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**BRO MORGANNWG**  
NHS TRUST



**An evaluation of electric profiling beds in the acute  
hospital setting: benefits to patient care and manual  
handling**

**Bro Morgannwg NHS Trust  
Health and Safety Executive**

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# CONTENTS

	Page
CONTENTS .....	I
AIMS AND OBJECTIVES .....	III
ABSTRACT .....	IV
LIST OF FIGURES .....	V
LIST OF TABLES .....	VI
CHAPTER 1: INTRODUCTION .....	1
1.1 Manual handling risk in healthcare. ....	2
1.2 Bed types. ....	2
1.3 Bro Morgannwg NHS Trust. ....	2
1.4 Literature review. ....	3
1.5 Legal framework. ....	6
CHAPTER 2: METHODOLOGY .....	8
2.1 Manual handling risk. ....	9
2.1.1 Frequency of exposure to risk. ....	9
2.1.2 Risk associated with each operation. ....	10
2.2 Nursing time. ....	11
2.3 Nursing cost. ....	11
2.4 Musculoskeletal disorders. ....	12
2.5 Patient experience. ....	12
CHAPTER 3: RESULTS .....	14
3.1 General results. ....	15
3.2 Manual handling risk. ....	16
3.2.1 Frequency of exposure to risk. ....	16
3.2.2 Risk associated with each operation. ....	18
3.3 Nursing time. ....	25
3.4 Nursing cost. ....	25
3.5 Musculoskeletal disorders. ....	26
3.6 Reported manual handling incidents. ....	27
3.7 Patient experience. ....	27
CHAPTER 4: ANALYSIS OF RESULTS .....	28
4.1 General results. ....	29
4.2 Manual handling operations. ....	29
4.3 Risk associated with manual handling operations. ....	35
4.4 Nursing time. ....	36

4.5	Nursing cost. ....	38
4.6	Musculoskeletal disorders. ....	39
4.7	Patient experience. ....	41
CHAPTER 5:	DISCUSSION OF RESULTS .....	47
CHAPTER 6:	CONCLUSIONS .....	51
REFERENCES	.....	53
ACKNOWLEDGEMENTS	.....	56
APPENDICES	.....	58
	Appendix I	
	Appendix II	
	Appendix III	
	Appendix IV	

# AIMS AND OBJECTIVES

Profiling beds were perceived to have a number of benefits for the delivery of nursing care. This project aimed to quantify some of these benefits. The presence of profiling beds within the Neath Port Talbot hospital and their absence from Princess of Wales allowed direct comparison between two acute hospitals within the same trust.

The aims of this comparison were:

To examine the key manual handling risks associated with typical care tasks undertaken with patients occupying profiling and standard beds. The project aimed to compare a number of criteria:

- The number of patient handling tasks carried out by nursing staff,
- The amount of nursing time occupied by these tasks,
- The level of risk to which staff are exposed in carrying out these tasks
- The prevalence of musculoskeletal pain amongst staff
- The role of the beds in improving the patient's experience

To examine the reasonable practicability of profiling beds in the management of musculoskeletal risk and enable an informed decision to be made on the allocation of resource.

The hypothesis of the evaluation was that the provision of profiling beds would reduce the number of patient handling operations carried out by nursing staff and therefore reduce the risk of musculoskeletal disorders (MSD's), both in frequency and level of risk.

# ABSTRACT

The benefits of profiling beds seemed obvious to the staff and patients that used them, this study aimed to quantify some of these perceived benefits. Two hospitals, one equipped with standard NHS beds and one equipped with electric profiling beds, within an NHS Trust were used in a cross sectional study. Staff in six wards across the two hospitals, were asked to record the frequency at which they carried out eight common manual handling operations. The study used a postural analysis tool (REBA) to indicate the risk level of musculoskeletal injury posed by six of the eight selected patient manual handling operations. The study demonstrated a 62% reduction in the number of manual handling operations carried out per patient through the provision of electric profiling beds. The REBA risk scores for the operations using the profiling bed were between 40% and 90% lower than those for the standard bed. The reduction in nursing time taken up by manual handling operations was calculated at nearly 120 hours over the seven-day study period. Annually the theoretical time saving was calculated to be 1619 nurse days, sufficient to run 810 two-day training courses in accordance with the All Wales NHS Manual Handling Training Passport and Information Scheme. A notional saving of over £120,000 per annum for all medical and surgical wards at the Hospital was estimated. A musculoskeletal questionnaire was administered and this identified an increase in reported musculoskeletal discomfort in wards without profiling beds. The nurse population studied was at an increased risk of injury to the elbows (55% higher), hips/thighs/buttocks (100%) and knees (40%) in comparison to the normal female population. Eighty-eight patients were interviewed and of those who expressed a preference 100% of those at Neath Port Talbot felt that the bed had improved their stay, 75% felt very comfortable in profiling beds compared to 0% in standard NHS beds.

# LIST OF FIGURES

	Page
3.1 Total manual handling operations per ward.	17
3.2 Transfer patient onto a bedpan, REBA flowchart.	19
3.3 Assisting a patient out of bed, REBA flowchart.	20
3.4 Position a patient for feeding, REBA flowchart.	21
3.5 Lying a patient down, REBA flowchart.	22
3.6 Sitting a patient up in bed, REBA flowchart.	23
3.7 Turning a patient in bed, REBA flowchart.	24
4.1 Comparison of manual handling activity.	33
4.2 Nurses' annual prevalence.	39
4.3 Annual prevalence by hospital	42
4.4 Nurses' annual disability data.	43
4.5 Comparison of annual prevalence.	44
4.6 Do you feel the bed improved your stay? (Hospital).	45
4.7 Do you feel the bed improved your stay? (Ward).	46
4.8 How comfortable do you feel? (Hospital).	47
4.9 How safe do you feel? (Ward).	49

# LIST OF TABLES

	Page
1.1 Wards involved in study.	3
2.1 REBA action levels.	11
2.2 Nursing pay (£) by grade.	12
3.1 Hospital responses and response rates.	15
3.2 Ward responses and response rates.	15
3.3 Patient days per hospital.	16
3.4 Patient days per ward.	16
3.5 Total number of manual handling operations.	16
3.6 Manual handling operations per ward.	17
3.7 Individual manual handling operations per ward.	18
3.8 Nursing time comparison.	25
3.9 Conceptual cost saving.	26
3.10 Total conceptual cost saving for three wards over one week.	26
3.11 Questionnaires returned per ward.	26
3.12 Reported manual handling incidents per hospital.	27
3.13 Reported manual handling incidents per ward.	27
3.14 Bed modernisation questionnaires completed.	27
4.1 Manual handling operation per questionnaire per hospital.	29
4.2 Manual handling operations per questionnaire per ward.	30
4.3 Manual handling operations per shift per hospital.	31
4.4 Manual handling operations per shift per ward.	31
4.5 Manual handling operations per patient day per hospital.	31
4.6 Manual handling operations per patient day per ward.	32
4.7 Ratio comparison by hospital.	32
4.8 Ratio comparison by ward.	33
4.9 Orthopaedic ward comparison.	34
4.10 Surgical ward comparison.	34
4.11 Medical ward comparison.	34
4.12 REBA scores and action levels for the video simulated operations assessed as a single discrete task.	35
4.13 Potential time saving per ward.	37
4.14 Total time saved.	37
4.15 Conceptual cost savings (£).	38
4.16 Per annum conceptual cost savings (£).	38
4.17 Per annum conceptual cost saving for all wards (£).	38
4.18 Do you feel the bed improved your stay? (Trust and hospital).	45
4.19 Do you feel the bed improved your stay? (Ward).	45
4.20 How comfortable do you feel? (Trust and hospital).	47
4.21 How comfortable do you feel? (Ward).	47
4.22 How safe do you feel? (Trust and hospital).	48
4.23 How safe do you feel? (Ward).	48





