national strategy for the Health Industry. The objective of Worksafe Australia was to monitor the

equipment and work practices of the hospitals of each state (Pollard, 1992). As a result of this and other strategies, preventing back injuries among nurses has become a major priority by occupational health and safety and nursing personnel.

Back injury prevention programmes have predominantly involved educating nurses in a classroom setting using a approach to back care (Collins, 1990). This approach to back education has its limitations and has not made a significant impact on the number of back injuries reported by nurses (Collins, 1990).

More recent clinical and epidemiological studies conducted by researchers Buckle (1987), Collins (1990), King (1991), Gonet and Kryzwon (1991), McAbee (1988), and Stubbs et al. (1983), have established that a comprehensive holistic approach is necessary to prevent back injuries in nursing personnel. However, those who are experiencing back injuries, and who actually work on the hospital wards, the nurses, are the most silent on this issue and often the least involved in the active prevention of their own back injury (Collins, 1990).

Most current back educational programmes for nursing staff (as does the hospital, used as the basis for this research study), use a multifaceted approach to back injury prevention. Group training sessions, usually when the nurses are being orientated into the hospital, are conducted as one part of this approach. The question has to be asked,

how effective is this teaching and learning technique especially when back injuries are still a major problem for nurses.

1.3 Purpose

Within the framework of action research, the purpose of this study was to (a) determine the ward in which nurses have the highest risk of back injuries, and (b) to implement and evaluate an individualized back injury prevention programme designed by the author. It was implemented in a major, public acute care teaching hospital in Perth, Western Australia, on a ward where nursing staff in 1990/1991 reported a high incidence of back injuries.

The study was unique because it was delivered by and for the nurses at greatest risk for back injuries. Review of the literature has shown that internationally, the method of teaching (individualized tuition) has been used only in a limited, formal capacity for educating nursing staff about back injury prevention. Evaluation of this teaching method, designed to prevent back injuries in nurses, was measured by using four criteria:

1. Reduction of back injuries was measured using statistical data of back injuries before and after the teaching programme was implemented.

2. Worth of the programme was described by considering intrinsic value to the participants, and the financial costs for the employer.

3. Behavioural change was assessed by evaluating lifting techniques before and after the programme was implemented.

4. Cognitive knowledge acquisition related to back injury prevention, was measured by evaluating data from questionnaires collected before and after implementation of the programme.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1 Introduction

This chapter presents a critical analysis of relevant research publications and information representing the current state of knowledge related to back injuries, and back injury prevention programmes among nursing personnel. The literature review was conducted by using CINAHL, Medline, ERIC, Dissertations Abstracts, related journal articles and newspaper articles. The review is organized into three subsections:

- 1. International epidemiological aspects of the problem.**
- 2. Programming for back injury prevention.**
- 3. Rationale for choice of the evaluation model.**

Detailing the subject area in this manner has permitted specific analysis of relevant concepts, and will assist in clarifying pertinent themes of major problem areas and the identifying and linking of solutions to these matters of concern. The following questions relating to back injury

and the prevention of back injury have been asked to guide the literature review.

How widespread is the problem of nurses' back injuries (incidence, prevalence and absenteeism)?

What significant factors contribute to nurses' back injuries?

Why is an ergonomic or multifaceted approach injury prevention considered necessary when developing a programme?

How can a different approach to teaching back care make an impact on back injury prevention?

Why is it necessary that nurses working in the clinical areas be involved with their own back care?

2.2 International Epidemiological Aspects of the Problem

2.2.1 Incidence

In order to identify the magnitude of the problem, the incidence of back injuries in nurses was analyzed. Although conducted in different countries there is a similarity in results found from these studies.

Researchers (Buckle, 1987; Collins, 1990; Jenson, 1987; Hardman, Wise and Greenwood, 1991; Stubbs, 1987) have agreed that there is a high incidence of back injuries and pain suffered by nurses. Stubbs (1987) stated that, "there is little doubt that back pain as a symptom, is a major problem within the nursing profession" (p. 287).

Reported incident rates varied and were dependent upon the format of the incident forms. Some forms elicited information which often defied proper statistical analysis (Harber et al., 1985; Stubbs et al., 1983). There is also the problem of under reporting of back pain and injury by nurses who felt their job status may be placed in jeopardy if they reported a back injury (Collins, 1990; DOSHWA, 1989; McAbee, 1988; Owen & Garg, 1991; Stubbs et al., 1983).

2.2.2 Prevalence

It has been difficult to ascertain the problem pertaining to nurses' back injuries because of different definitions of what constitutes reportable back injury for statistical purposes. Studies examining the existing problem of nurses' back injuries have ascertained its negative impact upon the nursing profession. Stubbs et al. (1983) estimated after conducting a survey involving 3,912 nurses, that 43% of nurses from England and Wales suffered from back pain each year. Reportable back pain in Great Britain is measured from the first day the injury is sustained. However, in the United States of America (U.S.A.), a reportable case of

back pain involves 4 or more lost working days (Owen, 1989). Owen and Damron (1984), found that 56% of back injured nurses in the U.S.A. lost 0-3 working days, therefore the prevalence of back pain may be much higher in this country than what is actually reported.

Epidemiological studies have also indicated that a high prevalence of back pain and injury found in nurses can be compared to the rate found in heavy industry workers (Jenson, 1987; Owen & Garg, 1991; Tabour, 1982). Nurses are considered manual handlers because they handle and move patients, which is similar work to those who handle heavy objects in industry (Owen & Garg, 1991; Tabour, 1982). A multi-occupational survey conducted in Israel, ranked nurses second only to heavy industry workers in prevalence of back pain (Jenson, 1987).

This comparison of nurses and manual handlers does not take into account the objects to be handled. Nurses lift patients who are often unpredictable in behaviour, while industrial workers deal only with inanimate objects (Baines, 1989; DOSHWA, 1989). The likelihood of injury to nurses can be assumed to be greater due to these factors.

2.2.3 Absenteeism.

Results from both international and national studies (Buckle, 1987; Collins, 1990; Ferguson, 1970; Johnston, 1987; Saywell et al., 1987) have demonstrated that there is a direct relationship between the type of

back injury suffered by nurses and the length of time required for recovery. While duration of sick leave is an important guide for calculating the cost of the problem, it is not a good estimation of the size of the problem (Buckle, 1987).

Stubbs et al. (1983) calculated that 764,000 working days are lost every year by nurses, as a result of back injuries, in England and Wales, and accounted for 16.2% of all sick leave. A study conducted in the United States of America by Owen and Garg (1991) estimated that an average of 6.5 days of sick leave per year was taken by nurses for unreported back pain. These figures which demonstrate how large the problem is, are also supported by research conducted in Alberta, Canada (Shim & Mensink, 1989).

Research studies conducted in the United States also found that working time lost, and related costs due to back injuries are increasing. Overall, 25 million workdays were lost and 14 billion dollars was spent compensating those with back pain in 1978. Data for the 1985-1986 period demonstrated that both costs and workers' time had increased by 7.9% per full time worker (Leonard, 1990; Melton, 1983).

The extent of this problem is also quite significant in Australia, as outlined in the introduction of this thesis. In an article written by Baines (1989), it was estimated that a nurse who lifts a dependent patient, without assistance, can sustain an injury serious enough to claim more

than \$120,000. In another Australian study, conducted in Queensland over a period of 5 years and involving 453 nurses, Collins (1990) found that 42-59% of nurses required sick leave following a back injury.

In Victoria, during the years 1985-86, registered nurses made up the highest number of all female claims for work related back injuries, and in two regions of New South Wales, nurses' back injuries accounted for 50% of all hospital staff (Sinclair, 1988). The Department of Occupational Health, Safety and Welfare (1989) found that the yearly cost of back strain injuries in Western Australia's 110 nursing homes came to over 1 million dollars.

These figures constitute a significant proportion of all work related injuries acquired by nurses. The excessive amount of sick leave taken by these nurses can lead to decreased productivity and insurance costs for the hospital, and distress to the injured worker (Harber et al., 1985; Sinclair, 1988).

2.2.4 Contributing Factors to Nurses' Back Injuries

The actions of handling, lifting, carrying, transferring or moving patients, have been linked to the most frequent occupational injuries in hospitals (Collins, 1990; Sinclair, 1988). Most back injuries result from prolonged periods of lifting in which the tissues of the spine gradually degenerate. The actual back injury may be minor, but after many months

and years of constant pressure, the vertebral disc may prolapse and cause permanent disability (Rodgers & Salvage, 1988).

These findings were substantiated in a study conducted by the Department of Occupational Health and Safety (1989), involving seven Western Australian nursing homes. It was found that lifting heavy patients was not the most significant factor in the causation of back injuries. Stooping was the major cause of back pain as it led to a reduction of blood flow to the muscles. The researcher of the above study using an device called a inclinometer attached to the sternum of working nurses, found that much of the risk to injury of nurses' backs arose from the action of stooping over patients' beds.

Parton (1990) arrived at similar conclusions after conducting a 12 month study into the causes of 257 back injuries of farmers in New South Wales. For example, shearing results in back pain caused from a postural problem. Although there are differences between the type of work that nurses and farmers perform, these studies highlight the fact that back injuries can be caused by chronic bad posture and not only by acute incidents of strain.

Other significant factors have been identified as contributing to nurses' back pain. These factors related to personal attributes, the type of relationships between management and nursing staff, and the level of

knowledge about the use of equipment and back injury prevention will be discussed further.

2.2.4.1 Personal Characteristics

Personal characteristics are categorized into variables such as age, gender, length of time in position and clothing restrictions such as freedom of movement.

Age: Various studies (Cato, Olson & Studer, 1989; McAbee, 1988; Owen, 1989) have indicated that younger nurses (20–40 years) have a slightly higher incidence of back injury and pain than the same population at large. In a study conducted by Cust, Pearson and Mair (1972), involving 911 nurses and 949 teachers, it was found there was little difference between nurses (bending over beds) and teachers (bending over primary school childrens' desks), in the overall prevalence of back pain. Nurses were more likely to get their first attack during the ages 21–25, whereas teachers back pain increased with age. A cohort of nurses was being studied to ascertain how many drop out of nursing because of back pain.

In a further study by Videman et al. (1984), involving 880 nurses it was found that back pain was more prominent in the under 30 age group (McAbee, 1988). But, Stubbs et al. (1983) found after a study involving 3,912 participants, that nurses with back pain or injury had a mean age of

35.8 years. The average age for back injury in females involved with industrial work is 35 years (McAbee, 1988).

While results of some research have demonstrated comparison between nurses and other occupational groups with work related back pain. Other studies have indicated that nurses are more at risk for sustaining back injuries than the general population, and usually at a earlier age (Mandel & Lohman, 1987; McAbee, 1988).

Gender: This variable, as the only contributing factor to back pain, has not been studied to any major extent (McAbee, 1988). But, Sinclair (1988) reported that no differences have been found in the incidence of back pain between male and female Physiotherapists. Other studies have shown that males are more likely to sustain back injuries than the female population (McAbee, 1988).

Cust, Pearson and Mair (1972) surveyed 911 nurses and found 19.9% of back pain was attributed to females as compared to 32.4% male nurses. Stubbs and his researchers could not find that gender, height or weight were risk factors for back pain (Sinclair, 1988). Although results appear to be inconclusive, some studies do show that young female nurses appear to be more at risk than their male peers (McAbee, 1988).

Length of Time in a Nursing Position: Researchers such as Collins (1990), Ferguson (1970), and Stubbs et al. (1983) believed that

differential exposure was the most significant factor in the development of back injury or pain. The longer a person is exposed to heavy lifting the likelihood he or she is to suffer from back pain (McAbee, 1988). There does not appear to be agreement among researchers to the length of employment and the number of back injuries. Cust, Pearson and Mair (1972), Johnston (1987) and Stubbs et al. (1983), have implicated that nurses are more likely to suffer from back pain or injury between 1 to 4 years into their employment. On the other hand, Sinclair (1988) reported that high proportions of back pain sufferers have been found in physically demanding occupations of 11 or more years. But in employment on nursing units where frequent lifting was required it was found to be 8 years (McAbee, 1988).

Cust, Pearson and Mair (1972) demonstrated that there were significant differences concerning time of the onset of back pain and work experience on different wards or units. The highest incidence of back pain was reported by nurses working in gerontology units (19.9%), followed by medical units (10.3%) then surgical units (8.8%) (Rodgers, 1985a; 1985b). Stubbs (1987) supports these research findings in his report released at a seminar in New South Wales, that nurses specializing in areas such as gerontology and medicine sustained more back injuries than did nurses from other disciplines (Sinclair, 1988). However, in a later study, Stubbs et al. (1983) failed to substantiate their original research findings (Sinclair, 1988).

There are very few studies which have implicated nursing speciality as a causative factor to the contribution of nurses' back injuries. It appears that nurses working in an environment which requires more lifting and transferring of patients such as a gerontology ward would sustain more back related problems.

Restriction of movement: Arad and Ryan (1986) found after conducting a study (n=815) in an Eastern Australian hospital, that the average nurse spent 6½ hours sitting, 24 hours standing and 9½ hours bending. Bending over beds and patients (which can result in chronic back injury and pain), or lifting is further impeded by restriction of movement caused by skirts or dresses (Stubbs, Buckle, Hudson, Butler & Rivers, 1985; Hempel, 1993; McAbee, 1988; Stubbs, 1981), thereby placing nurses at higher risk for sustaining back injuries.

Constricting uniforms also put nurses at risk for back pain or injury because they restrict positioning and alignment of the spine (McAbee, 1988). Stubbs et al. (1985) examined the mobility of nurses (n=37) wearing dress uniforms, trouser/tunic combination or leotards (n=10). The researchers found there was reduced hip flexion by 26% when wearing the dress uniform. But the participants' responses to a questionnaire demonstrated their preference in wearing the dress uniform as outlined in Table 1.

Table 1. Overall Preference for Uniforms

	n	%
Dress	19	57.6
Trousers	11	33.3
Don't Know	3	9.1
Total	33	100.00

(four nurses did not provide an answer).

Note. From "Nurses' uniform: an investigation of mobility."
Stubbs, Buckle, Hudson, Butler and Rivers, 1985. International
Journal of Nursing Studies. 22, p. 227.

It was suggested by Seigal in 1968 that nurses are largely dependent upon past experience with hospitals and imagery created by the media about what constitutes a presentable uniform (Stubbs et al. 1985). In Western Australia while the dress, culotte and trouser/tunic styles of uniforms are available for nurses to wear, most nurses appear to prefer the dress and culotte styles of uniform.

2.2.4.2 Working Environment and Staffing Problems

Problems which arise concerning management styles, sometimes relate to the working environment and staffing levels. There is a direct link

between staffing levels and the incidence of back injury, as the nurse patient ratio decreases, the back injury rate increases (McAbee, 1988).

Staffing levels: Sinclair (1988) believes that low staffing levels are a long standing problem in Australian hospitals. Most employees will attempt to lift alone in preference to asking for assistance from their over worked colleagues (Cato et al. 1989). The problem is further exacerbated on night duty when even large hospitals keep their staff to a minimum in an attempt to reduce the payment of penalty rates to nurses (Sinclair, 1988).