# **CHAPTER ONE**

## **INTRODUCTION**

1.1 Nurses carry out a wide range of manual handling operations in the delivery of nursing care. Despite the increased awareness of the risk of musculo skeletal injury associated with patient handling and the implementation of measures to control that risk manual handling accidents still account for 40% of all sickness absence in the NHS. One in four nurses has at some time taken time off work with a back injury sustained at work.

The cost to the NHS of manual handling accident related sickness absence is in the region of £400 million each year. Every NHS employee who retires early because of a back injury costs the NHS at least an extra £60,000. A trust with an annual budget of £100 million and the average sickness absence rate of 4.6% is likely to be paying in the region of £1.25 million for staff who are unable to work due to back injuries each year<sup>1</sup>.

1.2 The majority of hospital beds are standard hydraulic, foot pump operated devices, with a flat base or mattress platform and a pull-out back rest. These are built to the King's Fund Specification that was developed in the 1960's. The mattress platform of Profiling Beds is split into a number of sections that can be angled by the occupant to achieve different positions. Height adjustment and movement of the mattress platform sections is powered either hydraulically or electrically. At present an electrically powered profiling bed will cost in the region of £1125 compared to £560 for a standard bed (exclusive of VAT).

### **1.3 Bro Morgannwg NHS Trust.**

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<sup>1</sup> NHS Back in Work campaign figures

The Bro Morgannwg NHS Trust is responsible for managing a comprehensive range of integrated hospital and community services for a resident population of approximately 300,000 living mostly in the County Boroughs of Neath Port Talbot, Bridgend and the western part of the Vale of Glamorgan.

There are two main hospitals providing acute care in the east and west of the local catchment area:

- Neath Port Talbot Hospital, opened in 2002 and has 273 beds.
- Princess of Wales Hospital, opened in 1986 and has 570 beds.

The recently opened Neath Port Talbot Hospital was fully equipped with electric profiling beds whilst the vast majority of beds in Princess of Wales Hospital were the standard unpowered beds. This provided an opportunity to compare the effect that the provision of electric profiling beds had on manual handling operations.

In order to compare the level of manual handling activity three wards from each hospital were selected, following detailed discussion with the relevant nursing management these were; an orthopaedic ward, a medical ward and a surgical ward. Table 1.1 below identifies the specific wards involved in the study. The wards were selected to enable comparison but it must be recognised that the wards were not identical. Although use of patient days as a common measure accounted for a large proportion of possible variables, not all could be catered for.

**Table 1.1** Wards involved in the study.

<b>Hospital</b>	<b>Orthopaedic</b>	<b>Medical</b>	<b>Surgical</b>
Princess of Wales	1	9	8
Neath Port Talbot	B2	D	A

#### 1.4 Literature review.

A literature search was undertaken on Medline and Ergonomics Abstracts to identify the extent of the literature examining hospital beds and musculoskeletal risks. A few papers were identified with relevance to this project but it seemed that very few papers directly examined the potential benefits of profiling beds in comparison with standard beds.

“In the UK most hospital beds are standard hydraulic, foot pump operated devices, with a flat base and a pull-out back rest.” Keogh and Dealey (2001:15). “Hospitals have used unpowered ‘King’s fund’ beds almost exclusively since their introduction in the 1960s (King’s Fund 1967). They are now being challenged by the arrival of powered, ‘profiling beds’.” (Mitchell et al 2000: 124).

A number of studies have examined the impact on a ward or hospital of the replacement of standard (King’s fund) beds with electric profiling beds. These studies have found a benefit to the organisation of savings in the costs associated with the incidence of pressure sores.

Keogh and Dealey (2001:17) report, “Patients sitting on these (King’s fund) beds tend to slide down the bed and often have difficulty adjusting their position or the bed height without help”. The tendency for patients to slide down the bed applies shearing forces to the skin that can contribute to the formation of pressure ulcers. The King’s fund centenary report quotes a

reduction of pressure sore prevalence from 6% to 3% over a three year period and refers to evidence presented by Swaine and Norman 1997 that the ability to position an occupant with support under the knee and calf can contribute significantly to reducing pressure on the heels of occupants as well as friction and shear on the sacrum, thus reducing the risk of pressure ulcer development.

Keogh and Dealey (2001:18) found that “electronically operated, multi-sectioned profiling bed reduces the risk of patients slipping down the bed” and that they were “more effective in promoting patient bed mobility and independence when transferring on and off the bed”. Dhoot and Georgieva (1996) found that occupants in hospital make about twice as many movements within, into or out of bed as similar occupants of standard beds.

The increase in patient mobility and independence is important in reducing the frequency of manual handling operations which not only pose a risk to those providing care but is also “thought to increase the risk of injury to the patient” (Mitchell et al 1998, quoted in Keogh and Dealey 2001:15) this is because “lifting an individual up and around the bed subjects the skin to shearing and friction.” (Gebhardt 1995 Koegh and Dealey 2001: 15).

The effects of a total bed management contract which facilitated the introduction of profiling beds reported by Robotham (2003) found a reduction in the incidence of Hospital acquired pressure ulcers with attendant savings in nursing time and pharmaceutical costs.

Mitchell et al (1998a quoted in Mitchell et al 2000: 127) studied the impact of a change from 'King's fund' beds to profiling beds and found "that acquired pressure sore rates had fallen by more than two thirds" and over the six month study period "290 out of 5500 bed-days had been released" and that "savings more than covered the costs of acquiring the beds"

With regard to the impact on the staff using the beds Mitchell et al (2000: 124) state "Staff found that adjusting unpowered beds can be difficult, demanding and often dangerous while consumers generally find it quite impossible." They go on to say "staff found the (profiling) beds much easier to use and felt noticeably less tired at the end of the shifts. Nurses could work alone during meal rounds instead of needing one to adjust the beds and make consumers comfortable and another to hand out trays" (ibid: 126)

Keogh and Dealey (2001: 18) state "the nurses found it easier to reposition and nurse heavily dependent patients on the trial (profiling) bed."

Robotham (2003) found the provision of profiling beds led to an 18% increase in patient independence i.e. reduction in manual handling activities with an attendant 69% reduction in nursing time. The Royal College of Nurses (1996) identified that 52% of manual handling accidents involve the hospital bed. The most frequent activity being carried out at the time of injury being moving the patient up the bed.

Studies by de Looze et al (1994) and Caboor et al (2000) both observed significant benefits where nurses had the ability to adjust bed heights. Further,

Nestor (1988) suggests that “a hospital bed with a height cycle time of approximately 20 seconds and nursing controls located on the bed side frame or side rail may be most useful for encouraging nursing personnel to use hospital bed design and control characteristics properly, prior to and during manual patient handling tasks in the hospital setting”. Dhoot and Georgieva (1996) found that where motorised height adjustment was provided nurses were significantly more likely to adjust the bed height than where this was done by foot pumps. The writers suggest these findings further support the provision of profiling beds.

An ergonomic risk assessment conducted on the adjustment of backrests on standard beds (Birtles and Williams 2004:18) identified that staff at a hospital trust needed to “compress the bed mattress in order to lower and raise the backrest, while overcoming frictional forces where the backrest rubs the top surface of the mattress”. The problem arose because of the replacement of the original 5-inch thick mattresses with new mattresses measuring 6.5 inches thick. The ergonomic assessment suggested, “there is a high risk of musculoskeletal injury related to the use of the unmodified backrest” (ibid: 20)

The Report of the King’s Fund centenary Bed Project “Better Beds for Health Care” gave a comprehensive review of research into the use of different bed types in healthcare. The conclusion of the report is clear “In most health care situations where occupants are confined to bed for a substantial part of the time, where they require more than a minimum of nursing care or where their

mobility is significantly compromised, powered variable-height profiling beds should be considered the provision of choice.”

Key findings from the literature review were:

1. Deployment of standard backrests can be associated with a high risk of MSD
2. Adjustment of bed height helps reduce MSD risk
3. Improving bed adjustability encourages staff to make use of the adjusting functions
4. Patient independence is increased with the ability to adjust the bed themselves
5. Factors contributing to the development of pressure ulcers are reduced in profiling beds
6. Studies are not available comparing MSD risks between profiling and standard bed types in the healthcare setting.

### **1.5 Legal framework.**

The Manual Handling Operations Regulations 1992 places a requirement on employers to minimise the risk posed to their employees by manual handling operations. Regulation 4(1)(a) requires employers to so far as is reasonably practicable avoid the need for his employees to undertake any manual handling operations at work which involve a risk of their being injured.

Thus the Regulation imposes a hierarchy of measures the employer must take, beginning with the obligation to take steps to avoid manual handling.



Where it is not reasonably practicable to avoid such manual handling operations, employers are required to make a suitable and sufficient assessment of the manual handling operations and take the appropriate steps to reduce the risk to employees to the lowest level reasonably practicable.

For it not to be “reasonably practicable” for an employer to avoid the need for his employees to undertake manual handling operations, he has to demonstrate that the cost (in money, time or trouble) necessary to avert the risk is grossly disproportionate to the degree of risk.

A strict interpretation of the Regulations would therefore suggest that if a reduction in risk of musculoskeletal injury can be achieved by replacing standard beds with profiling beds is shown, employers must provide them or demonstrate that it is not reasonably practicable to do so.

# **CHAPTER TWO**

## **METHODOLOGY**

## **2.1 Manual handling risk.**

The aim of the study was to identify the reduction of risk of musculoskeletal injury posed to employees gained by replacing standard NHS beds with electric profiling beds. Therefore, although nurses would carry out a wide range of patient handling tasks throughout a shift, the authors sought to identify those in which the nature of the bed would have the greatest impact. The Trust's Manual Handling Co-ordinator along with the Trust Manual Handling trainers were asked to identify manual handling operations which involved moving the patient on, onto or off a bed. Eight routine manual handling operations were identified:

- Assisting a patient into bed
- Assisting a patient on/off bed pan
- Assisting a patient out of bed
- Feeding a bed patient
- Laying a patient down in bed
- Moving a patient up the bed
- Sitting a patient up in bed
- Turning a patient in bed

### **2.1.1 Frequency of exposure to risk.**

A questionnaire was developed (Appendix 1) to record the number of times each of the eight manual handling tasks was carried out. The questionnaire listed the manual handling operations and asked for information relating to staff grade, ward, day of the week and shift. Over a seven-day period, between 25 and 31 July 2004, staff were

requested to record each time they carried out a particular patient handling operation. A separate sheet was completed for each shift.

The responses were then used to calculate the total number of manual handling operations carried out for each ward over the study period. These figures were used to compare the frequency of exposure to manual handling risk between the two hospitals.

### **2.1.2 Risk associated with each operation.**

Bro Morgannwg NHS Trust's manual handling trainers were video recorded carrying out each of the manual handling operations at one of the Trust's training facility in Cimla Hospital, Neath. It should be noted that the handling techniques used in each case represented best practice. The videos were then analysed by a Specialist Inspector (Ergonomics) of the Health and Safety Executive, using a postural analysis tool called Rapid Entire Body Assessment (REBA). This tool was developed to be sensitive to the assessment needs of the healthcare sector (Hignett and McAtamney, 2000). The report is contained in Appendix IV.

The REBA system uses look-up tables to derive an overall score of risk based on assessment of individual body areas (trunk, neck, legs and arms), the load or force involved, the activity level and the hold on the load (coupling). Action levels based on the REBA scores can be used to determine risk and guide action. For example, the scoring system has a maximum possible score of 15 attracting a 'very high' risk action

level requiring immediate action. Table 2.1 shows the REBA action levels.

**Table 2.1** REBA action levels.

Action Level	REBA score	Risk Level	Action
0	1	Negligible (neg)	None necessary
1	2-3	Low	Maybe necessary
2	4-7	Medium (med)	Necessary
3	8-10	High	Necessary soon
4	11-15	Very High	Necessary now

The patient handling operations were broken down into their constituent parts, each of which was then analysed using the REBA system.

## 2.2 Nursing time.

The video footage of the patient handling operations was used to time each manual handling operation. The difference in the length of time taken to complete the same operation on a profiling bed compared to a standard bed was taken to be a saving in nursing time. These times were then used to calculate, for the period of the study, the time that could have been saved if those wards with standard beds were equipped with profiling beds.

## 2.3 Nursing cost.

The mid-range of the basic salaries for each of the nursing grades was obtained from the Trust and a weekly and hourly, based on 37.5-hour working week was calculated for each of the nursing grades that responded to the questionnaire. No additional enhancements, such as shift allowance, were included in these calculations. The lowest grade (A), the highest grade (F) and

an average of all grades were used to allocate a value to the nursing time taken up by manual handling operations as shown in table 2.2.

**Table 2.2** Nursing pay (£) by grade.

Nursing Grade	Salary Range	Mid Point	Weekly Pay	Hourly Pay
A	10375 - 12615	11495	221.06	5.90
B	12210 - 13900	13055	237.36	6.33
D	17060 - 18830	17945	345.10	9.20
E	18230 - 22015	20122.50	386.97	10.32
F	20220 - 25250	22735	437.21	11.66
Average	15619 - 18522	17070.50	328.28	8.75

#### 2.4 Musculoskeletal disorders.

A standard Health and Safety Executive Musculoskeletal Disorders Survey questionnaire (Appendix 2) was administered to staff working in each of the wards during the week of the study. The questionnaire asks respondents to indicate whether they had suffered any aches, pains, discomfort or numbness over the past twelve months and within the past seven days. It also asks the respondents whether this has prevented them from carrying out their normal duties within the past twelve months. The responses were used as a basis to compare the incidence of musculo skeletal disorders between wards with profiling beds and those with standard beds.