Rodgers (1985b) found in a study involving 95 nurses, that they would attempt to lift alone even though they knew it was dangerous to both the patient and themselves. It was also found that almost 30% of lifts were conducted by only one nurse when two would be more appropriate for the situation. Cato et al. (1989) found after conducting a study involving 35 nurses, that "staff shortage" and "it takes too long to wait for help" were cited as frequent reasons for inadequate lifting assistance. Some research has shown that adequate staffing levels can make a difference to staff injury and if the levels are dangerously low, closing wards should be considered by management (Sinclair, 1988).

Shiftwork as a variable also plays an important role in the incidence of back injuries. Not only do the altered circadian rhythms play havoc on the shiftworker's life. It was also found that the first few days back on the job, after time off work was a significant aspect to consider when a back injury

occurred (Hardman, Wise & Greenwood, 1991; Legg, 1987; Triola, 1989), because this was a period of time when more injuries occurred.

Hardman, Wise and Greenwood (1991) in their research in an Australian hospital reported, after conducting a study involving 109 registered nurses, that lack of sleep may not cause injuries or accidents, but re-familiarization to the ward area immediately following days off duty may increase the nurse's risk to back injury, as demonstrated in Table 2. In this table the shift injury, number of shifts worked in the fortnight, number of continuous days worked before the injury and work schedule are shown. The observed number and the number of expected back injuries are compared to demonstrate the direct relationship between re-commencement of work after days off duty, and the occupational back injury rates of nurses working shifts.

Other studies have demonstrated the ill effects of shiftwork on the workers' lives in the form of both physical and psychological consequences. It has been found that shiftworkers consume more alcohol and drugs i.e. drugs to make them sleep, feel better, stay awake and move their sluggish intestines (Sinclair, 1988; Triola, 1989). The consumption of these products may account for the high risk for sustaining back injuries. Nurses who worked shifts also had more visits to occupational health clinics, and took more sick days for serious illness as opposed to nurses who worked fixed day shifts (Triola, 1989).

Table 2
Frequency of all injuries

	Observed	Expected
<u>Shift of injury</u>		
Morning	44	49.8
Afternoon	35	35.8
Night	30	23.4
<u>Shifts worked on fortnight before injury</u>		
1 - 4	6	0.9
5 - 8	49	42.4
9 - 10	44	49.3
11 - 12	4	10.4
<u>Continuous days worked before shift or injury</u>		
0	44	35.0
1	16	10.7
2	25	33.2
3	15	15.2
4	3	9.0
<u>Work schedule</u>		
Rotating day/evening	68	76.1
Permanent day	12	7.3
Permanent night	29	25.6

Note. From "Shiftwork and occupational injury rates: nursing staff in an Australian hospital." Hardman, L., Wise, V. & Greenwood, K., 1991, Journal of Occupational Health and Safety, 7(6), p. 485.

There are no easy solutions to the problems associated with shift work and its effects upon nursing staff. Working consecutive shifts may eliminate the ill effects of shiftwork, including back injuries (Sinclair, 1988). This concept has been put into practice in New South Wales by

Terri Babbington (Sinclair, 1988) who designed a shiftwork roster for nurses, to reduce the ill health effects of shiftwork. The roster was based upon the following principles that:

1. Rosters change after 3-4 days, before adverse effects have been felt.
2. There are adequate breaks between shifts at least 10 hours, and between blocks of shifts, 3 days or more.
3. Shifts that cause social disruption are shared so that night duty, evening duty, weekend duty, are kept to a minimum for everyone.

The nurses involved were happy with the "Babbington Roster" which was devised with their consultation. It maintains flexibility to change shifts to suit their needs.

In summary, the international epidemiological aspects of nurses' back injuries have demonstrated that there is a major problem confronting the nursing profession. Table 3 summarizes findings from major studies of nurses' back injuries conducted both internationally and within Australia.

All of these studies in Table 3 except the 5 by DOSHWA (1989), Mandel and Lohman (1987), Owen and Garg (1991), Stubbs et al. (1985), Wachs and Parker-Conrad 1989, were conducted retrospectively and

depended on data collected by questionnaires. The type of data which was considered important for studying the incidence and prevalence of back injuries included generalized characteristics such as age, gender, history of back complaint and length of time in employment.

Although the multifactorial approach used to definitively ascertain the causes of nurses' back pain is useful, but it has its limitations. There is not enough material to draw any firm conclusions or to use comparatively with other studies. The benefits of using the multifactorial approach include the ability to understand back pain and to gain a broad overview of the past research studies which highlight the significance of the problems associated with back injuries.

The more specific studies were limited in nature and most of the studies in Table 3 were related to the determination of the causative factors contributing to back injuries. The areas in which there is minimal or inconclusive research data are the differences between gender in sustaining back injuries, the relationship of staffing levels and the incidence of occupational back pain, and comparative studies of back injuries sustained by nurses and those of other occupations.

Table 3 Nurses Back pain, Epidemiological Studies

(* denotes Australian Studies.)

Author	Design	Sample	Results
Arad & Ryan, (1986). *	retrospective	831	poor working condition
Cato, Olson, & Struder, (1989).	retrospective case study	37	restriction of movement
Cust, Pearson & Mair, (1972).	cross-sectional	911	comparison of nurses teachers.
Collins, (1990). *	longitudinal	900	multifaceted results.
DOSHWA, (1989). *	prospective case study	(7 nursing homes).	stooping & bending causes pain.
Ferguson, (1970). *	longitudinal	4189	multifactorial results.
Hardman, Wise & Greenwood, (1991). *	retrospective	109	shiftwork conditions.
Mandel & Lohman, (1987).	uni & multi-variate	428	aerobic exercise.
Owen, (1989).	prospective	503	non-reporting of pain.
Owen & Garg, (1991).	descriptive	38	use of mechanical aids
Parton, (1990). *	cross-sectional	5	farming districts bendi & stooping.
Stubbs et al. (1985).	prospective	37	restriction of movement
Stubbs et al. (1983).	retrospective	3912	annual prevalence.
Triola, (1989)	retrospective		review of literature.
Wachs & Parker-Conrad, (1989).	cross-sectional descriptive	38	lifting techniques.

2.3 Programming for Back Injury Prevention.

2.3.1 The Ergonomic or Multifaceted Approach.

A trend from a narrow approach which took the nurse out of the working environment into a classroom to be taught back injury prevention, into a broader more comprehensive teaching approach which included ergonomics, developed about 1985. In the related journal articles (Fitzler, 1982; Harvey, 1987; Hayne & McDermott, 1982; Jackson & Klugerman, 1988; King, 1991; Lee, Westers, McInnis, Ervin, 1988; Linton & Kamwendo, 1987; Marmor, 1987; Venning, 1987) overviews of completed work in the area of back injury prevention programmes were presented and the use of a multifaceted approach was emphasized.

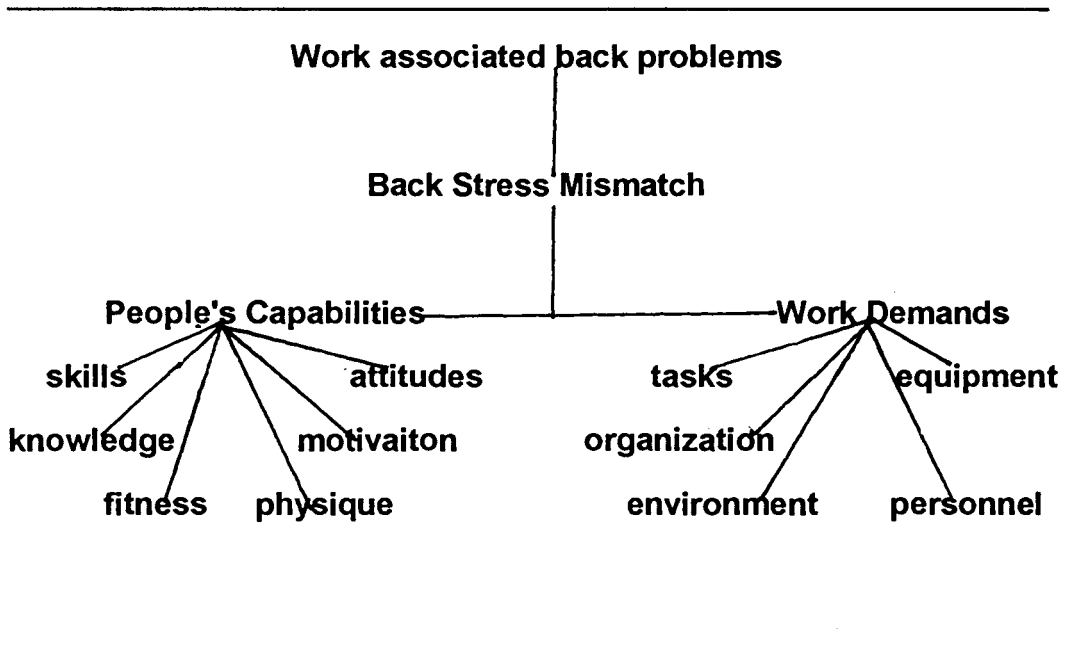
Prior to this time, teaching of nurses about back care used a behavioural educational method that focused solely upon lifting techniques taught in the classroom. This method of teaching failed to recognize the importance of other relevant areas of back injury prevention (Collins, 1990; Gregory, 1987; Sinclair, 1988).

The current more comprehensive approach to the development of back injury prevention programmes as can be deciphered from the available literature, has been to incorporate an ergonomic approach, being the study of people and their working environments (Walton, Beeson & Scott, 1986). The objectives of ergonomics are to reduce the

biomechanical, psychological and physiological strain on workers (Buckle, 1987; Legg, 1987; Worksafe Australia, 1989). The inclusion of ergonomics into a programme incorporates holistic principles into back injury prevention, by recognizing the importance of the interactions of the nurse with the work environment (Collins, 1990; Gonet & Krywon, 1991; Straker, 1989; Worksafe Australia, 1989). This relationship between person and environment is shown in Table 4. The model views back injuries as a result of mismatch between work demands and the worker's capabilities (Straker, 1989).

Straker (1989) believes that the number of back problems can be reduced by using the "worker and work" equation. An inability to match up the right person into the right environment will result in limited success of back injury prevention. Those hospitals which developed a systematic approach to back injury prevention were shown to have the lowest rate of reported injuries (Sinclair, 1988).

Table 4 Ergonomics Model of Work Associated Back Problems



Note From "Reducing Work-associated Back Problems in the Health Service: The role of the physiotherapist/ergonomist." Straker, L., 1989. Physiotherapy, 75, p. 698.

It has been suggested that people should not be made to adapt to poor work-places (Harvey, 1987; Sinclair, 1988; Stubbs et al., 1983). Traditional managers tend to look for careless workers rather than unsafe working environments when accidents occur (Harvey, 1987). The most common environmental hazards in hospitals have been delineated as: (a) poor design in relation to space, (b) the presence of slippery floors (c) poor lighting and electrical hazards, (d) the constant presence of noise, (e) inadequate ventilation, and (f) the use or misuse of equipment,

including bars over the bed, slide boards, blocks and hoists (Collins, 1990; Legg, 1987; Sinclair, 1988; Triola, 1989).

Mobile hoists have been available in Australian hospitals since the 1950s (Bell, 1987). They are not however favoured by nurses involved in patient care because: (a) they are time consuming, (b) difficult to use, (c) cumbersome in design, and (d) the patients disliked them (Bell, 1987; Harvey, 1987; Hayne & McDermott, 1982; Sinclair, 1988). This reluctance of nurses to use hoists appears to be related to lack of education of the nurse and patient, who are both apprehensive about the user's application of the hoist (Harvey, 1987; Sinclair, 1988). For example, "many nurses are unable to operate hoists correctly, do not understand the stresses of different postures and movements which lead to back injuries, and possess limited knowledge about the full potential of adjustable beds" (Baines, 1989, p. 14).

Some nurses may be encouraged to lift patients manually because they believe they are using the correct lifting technique (Harvey, 1987). At a worksafe conference in Sydney 1992, an expert in Occupational Health and Safety stated that "hospital workers handling patients were probably lifting the heaviest weights in all industries (see Table 5). The notion of encouraging correct lifting techniques was viewed as nonsense. Instead hospitals should use more mechanical devices for transferring patients" (September, 1992, p. 40).

There is no agreement as to what is a "correct" or "admissible" weight. While Harvey (1987) as shown in Table 5, recommends that twenty kilograms is the limit, for occasional lifting, the Australian Council of Trade Unions (ACTU), Health and Safety Preferred Standard Manual Handling advocates a limit of 16 Kilograms for all workers without assistance (Sinclair, 1988). In spite of recommended weight standards, the reality is that nurses lift more than what is considered to be "safe." Hayne and McDermott (1982) found the highest daily average weight lifted was 1,523 kilograms while Rodgers (1985a), reported that nurses individually handle loads of between 25-50 kilograms per shift.

Table 5. Upper weights of permissible weight (Kg) to be lifted manually.

	<u>Women</u>	<u>Men</u>
Occasionally	20	50
Frequently	12	18

Note. From "Back to the Drawing Board." Harvey, J., 1987. Nursing Times, 18, 46.

Nurses and other hospital staff need to be educated about how to use hoists and see them in the same light as useful pieces of equipment (Sinclair, 1988). Patients can be persuaded to use equipment if they see the benefits of this use to them (Harvey, 1987; Norman, Cameron & Sutton, 1993; Sinclair, 1988; Triola, 1989).

Harvey (1987) believes that hospital planners should be encouraged to think of nurses' backs when supplying equipment or commissioning a new unit. But it would be more appropriate and effective if nurses were involved in the planning of new units and of hospitals (Collins, 1990; Harvey, 1987).

While some hospital planners still believe that the ergonomical approach to back care means an expensive change in the hospital's philosophy. The hidden costs involved in nurses' back injuries usually far out-weigh the ergonomical changes needed within the hospital (Harvey, 1987). Making the job to suit the person can be cost effective (Steemson, 1988).

2.3.2 Different Approaches to Teaching Back Injury Prevention

The relationship between education and the prevention of back injuries in nursing personnel, must provide "the promotion and maintenance of the highest degree of physical, mental, and social well being of the staff member" (Triola, 1989). The educational programme should consider the level of experience and unique stressors of individual nurses (Hayne & McDermott, 1982; Johnston, 1987; Triola, 1989).

The educational objectives for nurses must include the acquisition of knowledge and proficiency in manual and mechanical lifting

techniques. The aim of the programme should be to produce a nurse who is proficient enough to adapt to different patient handling situations in the clinical setting. They should also provide individual nurse motivation to improve personal handling, expertise and confidence. The ingredients of such a programme have been suggested by Hayne and McDermott (1982), to include;

- **knowledge** **(anatomy and physiology)**
- **skill** **(safe handling)**
- **strength** **(personal limitations)**
- **motivation** **(worthwhile and skills)**
- **compassion** **(human qualities)**
- **common sense** **(adaptable approach).**

A critical analysis of the clinical research done to examine the effectiveness of back educational programmes in reducing back injuries was conducted. Aspects of the programmes which demonstrated a reduction of back injuries were selected as a basis for the development of this back injury prevention programme.