#### 2.5 Patient experience

In order to obtain the patient perspective on the difference between the two types of beds a further Bed Modernisation Survey questionnaire was developed by the Trust's Patient Experience Coordinator, (Appendix 3). The questionnaire was administered 'face to face' and sought the patients' views

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on whether they felt comfortable and safe and if they felt that the bed had improved their stay at the hospital.

# **CHAPTER THREE**

## **RESULTS**



### 3.1 General results.

Of the possible 661 shifts worked during the one-week research period a total of 539 correctly completed manual handling audit questionnaires were returned, representing an overall response rate for all wards taking part in the research of 82%. The number of responses received and response rates for the two hospitals taking part can be seen in table 3.1. Further, table 3.2 illustrates the number of responses and response rates for each of the individual wards.

**Table 3.1.** Hospital responses and response rates.

Hospital	Shifts Worked	Completed Forms	Response Rate
Princess of Wales	315	255	81%
Neath Port Talbot	346	284	82%

**Table 3.2.** Ward responses and response rates.

Ward	Shifts Worked	Completed Forms	Response Rate
1	112	95	85%
8	105	72	69%
9	98	88	90%
A	112	85	76%
B2	77	60	78%
D	157	139	89%

The number of patient days recorded during the research study was 823. Patient days represented the equivalent number of patients per day within each of the wards, totalled for the week. The numbers within each hospital and wards are shown in tables 3.3 and 3.4 respectively.

**Table 3.3.** Patient days per hospital.

<b>Hospital</b>	<b>Patient days</b>
Princess of Wales	456
Neath Port Talbot	367

**Table 3.4.** Patient days per ward.

<b>Ward</b>	<b>Patient days</b>
1	168
8	181
9	107
A	154
B2	35
D	178

### 3.2 Manual handling risk.

#### 3.2.1 Frequency of exposure to risk.

A total of 13,946 of the selected manual handling operation were recorded during the study period. Of these, 10,516 (75%) were undertaken at Princess of Wales Hospital and the remaining 3,430 (25%) at Neath Port Talbot Hospital. A breakdown of the selected manual handling operation is shown in table 3.5.

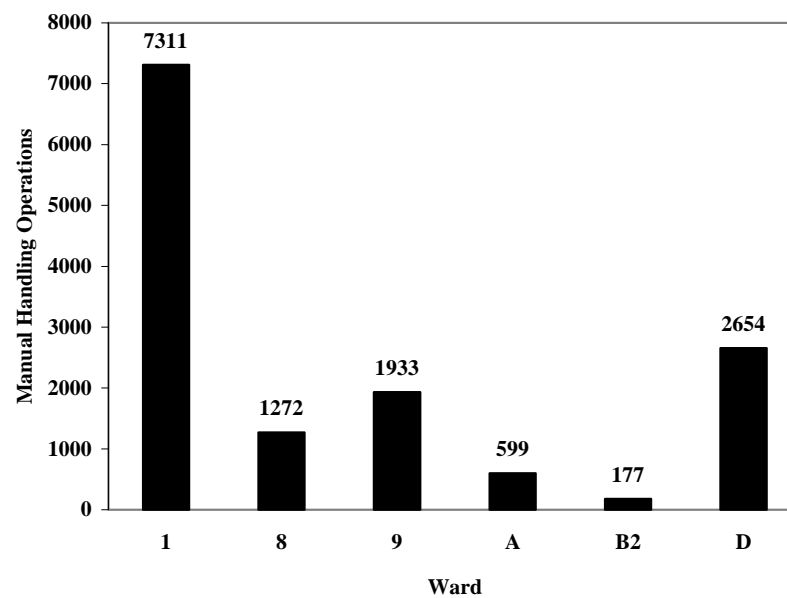
**Table 3.5.** Total number of manual handling operations.

<b>Manual handling operation</b>	<b>Total</b>
Assisting patient into bed	1486
Assisting patient on/off bed pan	1570
Assisting patient out of bed	1329
Feeding a bed patient	465
Lying patient down in bed	1766
Moving patient up the bed	2083
Sitting patient up in bed	2430
Turning a patient in bed	2817

A breakdown of the total number of manual handling operations per ward is shown in table 3.6 and figure 3.1. The number of individual manual handling operations per ward is shown in table 3.7.

**Table 3.6.** Manual handling operation per ward.

	Ward					
	1	8	9	A	B2	D
Manual Handling Operations	7311	1272	1933	599	177	2654



**Figure 3.1.** Total manual handling operations per ward.

**Table 3.7.** Individual manual handling operations per ward.

Manual handling operation	Ward					
	1	8	9	A	B2	D
Assisting patient into bed	702	166	221	62	28	307
Assisting patient on/off bed pan	917	25	217	62	28	321
Assisting patient out of bed	566	186	197	70	36	274
Feeding a bed patient	148	5	145	2	2	163
Lying patient down in bed	1081	134	197	73	14	267
Moving patient up the bed	1061	247	293	94	27	361
Sitting patient up in bed	1247	290	295	132	39	427
Turning a patient in bed	1589	219	368	104	3	534

### 3.2.2 Risk associated with each operation.

Of the eight manual handling operations identified in the survey six were selected for analysis using the REBA tool. The selected manual handling operations were numbered as follows:

1. Transfer onto a bed pan
2. Assisting patient out of bed
3. Transfer in bed ready for feeding
4. Lying a patient down in bed
5. Sitting a patient up in bed
6. Turning a patient in bed

Two manual handling tasks were not selected for analysis, assisting a patient into bed and moving a patient up the bed. These tasks were ostensibly the same if the task is carried out with the patient laying flat. A more detailed picture of the comparative risks for each of the simulated operations is given when the operations are broken into component sub tasks and assessed. The results of these assessments follow in figures 3.2 to 3.7.