Most of the research studies included a combination of variables needed for a successful back care programme but there was an emphasis on lifting techniques and body mechanics. The majority of these studies were quasi-experimental in design and relied upon retrospective data for statistical analysis, refer to Table 6 (Collins, 1990; Gonet & Kryzwon,

1991; Johnston, 1987; Sirles, Brown & Hilyer, 1991; Scholey, 1983; Shim & Mensink, 1989; Stubbs et al., 1983; Wollenberg, 1989). All of these studies demonstrated a reduction of back injuries. The researchers' recommendations for back injury prevention programmes focused upon the multifaceted approach and ergonomical principles.

Table 6: Summary of Back Injury Prevention Programmes

Author(s)	Intervention	Design	Results
Collins, (1990).	multifaceted program	longitudinal	decreased back injuries
Gonet & Kryzwon, (1991).	lifting techniques	one group pre/post test	unknown - on-going
Johnston, (1987).	multifaceted approach	quasi-exp	injury reduced 76%.
Scholey, (1983).	lifting techniques	one group pre/post test	decreased back injuries
Shim & Mensink, (1989).	multifaceted	prospective	reduced back injuries
Sirles, Brown & Hilyer, (1991).	back strengthening exercises	quasi-exp	significant improvements in back tone.
Stubbs et al., (1987).	lifting techniques	quasi-exp	need for ergonomics
Wollenberg, (1989).	three approaches	longitudinal	unknown - on-going.

2.3.3 The Individualized Approach to Back Injury Prevention

One Canadian research study reported by Johnston (1987) will be discussed at some length as it demonstrates an unique and pertinent approach to back injury prevention. The results were based on a programme conducted from 1982-1986. In 1981, 15,750 hours were lost to workers compensation claims or \$433,750 (Australian dollars), but in 1985 the hours had been reduced to 3,761 and dollars to 157,000. Both employee accidents and workers compensation claims had been reduced by 76%, outstripping the wage loss claims of 6 similar hospitals by 24%.

The hospital complex consisted of a 480 bed gerontology care complex which extended over 4 sites. The staff population was 700. While the staff mix was not reported the nursing staff suffered 73% of the reported back injuries and required time off work 88% of the time.

Preliminary discussions were held with employees and Union representatives before implementation of the back care programme to increase the chances of successful outcomes. After introduction of the programme, an assessment by a Physiotherapist, was made of each staff member's lifting and transferring techniques. If weaknesses were identified, one hour of individual tuition was given.

All new Nursing staff received three hours of theoretical instruction which included instruction in body mechanics and lifting and transferring

techniques by the use of a role model and direct feedback. The practical component of the education was conducted at the bedside, where the injuries most commonly occurred.

Four, one hour long, back care clinics were held for employees considered "at risk" (those who reported one or more back injuries). During these intensive skill building sessions, discussions on back injuries and demonstration of proper lifting and transferring techniques were conducted. After the four, one hour sessions, each employee received a one hour coaching feed back session while performing his/her regular duties. Regular follow up or inservice education related to body mechanics and patient lifting techniques as provided every two to three months.

The success of this programme (a reduction in back injuries) has been attributed to a consultative approach by management and employees. The study does not report the costs related to setting up this programme. However, the Physiotherapist's wages for conducting the programme came out of the overall savings of wages lost. Employees were asked if they thought the programme would work. Johnston (1987) attributed success of the programme to the staff's "enthusiastic acceptance" as it focused on the individual needs and emphasized prevention of back injuries.

2.4 Rationale for Choice of Evaluation Model.

This approach to back injury prevention as studied by Johnston (1987) appears to be the most successful from both management and employee perspectives. Yet, there is little published literature concerning back injury prevention programmes supporting the concept of using an individualized approach. The initial costs of educating a large number of employees individually would probably deter some hospital administrators from implementing it. But the long term benefits may prove to be cost effective.

Other aspects of research studies have also helped in developing a back injury prevention programme which has a holistic and individualized approach. Results of the epidemiological studies outlined the extent of the problem, when and how back injury occurs and the severity of its effects. The ergonomical and multifaceted approaches to back injury prevention have demonstrated that the work environment and its effect upon individuals should be considered when developing a programme.

An overview of what characteristics should be considered when studying or developing a programme for back injury prevention was provided by Jenson (1989). His matrix of ideas provides an assessment tool which presents the concepts of successful programmes such as the individualized approach presented by Johnston (1987).

The matrix columns are labeled "Person," "Task," and "Environment." Person refers to a member of the nursing staff. Task indicates an activity causing great stress to the person's back, such as patient-handling. Environment refers to factors such as physical characteristics of the work area. This holistic approach to the problem of nurses' back injuries is also outlined by Collins (1990), who believes that basic components of any comprehensive approach to back care should include:

1. Problem identification through accident investigation, analysis of injury reports and compensation claims, consultation and other input from staff and job/task analysis.
2. Job re-design so as to eliminate poor work postures and fatiguing movements and to allow workers variation in posture, movement and activity.
3. Training and education programmes which should cover not just lifting skills but also the skills required to identify and control risk factors.
4. Post injury management, an important complement to primary prevention programmes, designed to promote safe return to work

through use of rehabilitation services, phased return to work, and job assessment and modification.

The application of the identified components which transform a back injury prevention programme into practice required the use of a theoretical framework compatible with individual learning concepts. A framework in which learning is viewed as an ongoing process by which behaviour changes as a result of experiences, and responses to individual differences (Gazda & Corsini, 1980). The framework chosen for this study which supported the conceptual basis of teaching individual learners in their own working environment was the Social Learning Theory.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 Introduction

This chapter analyzes the concepts of social learning theory and suggests application of this theoretical approach to individual tuition. When considering individual tuition as a framework for the prevention of back injuries in nurses, preference is given to Bandura's Social Learning Theory (SLT), or modeling theory. His theory emphasizes the important roles of cognitive behaviourism that analyzes the learning, motivation and reinforcement in terms of the internal and external environment upon the individual (Bowers & Hilgarde, 1981).

The SLT which is also compatible with the humanistic approaches to learning (Sahakian, 1976), assumes that the learner is responsible, willing to learn and continually in the process of making new knowledge personally relevant. Zimbardo (1979) wrote that, "behaviour is shaped by reinforcers, but it is usually human beings who make those reinforcers available or scarce for one another" (p. 115). The learner imitates models who are perceived to be expert, competent, and having social power (Kramer, Polifroni & Organek, 1986).

They must be willing to learn the material that is presented by the teacher, and be motivated to learn and assimilate what has been taught in order to maintain their level of personal reinforcement (Joyce & Weil, 1986; Sahakian, 1976). The learning environment should also represent an important aspect of constructing new knowledge. A non-threatening learning climate can be crucial in promoting effective learning. In a co-operative climate, learners are more participative with their decision making (Collins & Hammond, 1991; Orton, 1981).

When continuously constructing knowledge which has a personal quality (Joyce & Weil, 1986), Bandura believed that the learner in order to master new material "self-efficacy" (one's ability to cope with environmental demands) must be established (Gazda & Corsini, 1980; Zimbardo, 1979). The learner should believe "I am (or am not) a competent person who can function effectively as an independent and self-reliant human being" (Zimbardo, 1979, p. 120).

Bandura also depicted the inter-relationship between environmental influences on behaviour and the behavioural influences on the environment. In this framework there is no direct cause and effect relationship such as in Skinner's operant conditioning or behavioural educationalist theory of learning. Rather the behavioural actions of an individual can affect change in the environment and aspects of the environment can influence perception of the individual creating change in their behaviour (Table 7).

Table 7

Reciprocal Determinism

Person	
Behaviour	Environment

Note. From "Psychology and Life" (p. 119) by **Zimbardo, P., 1979**, Illinios: Scott, Foresman and Company.

3.2 Application of the SLT to Back Injury Prevention

The essential elements of Bandura's theory are useful as a guiding framework of a back injury programme which is multi-dimensional and holistic in its approach to learning, recognizing the person within an environmental context as outlined in (Table 8).

Table 8: An Application of Social Learning Theory and the Essential Ingredients of a Back Injury Prevention Programme.

Social Learning Theory	Back Injury Programme
Behaviour (responsible)	Skill (safe handling) Common Sense (adaptable approach)
Person (learner)	Knowledge (human biology) Strength (personal limitations) Compassion (human qualities)
Environment (working or personal)	Motivation (worthwhile & skills)

References: Joyce and Weil, (1986), Hayne and McDermott, (1982) and Zimbardo, (1979).

Hayne and McDermott (1982) formulated what they described as the essential components of a back education programme. They advocated that each nurse should be encouraged to acquire the knowledge and skills deemed necessary to become proficient in back care and to adapt to each situation. Each nurse should also be motivated to improve personal handling, proficiency and confidence in regard to their work.

Principles behind the development of this type of programme are based on the assumption that nurses have some control over their behaviour, and that the learning environment does place value upon the dignity and worth of the individual (Brewin, 1990; Eiben & Milliran, 1976; Lovell, 1989). These principles are compatible with and supported by Bandura's Social Learning Theory.

3.2.1 Modeling

Kramer et al. (1986) have studied other design features which are characteristic of Bandura's Social Learning Theory, and incorporate the individual education of nurses in their own working environment, including modeling behaviours of learners based on SLT. Nurses may modify their behaviour given certain conditions. The learner may observe a model and the consequences of the model's behaviour for the model. The learner also has the opportunity to practice the behaviours he or she saw

modeled, they may imitate models who are perceived to be expert, competent, and having social power. Reinforcement is paramount in the acquisition process and most instrumental when the model, rather than the modeler, is perceived as rewarded.

These conditions/pre-cursors to learning and modifying behaviours as espoused by Kramer et al. (1986) demonstrate how learning can occur in a working environment such as a ward area, where behaviour of junior nurses is influenced by senior registered nurses who are role models. Junior nurses perceive senior registered nurses as having superior knowledge of lifting and transferring patients (Rodgers, 1985b). They are also perceived by junior nurses to be the most powerful role models who have the most influence over the learning environment (Fretwell, 1980; Rodgers, 1985b).

Fretwell (1980) concluded that the clinical nurse is the key person who controls the learning environment. The learning environment created by the clinical nurse and other senior nurses on the ward is seen as an environment which meets the needs of the learner. It is not hierarchical and one of its key features is teamwork (Fretwell, 1980; Hayne & McDermott, 1982; Rodgers, 1985a;). The ability to work in a team, and good staff relationships is important in creating a a ward supportive to safe lifting, because the junior nurses are more influenced by the ward situation than the classroom (Rodgers, 1985b).

3.3 Summary

When using an individualized approach to teach nurses about back injury prevention, consideration has been given to the learning environment. Team building strategies and specific instructional techniques were required. An holistic approach incorporating individual learning needs as outlined by the Bandura's Social Learning Theory, was identified as the most appropriate method for teaching nurses about back injury prevention. Key features characteristic of the Social Learning Theory which are applicable to using individual tuition as a means to teach nurses about back injury prevention include the provision of practice in the working environment; the use of models to demonstrate behaviours; and the helping of the learners to develop a sense of self efficacy.

The methodology that will be used in this study, takes into account all the characteristics deemed necessary to create a learning environment in which the student actively participates. It is envisaged that active participation by the nurses involved in the study will encourage a long term positive outcome. This outcome will be reflected by a reduction of back injuries in the nurses working on the ward chosen for this study and will also demonstrate worthiness as expressed by the participants.

The action research technique used to conduct the study will involve the active participation by the researcher, who was working as a clinical nurse in the ward in which the research was conducted. Action research is holistic in approach and is appropriate in situations in which the researcher is a participant and hopes to improve the practice of those who are under-taking the research (Smith & Hope, 1992). In this specific case, the researcher has developed and implemented a back injury prevention programme in an ward area where she works. The advantages and disadvantages of using this research method for this study will be further discussed in the proceeding chapters.

CHAPTER FOUR

METHOD

4.1 Introduction

This chapter describes the method used to identify the need for and subsequent implementation of a back injury prevention programme for nurses. Both the quantitative and qualitative perspectives of the evaluation data will be presented. Programme implementation will be described under programme procedure and delivery format.

4.2 Design

The design of the study was based on action research. It involved using a combination of retrospective and prospective data collecting techniques, a form of data collecting commonly used when evaluating action research (Austin et al. 1986). The design consists of the study of one group of subjects who receive a single treatment and are tested twice, once before and once after the treatment. The design for this study included the development and implementation of (a) a practical lifting assessment tool, (b) pre and post back injury prevention programme questionnaires, and (c) the creation of a back injury prevention

programme. See Table 9 for the chronological series of steps taken for this study, as per action research design.

Table 9. Action Research Design of the Study.

Pre - test	Treatment	Post - test
3. Testing of subjects.	5. Programme implementation, (to preceptors).	7. Testing
4. Lifting assessments.	6. Programme implementation, (to preceptees).	8. Lifting
9. Evaluation of the data.		
10. Review of the study ward's back injury statistics.		
11. Review of the hospital's back injury statistics.		

By means of pre-testing the back education programme, data about individual nurse's lifting techniques (in collaboration with a back educator from the study hospital) were collected. Participants' knowledge about prevention of back injuries, and related body mechanics was sought through the appropriate questions. The back injury prevention programme was then introduced to the participants. This aspect of the study was based on the theoretical framework as described in the previous chapter.

Four months after implementation of the programme (December, 1992), the post tests were conducted. Each participant's lifting technique was re-assessed and their theoretical knowledge re-examined. Each nurse's perceptions and experiences about the back injury prevention programme and back care were also measured.

4.3 Selection of the Study Sample

4.3.1 Reference Population

The hospital complex chosen for the study is one of the major public teaching hospitals in Western Australia. The majority of the clientele consists of acutely ill patients.

From a total hospital population of 1300 nurses (1990-1991) and 1048 nurses (1991-1992), 218 back injuries were reported during the period July 1st, 1990 to July 1st 1992. This meant that 1 in 8 nurses experienced back injuries during this period of time July, 1991 to July, 1992 .

4.3.2 Subjects

The sample for this study included nursing personnel working within the medical/stroke unit of the hospital. A 2 year retrospective audit

of the hospital identified this unit as an environment which put nurses at greater risk for sustaining back injuries than other wards in the hospital. Data from the July 1st, 1991-June 30th, 1992 showed that there were 13 back injuries reported from the ward involved in this study.

During the same period of time there were 111 back injuries reported from the rest of the hospital. The number of nurses at the hospital was 1048, and the number of nurses in the medical/stroke unit was 21. This meant the sample represented 2% of the hospital's nursing staff but 11.7% of the hospital's total back injuries (refer to Table 10).

Table 10: Comparison of Back Injuries (1991/1992).

	n	% of total.	Injuries	% of total
Hospital:	1048	= 100%	111	= 10.6%
Sample:	21	= 2%	13	= 62%

The participants consisted of 18 nurses, 14 of whom were female. Their ages ranged from 21 to 52 years (mean =34.8, SD = 7.6). Selection of the participants included those nurses who were permanently employed on the unit and were currently not on sick leave for back injury (refer to Table 11).

Table 11 : Characteristics of the Participants.

Characteristic	n	%
Sex		
Male	4	22.2
Female	14	77.8
Age in Years		
21 - 30	6	33.3
31 - 40	9	50.0
42 - 52	3	16.7
Years of Nursing Experience		
0-5	7	38.8
6-20	7	38.8
21-26	4	22.4
Reported Work Related Acute Back Injuries		
Not Reported	8	44.4
	1	5.5

4.4 Setting

In the 21 bed unit in which the participants worked, admitted for medical conditions, with six beds specifically allocated for patients who had been newly diagnosed with a stroke. However, within the time frame of this study, up to 58% or 12 patients were admitted with strokes.

The acute nursing care which is delivered to all of these patients includes the lifting, transferring and assisting of people up and down, and in and out of beds and chairs on a regular basis.

4.5 Instrumentation

Evaluation data were gathered by using self administered questionnaires, pre and post back injury prevention programme, and by assessing individual lifting techniques of the study participants. The pre-test questionnaire (Appendix B) consisted of 2 sections. Part 1 questions related to personal information such as age, gender, length of time in employment, current and past back injury status. Part 2 required answers to knowledge based questions such as basic anatomy and physiology and back care practices.

The post-test (appendix C) also had 2 sections. Part 1 questions related to the effectiveness of the back injury prevention programme. This instrument required the participants to respond by circling the appropriate answers of a Likert type scale. The questions related to perceived worth of the programme and behavioural change. Part 2 contained the same knowledge based questions as the pre-test.

The third instrument (Appendix D) also required a pre and post programme, lifting assessment of the study participants. The instrument was scored by converting raw scores into statistical data.

4.5.1 Reliability and Validity

The questionnaires were formulated after a critical analysis of the literature, and involved using open ended and fixed choice questions and rating scales. Research personnel from the university and study hospital reviewed the questionnaires to ascertain face validity following a pilot survey involving 10 nurses. The nurses did not experience any difficulties interpreting or answering the questions.

Reliability of the lifting assessment instrument was conducted by initially assessing the participants' lifting techniques using 2 assessors. Assessor 1 was the author of this study and assessor 2 was an experienced clinical nurse specialist, who was involved in back education and orthopaedic nursing.

4.5.2 Data Collection

Data was gathered over a 6 month time period. Pre-test questionnaires were distributed 2 weeks prior to when the lifting assessments were conducted. Each participant was required to complete the questionnaire in the medical/stroke unit, place it in a sealed envelope and drop it in a container located in the medical/stroke unit. It was estimated that the questionnaire would only take 15-20 minutes to complete.

The lifting assessments were then conducted, each assessment took approximately 45-50 minutes to complete. After the programme was implemented the post tests were then distributed, these questionnaires were also estimated to take 15-20 minutes to complete. The participants were then required to have their lifting assessments reassessed.

4.6 Programme procedure

When developing the back injury prevention programme, several processes were involved, including the use of multiple approaches to teach individual instruction to maintain a more interesting learning environment (Lovell, 1989; Watts, 1990). Aids such as audiovisual displays highlighting the significance of using correct lifting techniques and mechanical aids were used. A booklet containing the full programme material (see Appendix E) was also distributed to each participant to use as reference material.

Stretching exercises and low impact aerobics were also made a part of the wider programme. This aspect of back injury prevention was considered an important part of education. The exercises were conducted between 0715-0730 each morning before commencement of the morning shift during the time course of this study.

Preceptors (four senior registered nurses) were allocated to teach the more junior nursing staff. The preceptors who were taught by the

researcher, also answered the questionnaires and participated in the programme before they passed on their experience and expertise to the remaining participants in the study. It was anticipated that, because the concepts of the programme were being introduced by other nurses working within the area, it would motivate the remaining participants to become more involved with their own back care practices.

The global objectives for this programme were to reduce the number of back injuries and prevalence of back complaints within the members of the study group. To achieve these objectives it was anticipated that nurses studying this programme would be able to gain both knowledge and practical skills. The theoretical knowledge component covered aspects of the: (a) human spine and related body mechanics, (b) hazardous work situations that contribute to back injuries, (c) theoretical aspects of selected lifting techniques, and (d) back care principles. The practical component was to enable nurses to acquire practical skills to: (a) lift and transfer patients using aids such as the hoist and slide boards, and (b) select appropriate lifting techniques.

The long term objective of the programme was to educate all the participants involved in the study to the same high level of competence. This meant that the preceptors (senior nurses) would use their experience and expertise to bring their preceptees (less senior nurses) to a similar level of competence, and would provide an opportunity for nurses to participate in their own back care.

These objectives incorporated the holistic and multi-dimensional aspects of back injury prevention which were based upon the concepts of social learning theory or modeling, assuming the inter-relationships between individual learning behaviour and the environment.

4.7 Delivery Format of the Programme

The individualized, theoretical instruction was delivered in a 60 minute session after the pre-tests had been completed. The knowledge components included the use of text books, and models such as the human skeleton and slides. Before the instruction phase was implemented, team building strategies were employed to encourage a congenial learning environment.

The strategies included creating a working environment in which a sense of unity and support between the participants could be developed. This form of team building included using good interpersonal skills both at work and socially. Personal and work related problems were discussed between the participants and researcher and when appropriate, resolution of these problems was generated.

The work was acute and demanding and there were many physical and psychological stressors that affected the nurses. Within this context, nurses sharing their work helps to create supportive environment which

makes is safer for both nurses and patients. Some of the stressors included the "heaviness" of the work, due to the fact that the majority of patients were highly dependent upon the nursing staff for their basic needs. For example, if 2 people lift together there is less likely the risk of back injury. Other examples include sharing exercises together and teaching each other (more senior with less experienced nurses). Learning together in a environment which supports safe work practices allows for a climate of shared experiences beyond strict individual nurse work commitments.

4.8 Ethical Considerations

Consent for this study was obtained from the Ethics Committee of Edith Cowan University and from the Ethics Committee of the hospital chosen for the study. Written consent was also obtained from each of the participants before commencement of the study. The informed consent: (a) explained the purposes of the study, (b) delineated the risks and benefits of the study, (c) invited the participant to ask questions for clarification, (d) explicitly assured that co-operation was voluntary, and (e) stated that the participants may withdraw at any time with no penalty to themselves (see Appendix A).

The programme was recognized by the hospital as equivalent to its own back education programme. Mandatory yearly updates of back education, consisting of one hour tuition in lifting and transferring

techniques, are required by all nursing staff employed at the hospital. This educational requirement is taught outside of the ward environment. Those nurses who participated in this research study were granted exemption from the hospital programme.

As defined by the hospital, upon completion of this study, all related data will be kept secure in the hospital's research unit, for a period of 7 years.

CHAPTER FIVE

RESULTS

5.1 Introduction

This chapter presents the results, and evaluation of the back injury prevention programme. The participants' knowledge about basic back care, perceived and financial worth of the programme and lifting assessments were statistically analyzed. The qualitative data included themes based on the participants' ideas concerning back injury prevention which are grouped under headings such as lifting assessments, equipment, work space and staffing the final section of this chapter.

5.2 Knowledge Based Pre and Post Test Assessments

Changes in knowledge concerning back injury prevention were measured using pre and post questionnaires. The questions required the participants to relate their basic level of knowledge of back injury prevention and related anatomy and physiology (see Appendix B). The content areas included: (a) specific lifting procedural knowledge, (Questions 1 and 2); (b) a theoretical background to related body mechanics, (Question 4); and (c) prevention of back injuries, (Question 3).

The difference between the pre and post test questions was evaluated by using the paired t test ($m=3.1$), $t(10)= 2.77$, $p<0.05$). The results indicate that there is a significant difference between pre ($m= 9.4$) and post ($m= 12.5$) testing. The participants' knowledge of basic anatomy and physiology and back care issues had increased after implementation of the programme.

5.3 Percieved Worth of the Programme, and Behavioural Change of the Participants.

The participants were required to complete a questionnaire which required a Likert scaled response. The following table outlines their answers to this part of the post test (Appendix C).

Table 12. Participants' Responses to Part A. Appendix C.

Questions	Participant Responses	* 1	* 2	* 3	* 4
practiced what was learned (programme).		0	0	8	4
practiced what was learned (lifts and transfers).		0	1	7	4
practiced back exercises.		0	4	7	1
perceived worth of the programme.		0	0	7	5
perceived worth of individual tuition.		0	4	4	4

Note *1 negative response e.g. no or never.

*2 sometimes or fairly useful.

*3 most of the time or quite useful.

*4 all the time, extremely useful or yes.

5.4 Financial Worth of the Programme

The time which was taken to complete the questionnaires, individual assessments and programme was calculated from a log kept by the researcher. It is revealed in detail in Table 13 showing proportional financial costs in Australian dollars. The biggest cost in terms of dollars and time was devoted to the lifting assessments of the participants. Each assessment took between 45-60 minutes to complete. Difficulties arose when there were not any available beds to use for these purposes and it was necessary to wait for a patient to be discharged from hospital. Other problems occurred when the equipment needed for assessments was being used in other areas of the hospital.

Table 13. Time and Approximate Costs Related to the Study

Time and Cost Analysis	Researcher	Participants
Participant Consent	1.5 Hrs	1.5 Hrs
Pre-test Questionnaires	1.0 Hrs	4.5 Hrs
Lifting Assessments (pre)	13.5 Hrs	13.5 Hrs
Programme instruction	3.0 Hrs	
Preceptors		15.0 Hrs
Preceptees		15.0 Hrs
Exercises (approximately)	6.0 Hrs	35.0 Hrs
Video and slides	3.0 Hrs	18.0 Hrs
Post-test Questionnaires	1.0 Hrs	3.5 Hrs
Lifting Assessments (post)	10.5 Hrs	10.5 Hrs
Total Hours	39.5 Hrs	106.5 Hrs
Sub Total Costs (Approximate)	\$ 710.00	\$ 1,550.00
Total Costs (Approximate)		\$ 2,260.00

5.5 Lifting Assessments.

Individual lifting assessments were measured using a numerical scale. While the participants demonstrated a reasonable level of competency with their lifting techniques at pre-testing, many needed further tuition. The post-test lifting assessments demonstrated an improvement in the participants' lifting and transferring techniques. A paired t test for unequal variances was used. The analysis ($m = 3.6$), $t(11) = 4.63$, $p < .01$, indicated a significant difference between pre and post testing of the subjects.

Most of the nurses felt this part of the study (by being competent with safe lifting techniques), was a guide which was worthwhile for their own personal protection and every other member of staff who is delivering direct patient care. This was evident from these statements by the participants, "the appropriate lifting techniques should be used all the time," and "the mechanical hoist should be used as often as possible," The comment that, "every member of staff is now aware of the back safe techniques," indicates that each member of staff should be acknowledged back safe in order to trust and seek help from each other in caring for patients' basic requirements.

Some participants felt that the expertise of the people providing assistance with the lifting of a patient should be considered. This aspect of back care was highlighted by comments such as "adequate assistance

should be given from qualified staff." The importance of regular educational sessions and feedback for nurses concerning their lifting was emphasized by this comment, "keep reinforcing and educating staff on correct techniques, say every three to six months."

The participants were tested in the ward setting and using the available equipment to help with lifting. It was not considered ethical to use patients for this exercise, therefore nurses who had completed their assessment volunteered to act as proxy patients. With this experience of "acting" as patients, the nurses could learn what it felt like to be lifted and moved by someone. They suggested ways to ease the lifting for both patient and nurse, "get the patient to help, let him/her know what you are about to do," or "instruct the patient prior to manouvering."

5.6 Equipment

One of the other themes which emerged from the participants' post-test questionnaires included the aspect of educating nurses to lift and transfer patients, based on an understanding of both the theoretical and practical prospectives. However, no matter how knowledgeable nurses are, they need to have good reliable equipment to work with. The majority of the study group thought that modern and well maintained equipment was one of the most important aspects of back injury prevention.

Some of the comments which highlighted this aspect of back injury prevention included "well designed equipment which is maintained is needed," and "equipment should be at the correct height and in working order." One innovative participant suggested that "pushing people on beds, trolleys, commode chairs, and wheel chairs is archaic, and maybe these contraptions could be motorized."

5.7 Work Space

This theme highlights the importance of working in an environment that is free from obstacles which may impede the nurses' transferring and lifting techniques. Particularly when there is not enough space between beds, "room sizes are often difficult for nursing staff to move freely and safely."

A common scenario was observed by the researcher and described by the participants. When a patient needs assistance to transfer from a bed to a chair, several pieces of other equipment need to be shifted, the bed height adjusted and the chair needs to be manoeuvred around to accommodate the patient's changed position from a bed to a chair. "The working environment should be kept tidy and uncluttered."

5.8 Staffing Levels

The problem of adequate staffing levels is not unique to Western Australia, given the economic restraints of the shortages in hospitals and the community health system will become even more apparent. According to Rodgers and Salvage (1988), and the participants of this study, staff shortages contribute directly to many back injuries. In many instances, nurses feel that they have to deal with situations which put them and the patient at risk, because nurses do not wish to over burden their peers (Sinclair, 1988).

These observations from researchers such as Rodgers and Salvage (1988) highlight the importance of having a working environment in which "there should be enough staff on the ward so that time can be taken to perform lifts carefully, to the patient's benefit." Other comments from the study participants about staffing levels included the need to ensure that there "is adequate staffing so that staff can help each other with lifts," and "adequate assistance is needed from qualified staff," demonstrates the importance of maintaining an appropriate number of nurses who are "back care safe."

The main concerns raised by the participants, about back injury prevention were in areas of patient/ nurse safety, equipment, work space and staffing levels. These issues have also been identified by health and safety personnel as discussed in the literature review. There are no easy

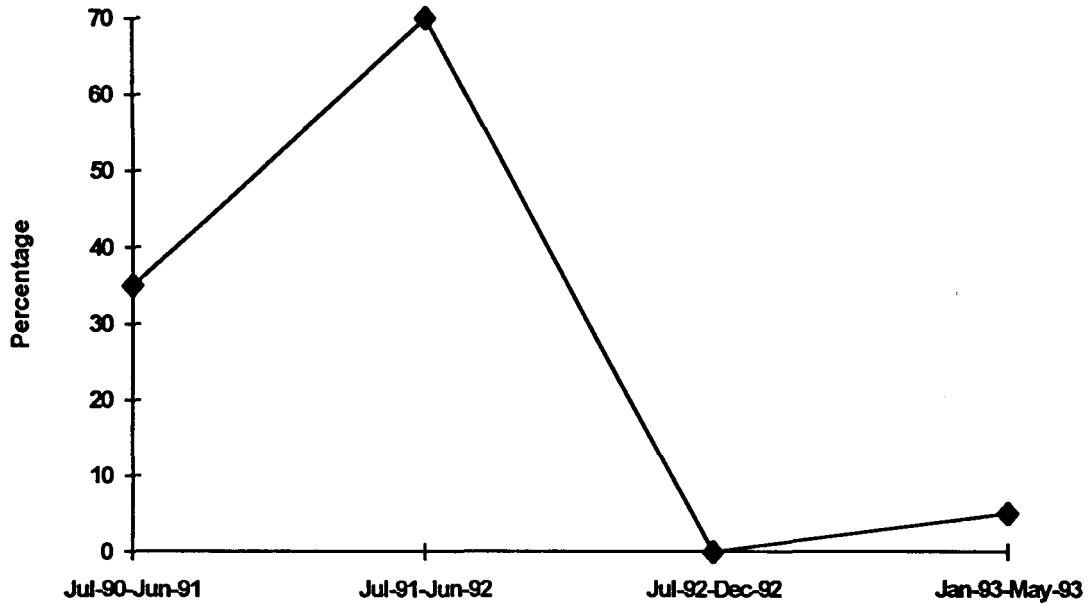
solutions of how these concerns can be resolved without undertaking major changes, as in the case of work space and nurse staffing levels.