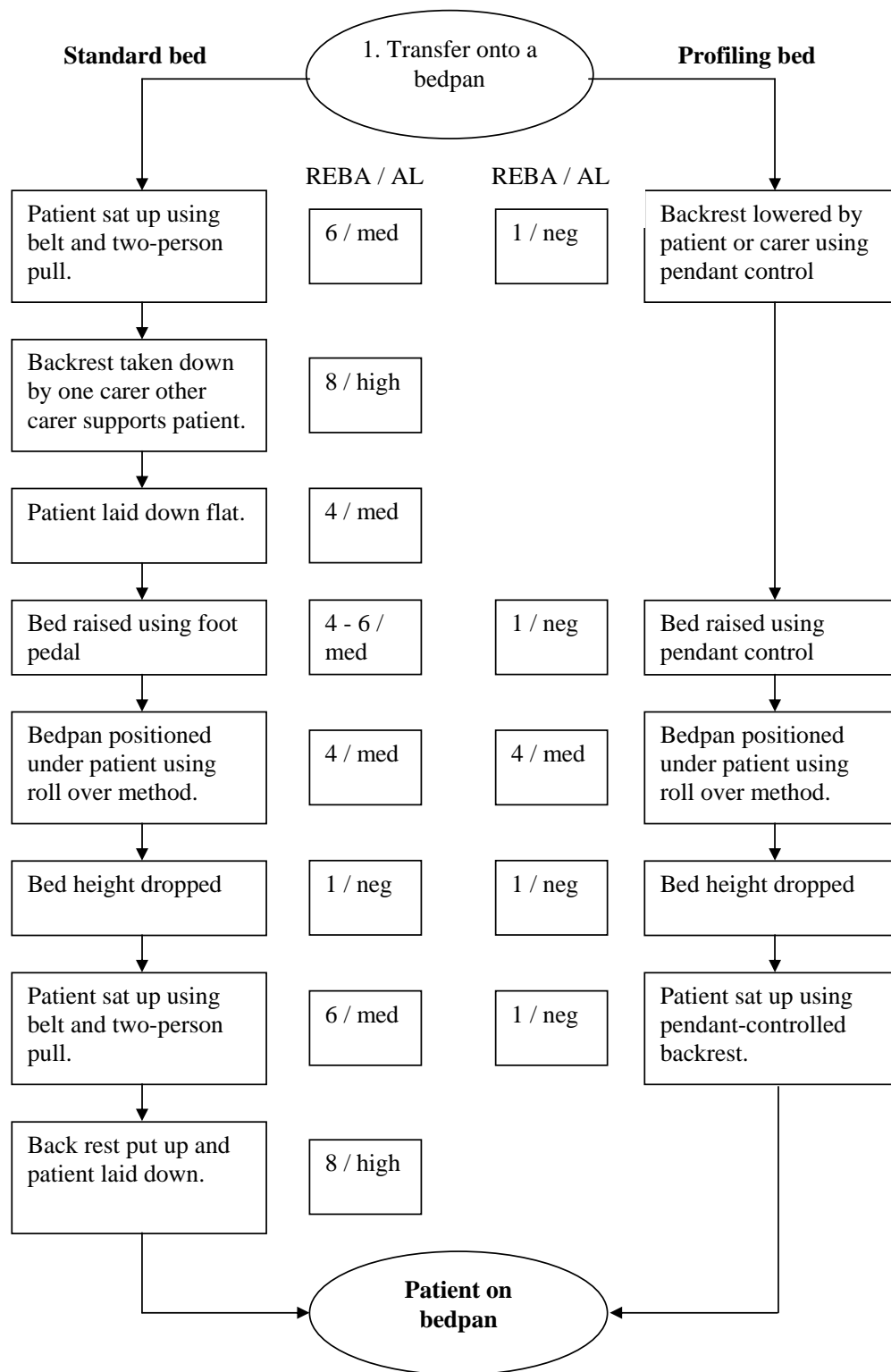


Figure 3.2. Transfer patient onto a bedpan, REBA flowchart.

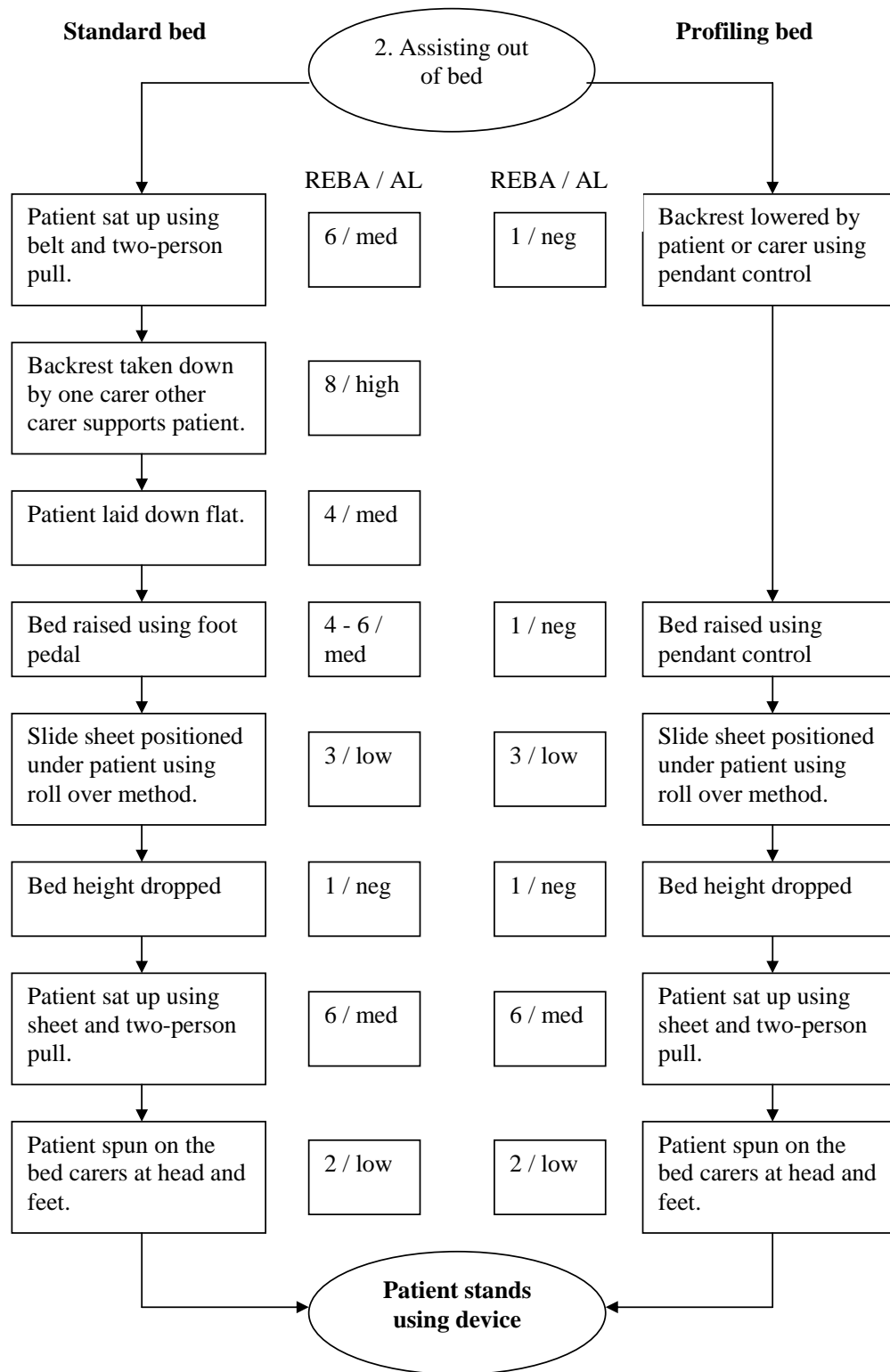


Figure 3.3. Assisting a patient out of bed, REBA flowchart.