5.9 Prevalence of Back Complaints

The prevalence of back complaints was measured by using the available statistical data from the hospital's Occupational Health and Safety Department. During the time frame from July 1st, 1992 to December 31st, 1992 and after implementation of the back injury prevention programme, there were no reported incidences of back injury from nurses working in the ward being studied. During the same period of time there were 60 reported incidences of back injuries from staff in the rest of the hospital.

More recent data from January 1st to May 31st, 1993, revealed 1 reported incident of back injury occurred (the subject was hit by a moving object), 63 other incidents of back injury occurred during the same period of time (Figure 1).

Figure 1: Percentage of Participants Back Injuries Before, During and After Implementation of the Back Injury Prevention Programme.



This chapter presented the results and analysis of the back injury prevention programme. Analysis of qualitative data gathered from the participants' perceptions about stressors associated with occupational back injuries was grouped around emergent themes. From statistical analysis of the quantitative data, participants theoretical knowledge and practical lifting techniques were evaluated. Further discussion of the data analysis and methodological considerations are presented in Chapter 6.

CHAPTER SIX

DISCUSSION AND CONCLUSIONS

6.1 Summary

The aim of this study was to evaluate the effects of individual tuition as a learning alternative for preventing nurses' back injuries. The rationale for the choosing the evaluation model included finding a framework that supported the conceptual basis for teaching individual learners in their own working environment. Social Learning theory is the framework which met this criteria. Its salient features included helping the learners to develop a sense of self efficiency and the use of models to demonstrate behaviours.

The measurable outcomes of this study have included a combination of actual reduction in participants' back complaints and the perception of change and knowledge of the instructional content. Participants' perceptions about stressors associated with occupational back injuries are measured as evidence of a new awareness of the environment instead of taking it for granted.

This study has demonstrated that individual tuition has a positive effect upon reducing the injury rate of nurses' back injuries. The four criteria by which the study was measured included, a reduction of back injuries, worth of the programme, behavioural change observed in the

participants and cognitive knowledge acquisition. In all four areas the criteria were met:

1. A Reduction in Back Injuries. Data analysis from the time frame July 1st, 1991 to June 30th, 1992 revealed there were 13 back injuries reported from the ward involved in the study. From July 1st, 1992 to December 31st, 1992 i.e. during and after implementation of the back injury prevention programme there were no reported incidences of back injury. More recent data (January to May, 1993) has revealed one reported incident of back injury occurred in the study ward (the subject was hit by a moving object), 63 other incidents of back injury occurred during the same period of time, in other wards of the hospital.

2. Worth of the programme by the participants was measured by their assessment and individual comments. Most of the participants thought the programme was quite useful (60%) while the remaining 40%, thought it was extremely useful.

3. Behavioural change was assessed at post-testing and included the participant's perceptions of the programme, acquired knowledge monitored by the use of questionnaires and assessments of lifting and transferring techniques.

4. Cognitive knowledge acquisition related to back injury prevention, and was measured by evaluating data from questionnaires collected before and after implementation of the programme.

The results between the pre and post test questions were tested by using the paired t test. Item analysis indicated a slight improvement of knowledge between questions one to three, but question four showed there was a significant improvement of knowledge about the physiological aspects of disc degeneration.

6.2 International Epidemiological Aspects of Nurses' Back Injuries

Researchers have demonstrated that there is a problem with nurses' back injuries that should be of concern to the nursing profession. The effects of back injuries on nurses have had long term personal, professional and financial repercussions. In some incidences the clinically orientated nurse is forced to leave the bedside to find work in a less physically demanding environment. The yearly pay out for back injuries in Western Australia has been reported to be 6.5 million dollars.

There have been numerous studies conducted to ascertain the factors associated with this form of occupational related injury. Results from these studies have shown that there are relationships between back injuries and age, gender, length of nursing experience, restriction of movement, environmental design, staffing levels in comparison to patient acuity and educational aspects related to back injury prevention programmes. These studies have usually relied upon retrospective data collecting techniques.

Although the incidence and prevalence of nurses' back injuries has been well researched there are some aspects of back injury prevention that need further research. For example, there is an acute shortage of studies related to back injuries and gender. This may be due to the fact that nursing is female dominated and conducting comparative studies about this factor may not be considered important.

There have been no studies found concerning the effects of the weather and back injuries. This may be a variable that has been overlooked by researchers conducting studies in countries where there are significant climatic changes in temperatures. In the winter months, nurses coming to work at 0700 usually face a heavy workload after coming in from a cold environment. The workload includes lifting and transferring patients either out of bed or up the bed ready for their breakfast.

Most of the studies related to back injury prevention programmes included a combination of variables needed for a successful back injury prevention programme. But, the emphasis was upon lifting techniques and related body mechanics. The outcome of these studies has meant that more nurses should become more directly involved with their own back care and play a major role in selecting equipment and designing wards.

There was only one study found which used individual tuition as an educational approach to teaching nurses about back injury prevention. The results of that study demonstrated its capacity to significantly improve the back injury rate in nursing staff. The results from the researcher's study have substantiated these findings.

6.3 Limitations of the Study

The participants were selected because it was identified they were working in an environment which had a high prevalence of back injuries. The incident rate of back injuries for this ward, per staff ratio, was demonstrated to be one of the highest in the hospital.

Even though the proposal for the study had received hospital approval, post implementation problems included conflict with other health related professionals. Health professionals such as Physiotherapists who believed back injury prevention of nurses as their domain. It is speculated that because of their own educational background, wanted to be the only ones involved in back injury prevention programmes.

These problems were not pre-conceived but intra-professional rivalry is not a new problem in the health care field (Halpern, 1992; Holden, 1991). Unless nurses claim ownership of the back injury problem and provide role models to demonstrate how the problem can be handled

at its source, then it will be very difficult to alleviate the incidence and prevalence of back injuries in nursing staff.

A part of the problem is that nurses working in the clinical areas do not believe other staff have an understanding of their working environment or its associated problems, which are usually unique to every ward. If senior nurses acting as role models can demonstrate that back injury prevention is an important aspect of occupational health and safety, and also provide support with practical issues and theoretical knowledge in back care, the more junior nurses will recognize its long term implications.

Other problems associated with the pre and post implementation of the programme included the availability of beds to assess the participant's lifting techniques. The acuity of the ward was reflected when it became apparent that these times were few and far between. Assessment was conducted when a patient was either discharged from hospital or deceased. But the participants took this in their stride and in some instances, provided the remaining patients in a room some light entertainment by not wishing to close the curtains around the bed where the lifting and transferring techniques were being assessed. On other occasions, the participants volunteered to remain after their normal working hours to be assessed. The problem was further exacerbated when assessing night staff. It was necessary to physically move another bed from a closed ward to conduct such sessions, which took place in the pantry area near the ward where the participants worked.

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The theoretical aspects of the implementation progressed well. The researcher used the conceptual basis of role modeling i.e. the senior nurses influenced the more junior nurses to participate in the programme. Although the researcher went through the programme with each of the senior nurses individually, it was difficult to foresee how this form of teaching was going to be conveyed to the learners. But the end results proved to be positive, i.e. no back injuries, and positive responses about the programme from the participants.

On the surface, individualized tuition may not appear to be an economically viable venture, but a reduction of 14 back injuries per year at an estimated cost of \$8000 per injury (Occupational Health and Safety, R.P.H.), would amount to \$112,000. These costs compared to the cost of implementation of an individualized back injury prevention programme would be cost effective. The long term savings are the retention of valuable employees and a more congenial working environment.

Implementation of the back injury prevention programme may have been difficult unless the researcher had the trust and confidence of the participants. The participants were encouraged to work together as a team and were loyal and supportive of each other at work and socially. Even after completion of the study some of these people left the ward to work in other areas of the hospital, friendship was still maintained.

6.4 Conclusions

The following conclusions are based upon the implementation and evaluation covering the effectiveness of the back injury prevention programme. The long term reduction of nurses back injuries is contingent upon the behavioural changes of the people working within the environment and the processes of management which can help to change the physical aspects of the working environment.

The present study took as it's starting point, that an individualized approach to nurses' back care may have the same effects upon their learning as in any other environment where the learning climate is experiential. The meaning of ward learning climate is a perception which is important for the learners. If each nurse is made to feel important or an important member of the team then teaching such people becomes a rewarding process of transferring knowledge.

A safe lifting environment depends to a great extent upon the continued relationship between the staff members, especially the junior staff with senior registered nurses and clinical nurses. These senior staff members are responsible for patient care and staff relationships. They can help make the learning environment one which is not only conducive

to learning but one in which more junior nurses feel the staff are more approachable and will help with lifting and transferring patients.

Other rewards of good interpersonal relationships within the learning environment are the use of role models i.e. senior registered nurses being role models to more junior staff.

All levels of nurses and hospital management should be familiar with the work-safe guidelines, recommendations and individual ward requirements, such as equipment in the form of mobile hoists, slide boards and well maintained patient beds. Regular reinforcement of back injury prevention should be an on-going process by every one involved in back care, including the people who it affects the most, those nurses who work in the ward areas.

6.5 Recommendations

Recommendations for improving the effectiveness of instruction should include the following:

1. Ownership of responsibility for nurses' back injuries be assumed equally by the hospital administration and nursing personnel.
2. Each specific ward environment is given consideration and practical help for its acuity, specialization and staffing levels. The

practical help should include equipment, individualized programmes and an adequate number of staff to meet the dependency of the patients.

3. Equipment such as hoists, beds and chairs need to be checked regularly for faults and mobility problems by the ward safety officers.
4. Each nurse involved in direct patient care needs to receive individualized instruction about back injury prevention, in his/hers own working environment.
5. More action research related to teaching back injury prevention by individualized tuition is performed by those people involved in back education or back care.

The problem of reducing nurses' back injuries can be resolved by using individualized tuition as a learning technique. To implement such a programme hospital wide, will involve a greater commitment of individual nurses to back care from all nursing staff. It will involve a recognition of the serious continuing number of back injuries sustained by nurses and the acceptance of responsibility by nurses to initiate, conduct and continuously be alert for potential problems related to back care.

A problem when interpreting the data from this type of research includes the increased risk of type I errors. This type of error may occur because of a small sample size, when the level of significance is set at 0.05.

Individualized tuition is one important aspect of back care. This research has demonstrated that it can be of value in reducing nurses' back injuries.

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APPENDIX A INFORMED CONSENT FORM

PROJECT TITLE:

Does an individualized back education programme change nurses' knowledge and practice about back injury prevention?

You are invited to take part in a research project on back injury prevention. Understanding is sought into nurses' theoretical and practical knowledge base of back injury prevention, and how these two areas are affected by a individualized nurse education programme.

In this study two questionnaires will be used for collecting information about demographic characteristics and theoretical knowledge about back injuries, this will take about 15 minutes to complete. It will also be necessary to have your lifting and transferring techniques assessed to ascertain whether these techniques need to be improved upon in order to help prevent you from sustaining any acute or chronic back problems. Any information that identifies individual participants will be destroyed at the completion of the study.

The long term advantages of this project may include the identification of an alternative approach into educating nurses' about back injury prevention. The final report will only contain information about the whole study group, and you will have access to this report.

Any questions you have concerning this project can be directed to Diane Riley on 2798789.

THIS IS TO CERTIFY THAT I, _____

(print name)

Hereby agree to participate as a volunteer in the above named project. I have read and/or had explained to me the information above and any questions I have asked have been answered to my satisfaction. I understand I may withdraw from the study at any given time.

I agree that research data gathered for this study may be published provided my name is not used.

Participant

Date

Investigator

Date

APPENDIX B

Part 1.

It would be appreciated if you could be of assistance by answering the following questions about (a) yourself, and (b) your knowledge about the prevention of back injuries. Please circle answers 1, 4, 5 and 6.

1. Gender Male Female
2. What is your age? _____
3. How many years have you worked as a nurse? _____
4. Have you ever had a back injury/ies associated with patient care?

Yes No

If yes, please indicate how long ago did these incidences occur, and if they were reported.

incidences	reported	
_____	Yes	No
_____	Yes	No
_____	Yes	No

5. Have you ever experienced back pain not associated with an acute incident?

Yes No

If yes, please indicate how long ago these incidences occurred.

incidences	reported	
_____	Yes	No
_____	Yes	No
_____	Yes	No

6. Have you ever participated in a back injury prevention programme? Yes. No. Please indicate the date _____

If yes, do you practice what you have learned about back injury prevention?

All the time.	Most of the time.	Sometimes.	Never.
1	2	3	4

APPENDIX B

Part 1.

It would be appreciated if you could be of assistance by answering the following questions about (a) yourself, and (b) your knowledge about the prevention of back injuries. Please circle answers 1, 4, 5 and 6.

1. Gender Male Female
2. What is your age? _____
3. How many years have you worked as a nurse? _____
4. Have you ever had a back injury/ies associated with patient care?
- Yes No

If yes, please indicate how long ago did these incidences occur, and if they were reported.

incidences

reported

Yes No

Yes No

Yes No

5. Have you ever experienced back pain not associated with an acute incident?
- Yes No

If yes, please indicate how long ago these incidences occurred.

incidences

reported

Yes No

Yes No

Yes No

6. Have you ever participated in a back injury prevention programme? Yes. No. Please indicate the date _____

If yes, do you practice what you have learned about back injury prevention?

All the time. Most of the time. Sometimes. Never.

1 2 3 4

Part 2

(1) List six different types of lifting techniques that can be used to transfer patients.

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

(2) List three situations that you would need to use a two person transfer.

- 1. _____
- 2. _____
- 3. _____

(3) What type of exercises could you do to help prevent yourself from sustaining a back injury?

(4) What are the patho-mechanics of disc degeneration?

THANK YOU FOR YOUR CO-OPERATION

APPENDIX C.

POST TEST (Back injury prevention).

Part 1

Please circle the answers to the following questions 1, 2 and 3, 4. and 5.

1. Do you think this programme is useful?

No.	Fairly useful.	Quite useful.	Extremely useful.
1.	2.	3.	4.

2. Have you practiced what you have learned from the programme?

No.	Sometimes.	Most of the time.	All the time.
1.	2.	3.	4.

3. Do you lift and transfer people in a different way than before?

Never.	Sometimes.	Most of the time.	All the time.
1.	2.	3.	4.

4. Do you practice back strengthening exercises?

Never.	Sometimes.	Most of the time.	All the time.
1.	2.	3.	4.

5. Do you think individual tuition is better than group tuition?

No	Sometimes.	Most of the time.	Yes.
1.	2.	3.	4.