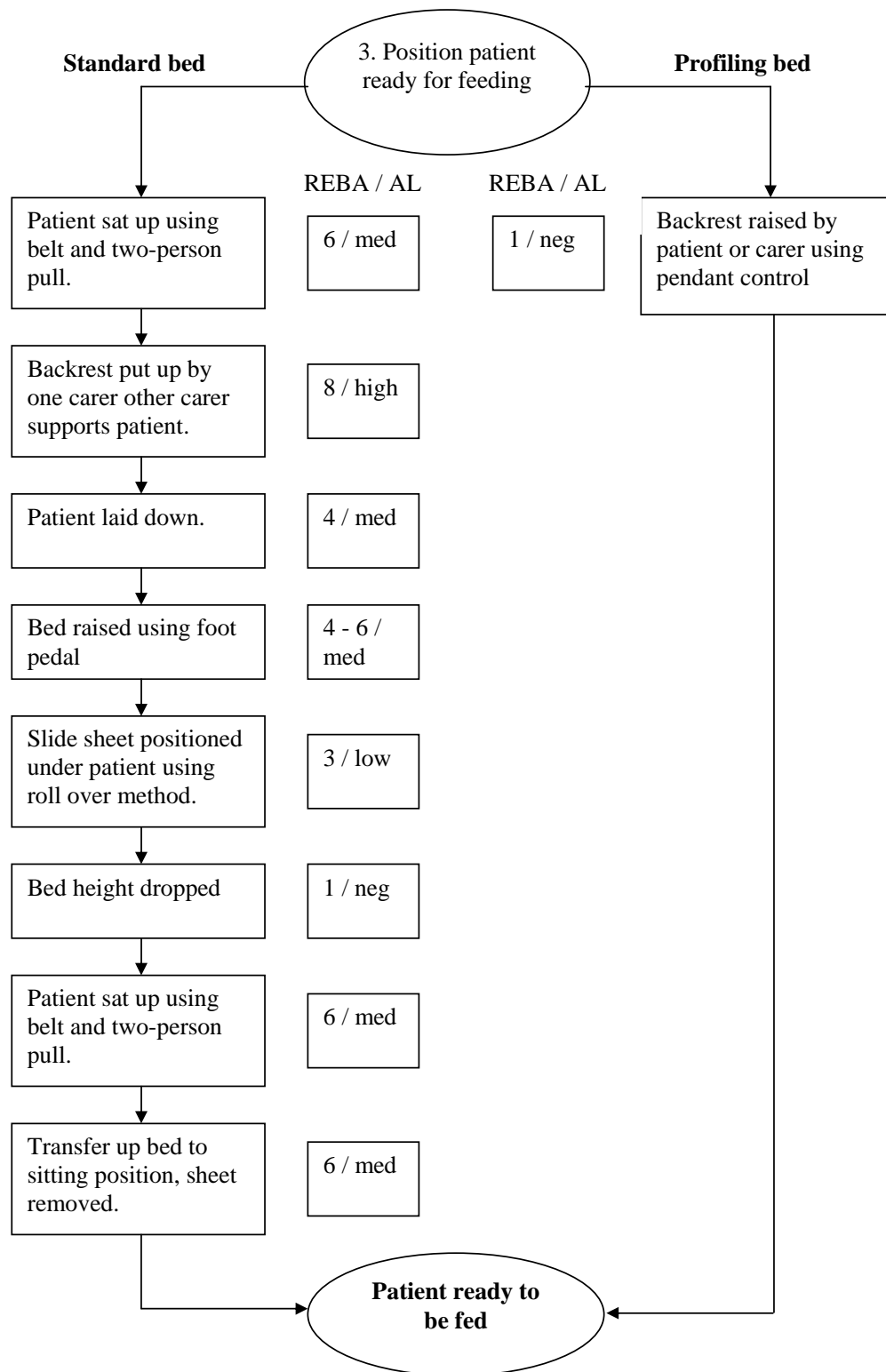


Figure 3.4. Position a patient for feeding, REBA flowchart.

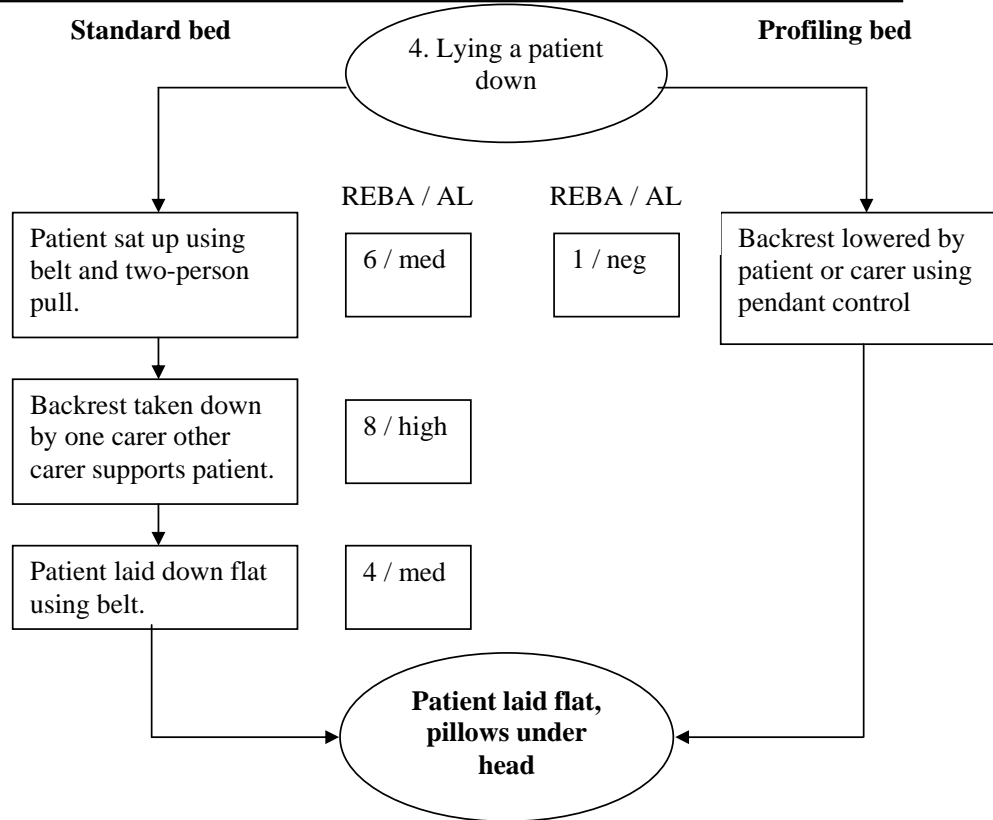


Figure 3.5. Lying a patient down, REBA flowchart.