6. Given your knowledge about body mechanics and lifting techniques, what recommendations would you make for a safe working environment?

Part 2

(1) List six different types of lifting techniques that can be used to transfer patients.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

(2) List three situations that you would need to use a two person transfer.

1. _____
2. _____
3. _____

(3) What type of exercises could you do to help prevent yourself from sustaining a back injury?

(4) What are the patho-mechanics of disc degeneration?

THANK YOU FOR YOUR CO-OPERATION

APPENDIX D

Assessment tool for Lifting and Transferring Techniques

Date _____ Assessor's Name _____ Participants's Name _____

Before and after completion of the programme the nurse will demonstrate to the assessor, his or her required competencies with the following lifting and transferring techniques.

Before attempting the following lifts and transfers the nurse should be able to identify and rectify any potential hazardous situations that may impede their techniques.

Please use the following grades.

(A) competent. (B) needs further tuition.

GRADES

- | | |
|---|-------|
| (a) The Australian shoulder lift | _____ |
| (b) Lift using a draw sheet | _____ |
| (c) Emergency turn | _____ |
| (d) Two handed seat lift | _____ |
| (e) Emergency transfer to floor | _____ |
| (f) Two person transfer from bed to chair | _____ |
| (g) Two person transfer from chair to bed | _____ |
| (h) One person transfer from bed to chair | _____ |
| (i) One person transfer from chair to bed | _____ |
| (j) Use of slide boards from trolley to bed | _____ |
| (k) Use of hoist from bed to chair | _____ |
| (l) Use of hoist from chair to bed | _____ |
| (n) Use of hoist from floor to bed | _____ |

APPENDIX E

BACK INJURY

PREVENTION

PROGRAMMIE

INTRODUCTION

This back injury prevention programme is intended to be used as a guideline for those persons preceptoring nursing staff who require education and demonstration in the area of back safety.

The material will cover the essential components of back injury prevention which are;

- (a) **an understanding of the human spine and related mechanics**
- (b) **identification of hazardous situations in the work place**
- (c) **various lifting techniques**
- (d) **use of the hoist and slide boards.**

A pre and post test of related back injury prevention knowledge is required to be completed.

On completion of this education the preceptee will be able to correctly answer at least 75% of the post test.

At the bedside the preceptee will be able to identify the risk factors which may impair lifting performance, and demonstrate to the assessor, correct lifting techniques. The long term plan is to; (a) educate all nursing staff working within the study ward to the same level of competence.

1.0 THE HUMAN SPINE AND RELATED BACK MECHANICS.

PRE-REQUISITE...read the anatomical and physiological features of the human spine.

Objectives

- 1.1 To understand the spinal column.
- 1.2 To understand back mechanics.
- 1.3 To identify the reasons to maintain safe lifting techniques.

1.1 THE SPINAL COLUMN...use bony model to demonstrate.

* Consists of 24 vertebrae mounted on a forward sloping base. From the horizontal plane about 40 degrees.

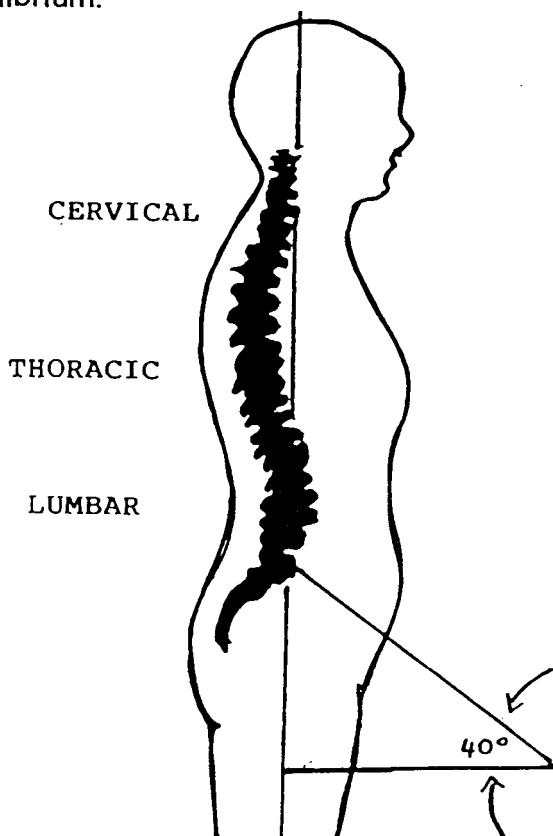
* Viewed laterally there are 3 curves, this is the result of the angled take-off of the spine from the pelvis

convexity forward in the lumbar area.

convexity backward in the thoracic region.

convexity forward in the cervical region.

* This brings the centre of gravity of the head and upper body over the pelvic body in a state of equilibrium.



VERTEBRA

This is the basic building block of the spinal column. General features of the cervical vertebrae.

- * Foramen in each transverse process.
- * Short bifurcated spinous process with exception of the seventh vertebrae.
- * ATLAS. . . first cervical vertebra; lacks body and spinous process.
- * AXIS (epistropheus) . . . second cervical vertebrae; forms pivot for rotation of ATLAS.

General features of the thoracic vertebrae.

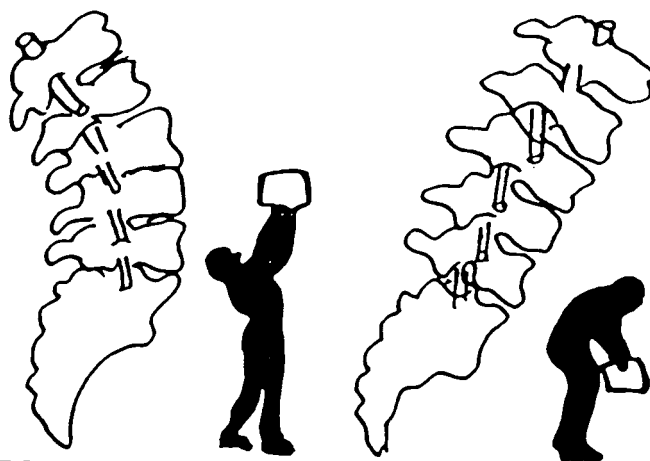
- * Body is flat and supportive or weight bearing part
- * Pedicles are short projections extending posteriorly from the body.
- * Laminae are the posterior part of the vertebrae to which the pedicles join.
- * Neural arch is formed by the pedicles and laminae; protects the spinal cord posteriorly.
- * Spinous process is sharp and projects inferiorly from the laminae.
- * Transverse process is the right and left lateral projection from the laminae.
- * Superior articulating processes project upwards from the laminae.
- * Inferior articulating processes project downwards from the laminae and articulate with the superior articulating processes of the vertebrae below.
- * Spinal foramen is the hole in the centre of the vertebrae.

General features of the Lumbar vertebrae.

- * They are strong, massive, superior articulating processes directed inwards instead of upwards.

1.2 Range of motion In the Lumbar spine.

- * It is capable of bending backwards to the point where the spinous processes nearly touch one another.
- * Can bend forward far enough to reverse the normally convex forward lumbar curve.
- * This extensive range of motion must be achieved without slipping or sliding of one vertebra upon another because of the vulnerability of the nerve roots as they exit from the spinal canal.

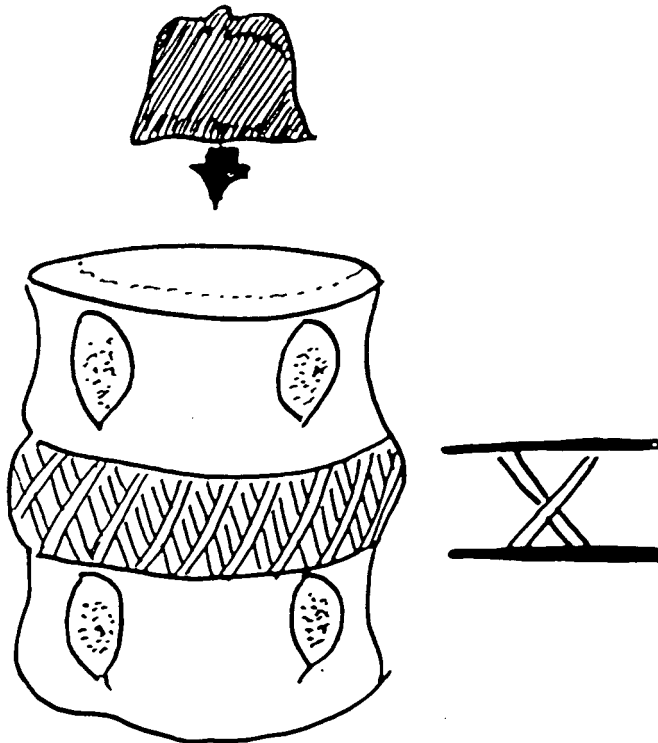


Backache at Work P22 by Rowe, M.L., (1983) U.S.A. Perinton.

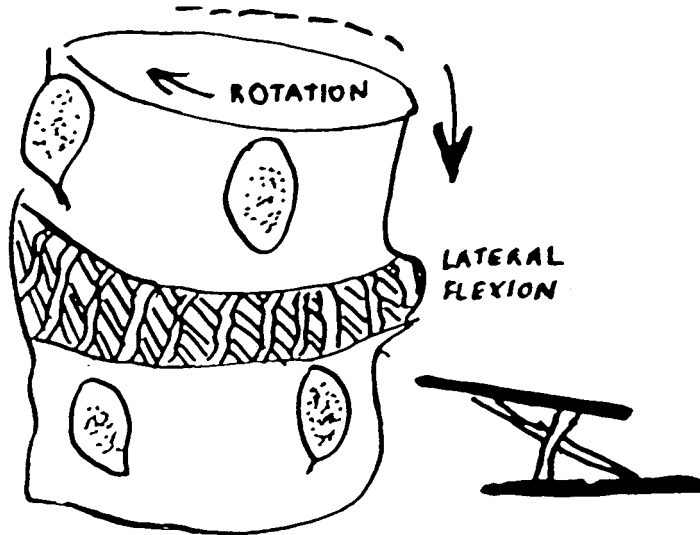
- * Stability and alignment between the vertebrae throughout the motion range is maintained by the Intravertebral discs. The ligaments serve as limitations to the extremes of motion.
- * When there is tilting away from the horizontal which occurs in the lumbar region, elements of stress are introduced and the load is concentrated upon one small arc of the total circumference in the back third of the disc. The fourth and fifth disc is put under severe stress.
- * An air cushion is supplied by the abdominal and thoracic cavities, sealed by the diaphragm and the abdominal muscles.
- * The act of holding the breath when undertaking a heavy lift is an example of the creation of this auxiliary pressure sharing mechanism.
- * Back pain often results from unguarded movements.

FUNCTION OF INTERVERTEBRAL DISCS

WHEN VIEWED FROM THE BACK AND FRONT
THE SPINE IS STRAIGHT

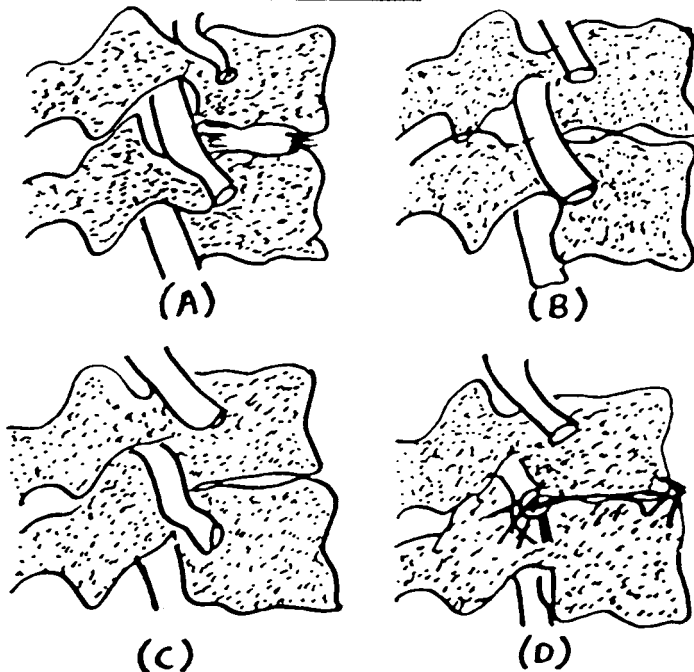


DISC SHOWING ANNULUS FIBROSUS



EXPLAIN SOME OF THE CAUSES OF THE DIFFERENT TRAUMAS THAT CAN OCCUR TO THE SPINE THROUGH PROLONGED LIFTING.

The pathomechanics of disc degeneration.



Backache at Work p26, by Rowe M.L., 1983.

(A). . . Normal state.

(B). . . Early degeneration. . . the disc space has narrowed forcing an over riding of the the articular processes at the facet joint

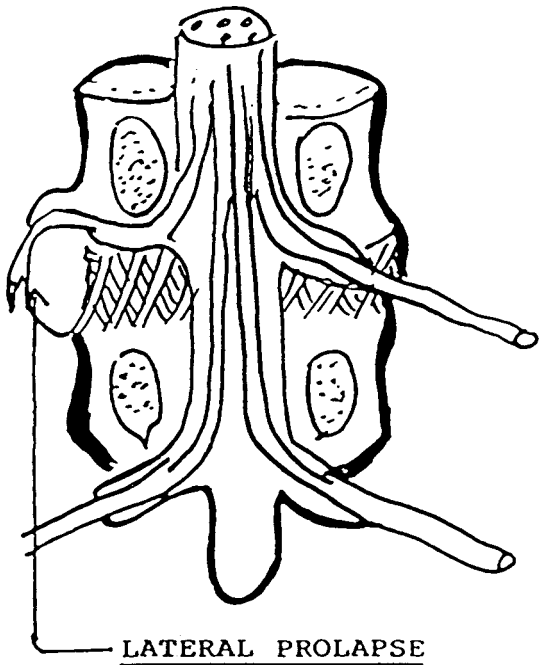
- * The port of exit for the nerve root loses some of its vertical dimension and becomes disorted in the horizontal configuration.
- * The casing fibres of the disc become slack and there is potential slipping and sliding on one vertebra upon another.

(C). . . Further narrowing of the disc space, overriding of the facet joint occurs.

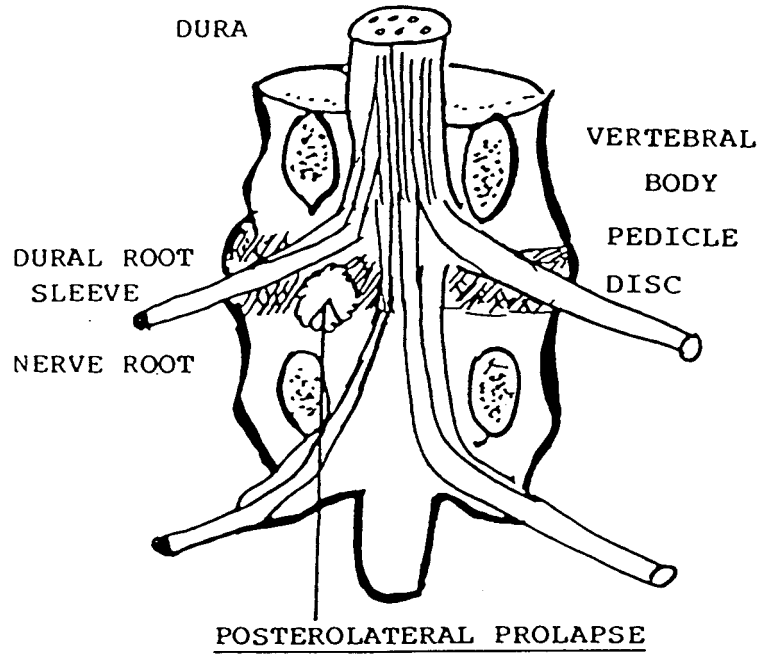
- * Disortion of the exit port loss of stability between the vertebrae may cause occasional pinching of the nerve root with motion of the spine.

(D). . . Herniated disc. The casing has ruptured.

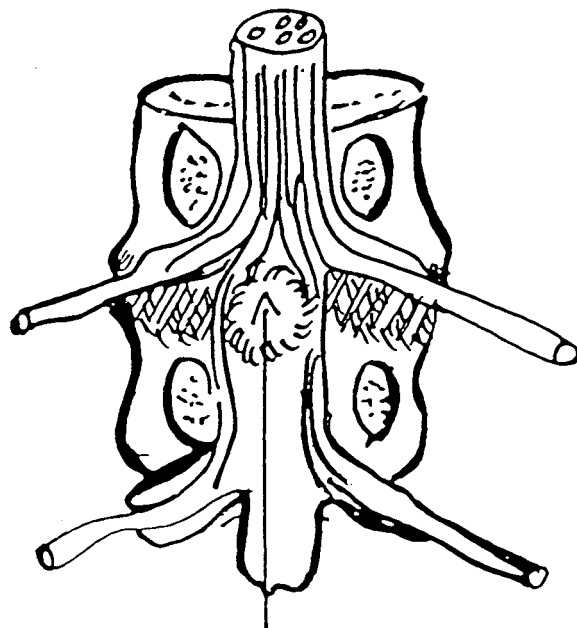
PROLAPSED DISC



LATERAL PROLAPSE



POSTEROLATERAL PROLAPSE



CENTRAL PROLAPSE

1.3 Risk Factors as identified by the Health department of Western Australia 1989.

Ask the preceptee what he or she perceives to be risk factors for sustaining a back injury.

Patients do not conform into neat packages. They are sometimes frightened of falling, unco-operative or unable to assist. They need to be handled with a lot of care.

The risk factors that are related to back injuries include;

- * Lifting with twisting, bending, or stooping for long periods of time.
- * Maintaining awkward postures.
- * Sudden maximal effort.
- * Prolonged sitting or standing.
- * Repetitive heavy lifting, pushing, pulling or twisting.
- * Restraining patients.

The Health department has made the following recommendations to avoid back injuries when transferring and lifting patients.

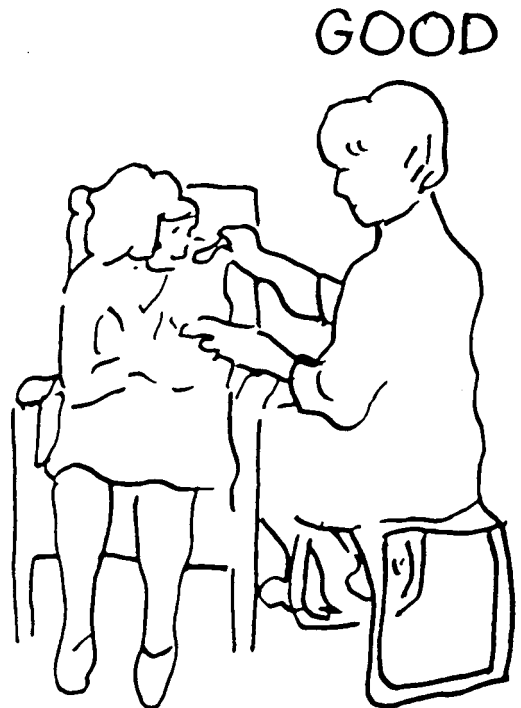
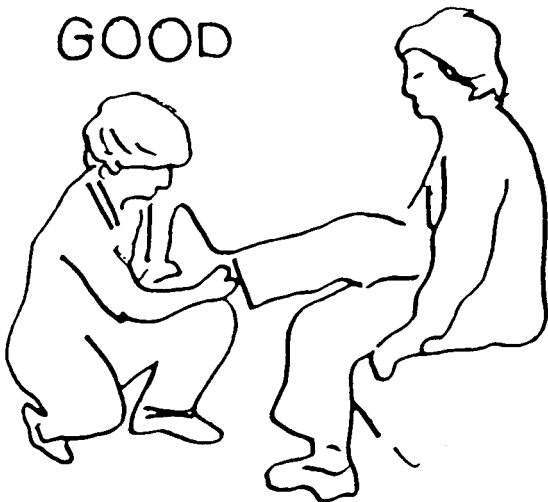
PATIENT CATEGORIES

DEGREE OF DEPENDENCE	MINIMUM CONDITION OF PATIENT	NUMBER OF PERSON FOR MANUAL LIFT OR ASSISTANCE IN MOVING	ALTERNATIVE LIFTING MEANS	EXAMPLES
Partial	Ambulant	1		Patients undergoing tests, recovering from mild stroke, and minor orthopaedic cases.
	Partially Ambulant	2		Patients suffering from hemiplegia, right or left hemisphere resulting from cerebral vascular illness.
	Non-Ambulant	2	Two persons and mechanical aids	Latter stage major post-operative cases.
Total	Prone, supine or seated	2	Two persons and mechanical aids	Head injury patients, major surgical cases, profoundly retarded patients and disabled.
	Problems with weight, size, shape and condition	Minimum 3	Two persons and mechanical aids	Geriatric patients, with complications
	Special Cases	Team *	Team and mechanical aids	Spinal injuries, cerebral surgical, critical injuries and stroke and cardiac patients.
	Emergency	Team *		Multiple fractures, coronary attacks, intensive care patients.
	Terminally ill	Minimum 2	Two persons and mechanical aids	Extreme debilitated and post surgery patients and those with critical injuries.
	Deceased	Minimum 2	One person and mechanical aids	

* Three or more persons including a leader

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THE HANDLING OF PATIENTS



(B) THE IDENTIFICATION OF HAZARDOUS SITUATIONS IN THE WORKPLACE.

Objective

1.0 The preceptee will be able to identify the necessary safety factors before attempting to lift or transfer.

Some examples will include;

- (1) explanation of the procedure to the patient.
- (2) adjustment of the bed to the correct height.
- (3) clearing the bed area from equipment, and asking visitors to wait outside.
- (4) identifying the patient's capabilities to assist with the transfer.

(C) EXERCISES PRIOR TO LIFTING.

It is recommended that the importance of being physically fit is re-inforced by the preceptor. These exercises can be practiced at work or at home.

It is not recommended that people who are already receiving Medical treatment for back pain participate in this form of exercise unless they have consulted with their G.P. or Physiotherapist. Trunk or leg exercises in the supine position strongly activate the iliopsoas muscle, which pulls on the lumbar spine and lumbosacral junction. These areas are often the site of strain and injury.

Back Exercises

TO HELP MAINTAIN A HEALTHY BACK.

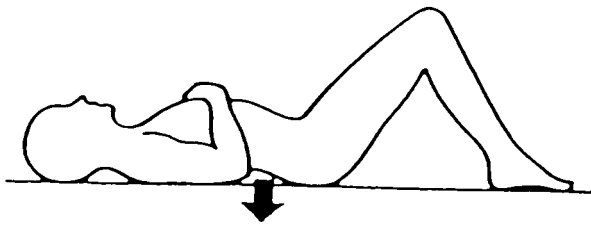
Please note : pages 101 - 109 have been adapted from the Royal Perth Hospital Teaching Manual for Back Education (Nursing) (1990).

PLEASE NOTE

- Only do those exercises indicated by your physiotherapist.
- Your therapist will determine how many of each exercise you should do.
- These exercises must be done slowly and precisely.
- Do not continue with any exercise if they cause persisting pain, as opposed to exercise induced "achey stiffness" which is normal when undertaking new exercises.
- Remember - for maximum benefit your exercise programme must be continued with at least once daily.
 - a correct posture is only acquired through conscious effort.

PELVIC TILT

Lying on back, knees bent and feet on floor. Tighten buttocks, draw in stomach so that the back flattens into the mat. Hold 5 seconds. then relax. Repeat.

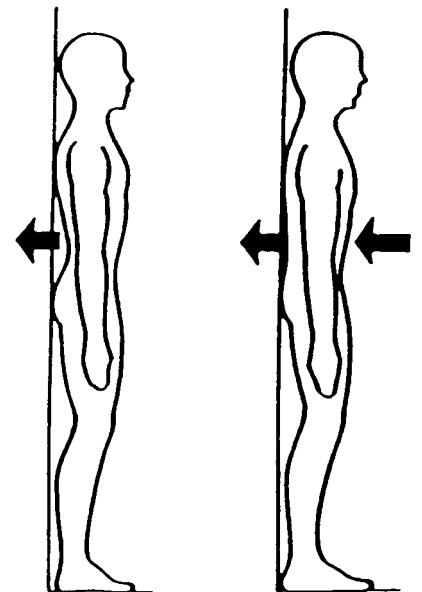


Lie on back, flattening the small of the back against the floor



LONGITUDINAL STRETCH

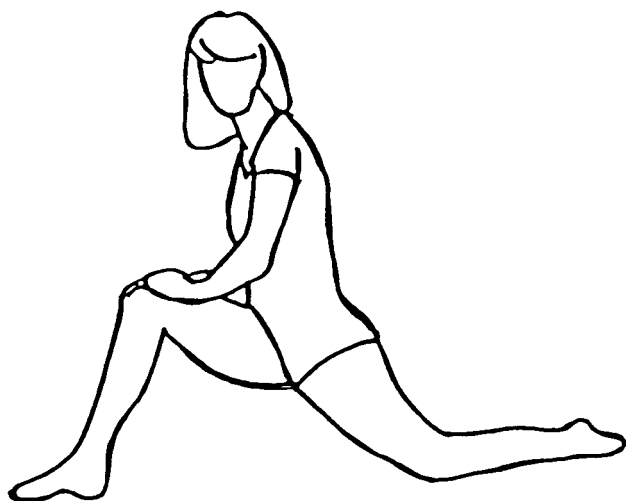
Lying on your back, tighten buttocks, draw in stomach, so that the back flattens into the floor, then stretch as shown in the diagram.



Stand against a wall flattening the lower back against the wall

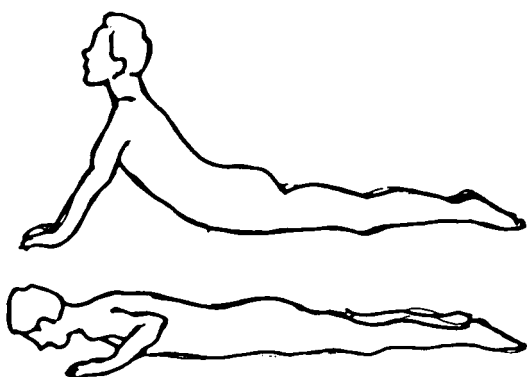
EXERCISES TO HELP MAINTAIN A HEALTHY BACK.

1. Body upright
2. Toes & pelvis pointing forwards
3. Lunge forwards

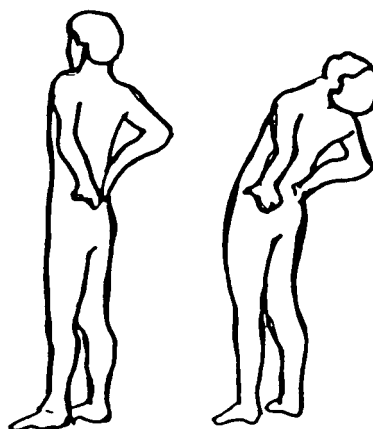


HALF PUSH-UP

Lying face down, push up on hands, keep hips and knees on mat. Straighten elbows to full extension if possible.



Stand with palms against buttocks. Bend backwards until lower back feels stretched. Straighten again and repeat as a rocking motion.

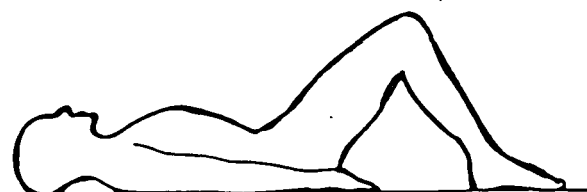


Exercises to Increase Forward Bending Flexibility - Lower Back

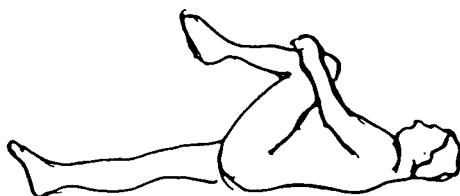
PLEASE NOTE:-

- These exercises act to stretch the lower back muscles.
- They may aggravate a disc strain or bulge, and should not be done if such a condition is present. Your physiotherapist will advise you in regard to this matter.
- The single knee-to-chest exercises are done alternately. They should be held for 5-10 seconds with the knee as close to the chest as possible.
- The double-knee-to-chest exercise is done in the same manner.
- Your therapist will determine how many of these are necessary for you to keep you back flexible.

Starting position



Single-knee-to-chest



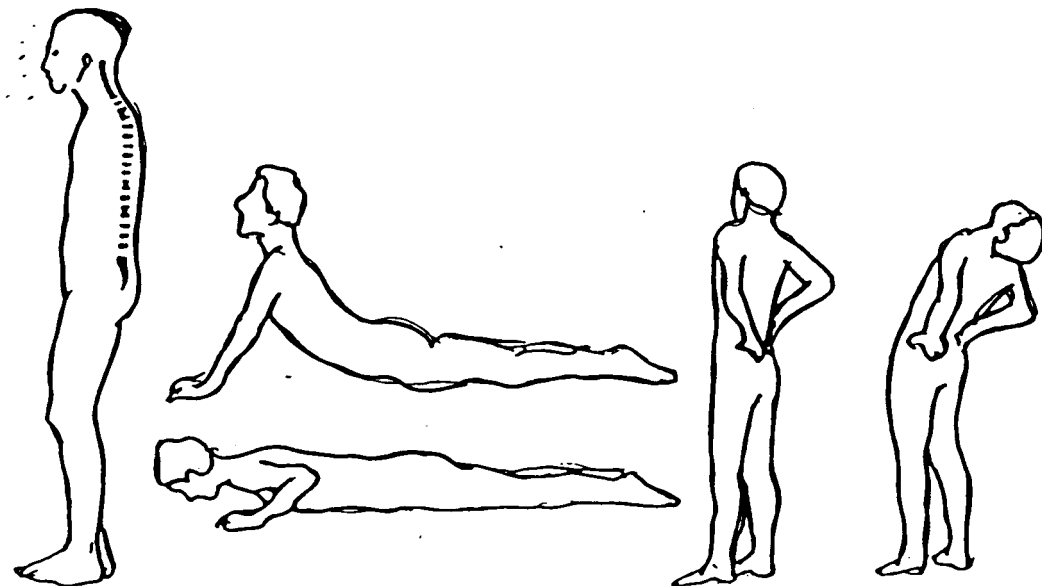
Double-knee-to-chest



Exercises To Increase Backward Bending Flexibility

PLEASE NOTE:-

- The push up exercise is done by pushing up with the arms, while the back and abdominal muscles are relaxed. Your pelvis must not lift off the ground.
- The backward bending stretch can also be done in standing.
- These exercises are especially good after you have been sitting or forward bending, and lifting.
- Your therapist will determine the amount that you should do.