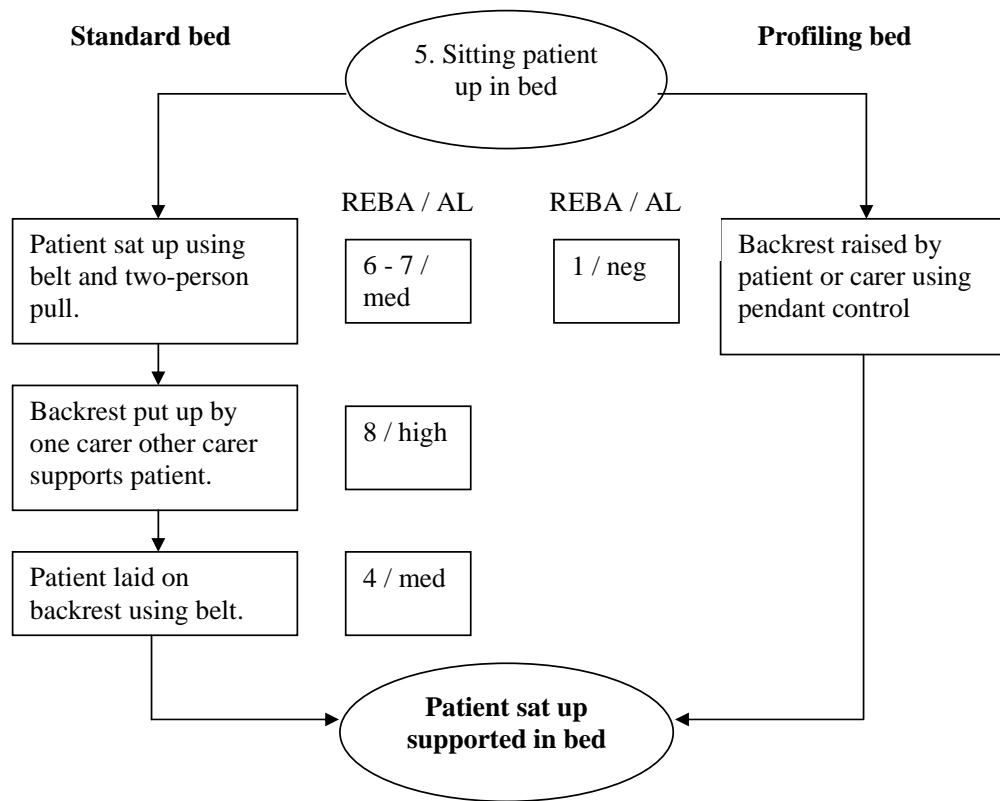


Figure 3.6. Sitting a patient up in bed, REBA flowchart.



### 3.3 Nursing time.

Each manual-handling task was timed using the video simulations. These timings were used to calculate the difference in the length of nursing time required to perform the selected manual handling tasks. Table 3.8 gives the potential nursing time saved for each of the manual handling operations had they been performed on profiling beds instead of standard beds. Two tasks *sitting a patient up in bed* and *feeding a bed patient*, did not take up any nursing time where the patient was able to use the profiling bed controls. These are shown in table 3.8 as taking 0 seconds with the actual time taken for the bed to attain the appropriate position given in brackets. Two tasks, *assisting a patient into bed* and *assisting a patient out of bed* were found to have negligible difference in times.

**Table 3.8** Nursing time comparison.

Manual handling operation	Standard Bed	Profiling Bed	Time saving (s)
Assisting patient into bed	1m 40s	1m 40s	0
Assisting patient on/off bed pan	1m 15s	1m 00s	15
Assisting patient out of bed	3m 05s	3m 05	0
Feeding a bed patient	3m 33s	0(18s)	213
Lying patient down in bed	1m 04s	0(12s)	72
Sitting patient up in bed	48s	0(18s)	48
Turning a patient in bed	4m 35s	3m 13s	77

### 3.4 Nursing Cost

The hourly rate calculated for Grade A and Grade F, along with an average of these grades were used as the basis on which to calculate a conceptual cost saving from the provision of profiling beds, these can be seen in table 3.9.

**Table 3.9** Conceptual cost saving.

Nursing Grade	Hourly Rate	Potential Time Saving			Conceptual Cost Saving		
		Ward 1	Ward 8	Ward 9	Ward 1	Ward 8	Ward 9
A	5.90	84.81	11.59	1.1875	500.38	68.38	7.01
F	11.66	84.81	11.59	1.1875	988.88	135.14	13.85
Average	8.75	84.81	11.59	1.1875	742.09	101.41	10.39

Taken from table 3.9 the total conceptual cost saving for the three wards for one week is shown in table 3.10.

**Table 3.10** Total conceptual cost saving for three wards over one week.

Nursing Grade	Hourly Rate	Total Conceptual Cost Saving
A	5.90	575.77
F	11.66	1137.87
Average	8.75	853.89

### 3.5 Musculoskeletal disorders.

Of the 150 Health and Safety Executive “Musculo-skeletal Disorders Survey” questionnaires a total of 120 were sufficiently completed, representing a response rate of 80%. While not all those questionnaires returned were fully completed, all the questions relating to incidence of musculo skeletal discomfort were answered. The sections commonly not completed were those requesting the respondents age and/or weight. Table 3.11 shows the number of completed survey questionnaires received from each of the wards.

**Table 3.11** Questionnaires returned per ward.

Ward	Returned Questionnaires
1	29
8	20
9	8
A	26
B2	15
D	22

### 3.6 Reported manual handling incidents.

During a retrospective one-year period from 1<sup>st</sup> April 2003 to 31<sup>st</sup> March 2004 a total of 193 manual handling incidents were reported by employees via the Trust incident reporting procedure. The number of reported manual handling incidents by hospital and ward are shown below in table 3.12 and 3.13 respectively.

Hospital	Reported Manual Handling Incidents
Princess of Wales	73
Neath Port Talbot	22

Ward	Reported Manual Handling Incidents
1	6
8	0
9	0
A	0
B2	0
D	2

### 3.7 Patient experience.

A total of 88 patients were interviewed using the bed modernisation survey questionnaire, 44 in each hospital. The breakdown for individual wards is shown in table 3.14.

Ward	Completed questionnaires
1	15
8	12
9	17
A	9
B2	8
D	27

# **CHAPTER FOUR**

## **ANALYSIS OF RESULTS**

#### 4.1 General Results.

The high level of returns achieved (81.5%) suggests that the response to the manual handling questionnaires was broadly representative of the level of activity on the wards. The nursing population within the wards is small so even with a high percentage return for the musculo skeletal survey the number of actual responses is still relatively small. Further, low returns were experienced on some wards.

#### 4.2 Manual handling operations.

Of the 13,946 reported manual handling operations the split between Princess of Wales Hospital (manual beds) and Neath Port Talbot (electric profiling beds) was 75.4% ( $n=10516$ ) and 24.6% ( $n=3,430$ ) respectively. This may indicate that a significantly larger proportion of manual handling activity was associated with the use of standard beds within the Princess of Wales Hospital. A total of 539 manual handling audit questionnaires were returned, producing a calculated ratio of 26 reported manual handling operations per returned questionnaire. The calculated ratio of manual handling operations per returned questionnaire for each hospital and ward are shown in tables 4.1 and 4.2 respectively.

<b>Hospital</b>	<b>Questionnaires</b>	<b>Manual Handling Operations</b>	<b>Ratio</b>
Princess of Wales	255	10516	41
Neath Port Talbot	284	3430	12

**Table 4.2** Manual handling operations per questionnaire by ward.

Ward	Questionnaires	Manual Handling Operations	Ratio
1	95	7311	77
8	72	1272	18
9	88	1933	22
A	85	599	7
B2	60	177	3
D	139	2654	19

The number of manual handling operation per returned questionnaire was significantly higher in the Princess of Wales Hospital (manual beds), with employees having to undertake well in excess of three times (342%) as many manual handling operations. The individual comparisons for ward function are illustrated in tables 4.9, 4.10 and 4.11 on page 34.