Exercises For Strengthening Abdominal Muscles

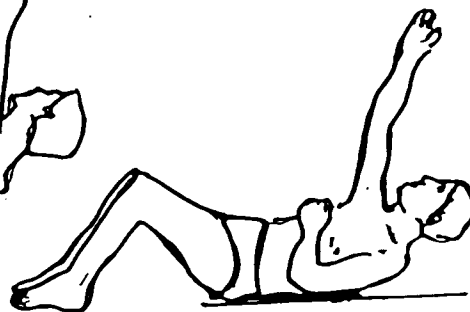
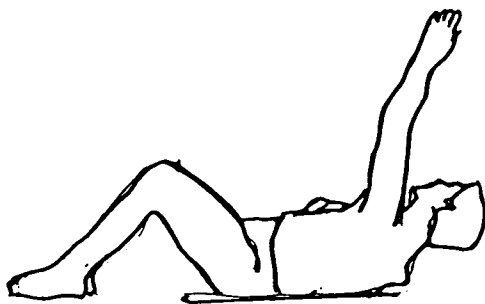
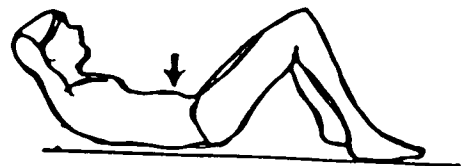
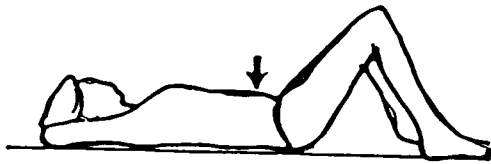
PLEASE NOTE:-

- Hips and knees are slightly bent.
- Raise the arms, head and shoulders off the floor as shown.
- Never raise to the point that the lower back is lifted from the floor.
- The feet should be stabilised.
- The partial set-up should also be done with the slight right and left twist.

Strengthening exercises should be:-

- Started midly and gradually increased in number as the muscles get stronger.
- They should be done one or twice per day.

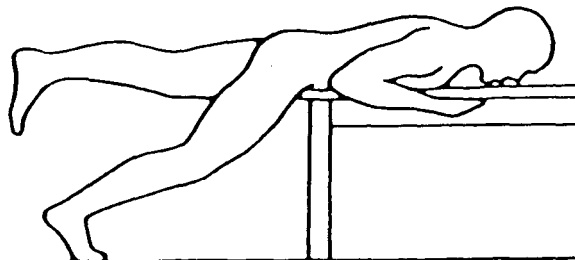
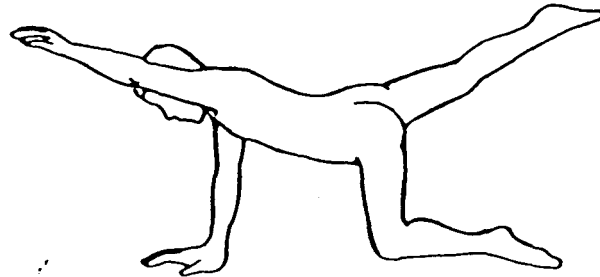
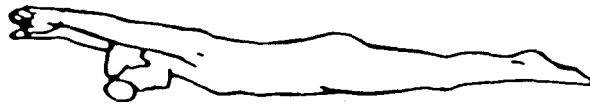
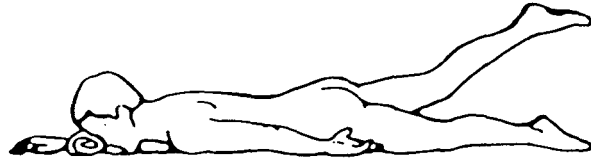
N.B. This exercise does cause increased pressure on the disc, and should no be done by some-one with an active disc disorder. Your Physiotherapist will guide you in this matter.



Exercises To Strengthen Back Muscles

PLEASE NOTE:-

- These exercises should be started gradually and done once or twice per day.
- Small ankle and wrist weights can be added to make these exercises more advanced.
- Your therapist will determine the amount that you can do.



Lie across table with hips just over the edge and toes on floor. Lift the leg to horizontal, lower and lift other leg

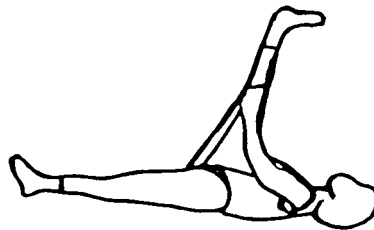
EXERCISES TO HELP MAINTAIN A HEALTHY BACK

STRETCHES

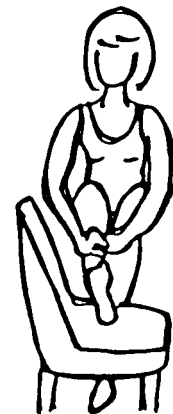
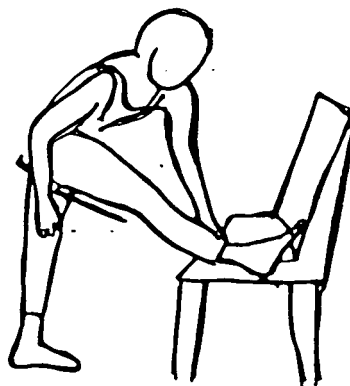
- are designed to produce both muscle and joint flexibility
- should never be painful
- a sustained stretch of 15 seconds or longer is preferable
- over stretching may aggravate the problem
- body position is of utmost important for an effective stretch
- the best results are achieved by stretching a little bit, often.

LEG STRETCH

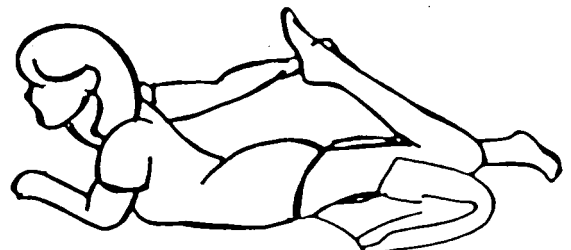
Lying on back, knees bent. Alternately stretch each leg by straightening the knee and pulling the foot back. Hold 2 seconds, relax and repeat.



- back straight when leaning forward
- knee is straight
- change body or foot position to stretch each muscle



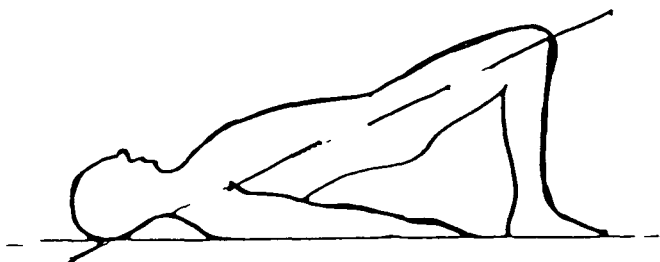
1. Opposite hand holds foot of flexed leg (knee fully flexed)
2. Feet & pelvis pointing forwards
3. Back straight & hip extended.



EXERCISES TO HELP MAINTAIN A HEALTHY BACK

BRIDGING

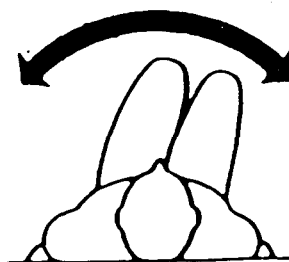
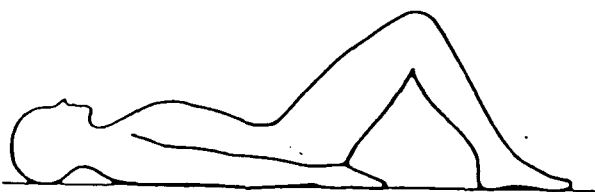
Lying on back, knees and feet apart and bend. Repeat pelvic tilt, then lift the buttocks off the mat. Relax and repeat.



Lie on back with knees bent. Lift bottom off floor until shoulders hips and knees are in a straight line.

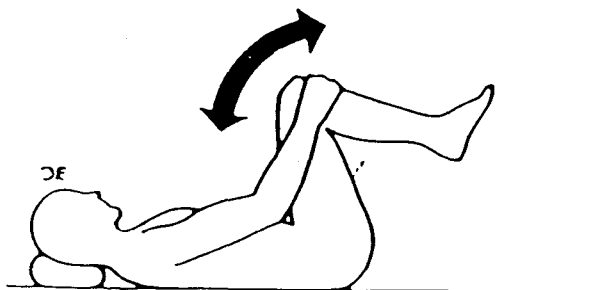
ROTATION

Lying on back, knees and feet together, shoulders flat. Roll knees from side to side, trying to touch floor. Repeat.

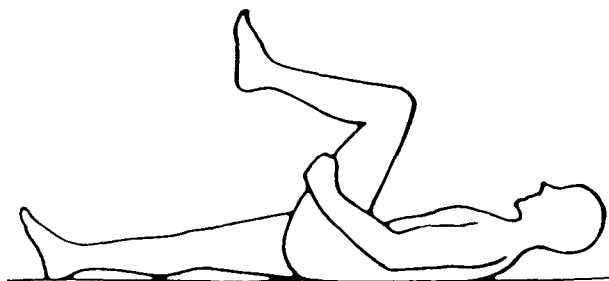


POSTERIOR STRETCH

Lying on back, legs straight. Alternately bend each knee to chest giving a 2 second stretch with the hands clasped around knee.



Lie on back pull one knee up and rock leg in 30 degree arc towards chest. Repeat for each leg separately then both knees up together.

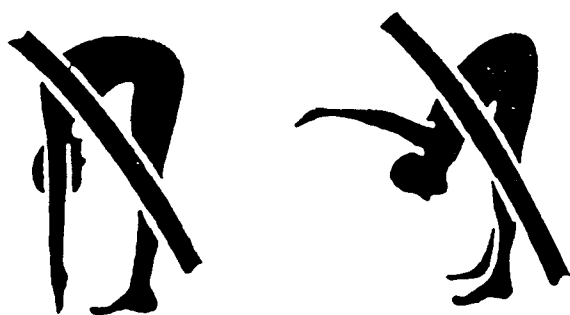


Lie on back pulling one knee towards chest. At the same time press other leg down holding position for five seconds.

CAUTION

NEVER DO THESE EXERCISES

Toe-touching exercises put excessive strain on your lower back. There is never any need to bend over and tilt from this position. All lifting should be done using your leg muscles, not your back. So bend at your knees, not your back.



Any exercises like these which stretch and extend the back beyond its normal capacity are dangerous and completely unnecessary.



Straight leg sit ups and leg raises are not effective in strengthening abdominal muscles. Like toe-touching, they put excessive strain on the lower back.



(d) USE OF THE HOIST AND SLIDE BOARDS.Contents for this session

- (1) Mobile hoist.
- (2) Slings.

Objectives

At the conclusion of this session, preceptees will be able to:

1. Identify the different types of slings and know the type of patient they are used for.
2. Know where the hoists and other lifting equipment are kept in the hospital.
3. Feel confident about using the equipment for transferring patients.

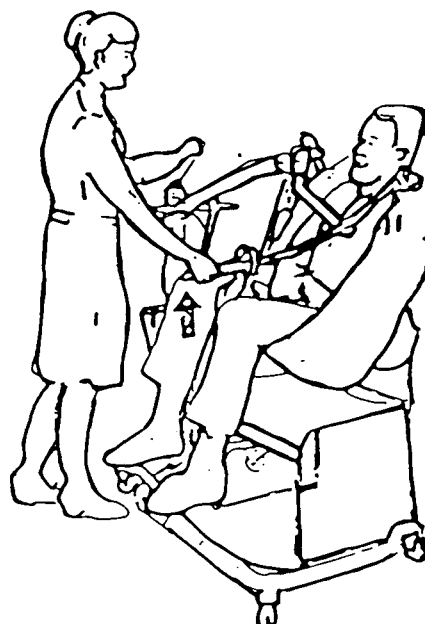
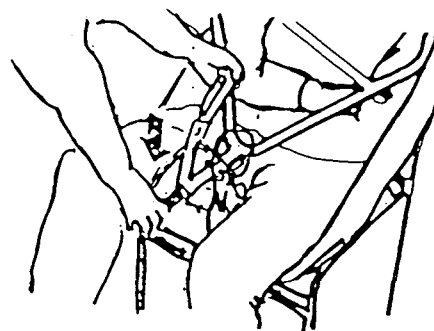
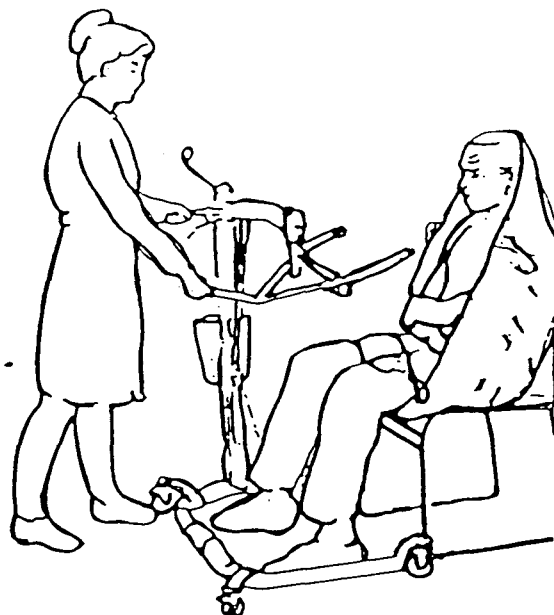
Reasons why staff do not wish to use hoists include;

- ★ patients/client dislike them.
- ★ they take too much time.
- ★ they are not readily accessible.
- ★ staff do not know where they are kept.
- ★ staff do not know how to use them.

DEXTRA SLING

TO LIFT FROM A CHAIR

1. Select correct sling size (blue - extra large; green - large; yellow - medium; red - small).
2. Place the sling around the patient so that the base of his spine is covered and the head support areas is behind the head. Pull each leg piece under the thigh so that it emerges on the inside of the thigh.
3. Before approaching the patient with the DEXTRA ensure that:
 - a. You approach the patient from the front with the open side of the chassis.
 - b. The positioning handle on the support frame is horizontal, facing away from the patient.
 - c. The wide part of the support frame is at or just below shoulder level.
 - d. The DEXTRA is close enough to be able to connect the shoulder pieces of the sling to the support frame.
4. Press down on the positioning handle of the support frame and attach the leg pieces.
5. Ensure that all four points are connected and raise the patient by turning the handle on top of the mast. At the same time, lift the positioning handle until the patient is reclined in the sling - the head support should come into use. This is the most comfortable position for transportation, it reduces pressure on the thighs.



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