During the study a total of 661 shifts were worked. The ratio of manual handling operation per shift was calculated by extrapolating the number of manual handling operations undertaken based on the 539 questionnaires returned. With a 100% response rate the questionnaires returned would equal the shifts worked, one questionnaire completed for every individual shift.

$$\frac{\text{Reported manual handling operations}}{\text{Returned questionnaires}} = \frac{13946}{539} = 25.87$$

$$\text{Shifts worked X } 25.87 = 661 \times 25.87 = 17100$$

Using this extrapolated figure for the number of manual handling operations produced a calculated ratio of 26 manual handling operations per shift. The calculated ratio of manual handling operations per shift worked for each hospital and ward are shown in tables 4.3 and 4.4 respectively.



**Table 4.3** Manual handling operations per shift worked by hospital.

Hospital	Shifts Worked	Manual Handling Operations	Ratio
Princess of Wales	315	12991	41
Neath Port Talbot	346	4180	12

**Table 4.4** Manual handling operations per shift worked by ward.

Ward	Shifts Worked	Manual Handling Operations	Ratio
1	112	8620	77
8	105	1855	18
9	98	2153	22
A	112	790	7
B2	77	227	3
D	157	2997	19

The number of manual handling operation per shift worked was significantly higher in the Princess of Wales Hospital (manual beds), with employees having to undertake in excess of three times as many manual handling operations per shift. The individual comparisons by ward function (orthopaedic, medical or surgical) are illustrated in tables 4.9, 4.10 and 4.11 on page 34.

Finally, a total of 863 patient days were recorded, producing a ratio of 20 manual handling operations per patient day for the Trust. The calculated ratio of manual handling operations per patient day for each hospital and ward are shown in tables 4.5 and 4.6 respectively.

**Table 4.5.** Manual handling operations per patient day by hospital.

Hospital	Patient Days	Manual Handling Operations	Ratio
Princess of Wales	456	12991	29
Neath Port Talbot	367	4180	11

**Table 4.6.** Manual handling operations per patient day by ward.

Ward	Patient Days	Manual Handling Operations	Ratio
1	168	8620	49
8	181	1855	10
9	107	2153	20
A	154	790	5
B2	35	227	7
D	178	2997	17

Again the number of manual handling operations per patient day was significantly higher in the Princess of Wales Hospital (manual beds), with employees having to undertake more than two and a half times (261%) as many manual handling operations per patient day. The individual comparisons for ward function are illustrated in tables 4.9, 4.10 and 4.11 on page 34.

Each of the three calculated ratios at hospital level clearly support the view that a significantly larger proportion of manual handling activity was associated with the use of standard beds within the Princess of Wales Hospital. The comparison between the Princess of Wales (manual beds) and Neath Port Talbot (electric profiling beds) for each of the calculated ratios is shown in table 4.7, with the comparison for each of the wards being shown in table 4.8.

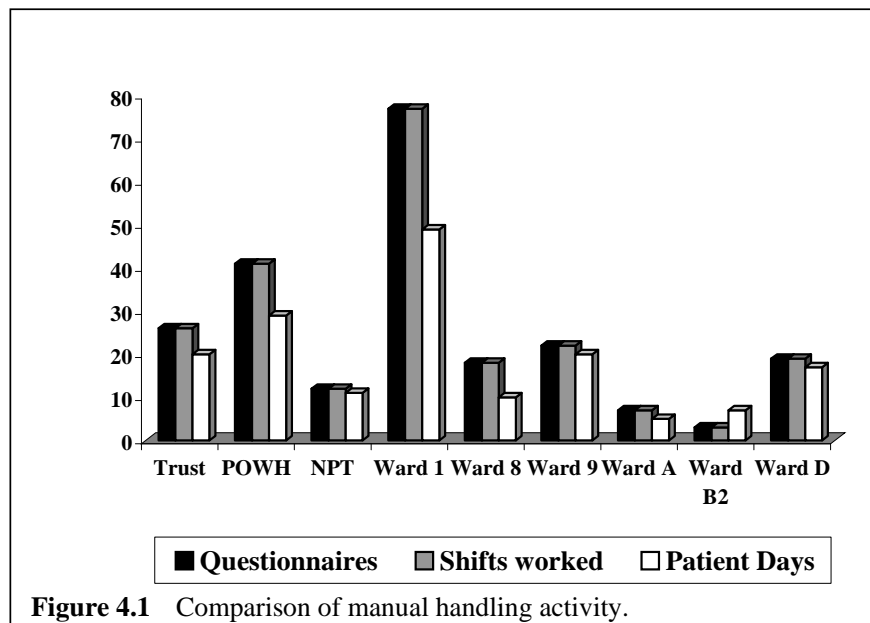
**Table 4.7.** Ratio comparison by hospital.

Hospital	Manual handling operations / patient	Manual handling operations / shift	Manual handling operations / questionnaire
Princess of Wales	21	33	41
Neath Port Talbot	9	10	12

**Table 4.8.** Ratio comparison by ward.

Ward	Manual handling operations / patient	Manual handling operations / shift	Manual handling operations / questionnaire
1	44	65	77
8	7	12	18
9	18	19	22
A	4	5	7
B2	5	2	3
D	15	17	19

Figure 4.1 illustrates the number of manual handling operations that were carried out per questionnaire, per shift and per patient day, for each hospital or ward.

**Figure 4.1** Comparison of manual handling activity.

In the orthopaedic ward at Princess of Wales Hospital (Ward 1) patients were being handled ten times more frequently than at the equivalent ward at Neath and Port Talbot Hospital (Ward B2) with staff carrying out 25 times more of the selected manual handling operations per shift. Similarly within surgical wards there were twice as many manual handling operations per patient and

per shift where standard beds are used (Ward 8) compared with profiling beds (Ward A). Although the difference is much less obvious within medical wards (Ward 9 and Ward D) there is still an 18% reduction in manual handling operations per patient day.

**Table 4.9.** Orthopaedic ward comparison.

Ward	Manual handling operations / patient	Manual handling operations / shift	Manual handling operations / questionnaire
1	49	77	77
B2	5	3	3

**Table 4.10.** Surgical ward comparison.

Ward	Manual handling operations / patient	Manual handling operations / shift	Manual handling operations / questionnaire
8	10	18	18
A	5	7	7

**Table 4.11.** Medical ward comparison.

Ward	Manual handling operations / patient	Manual handling operations / shift	Manual handling operations / questionnaire
9	20	22	22
D	17	19	19

### 4.3 Risk associated with manual handling operations.

Table 4.12 shows the overall REBA scores for each of the simulated manual handling operations videoed. Where a task is allocated a High REBA action level, measures should be taken immediately to control the risk.

**Table 4.12.** REBA scores and action levels for the video simulated operations assessed as single discrete tasks.

Simulated Operation	Combined REBA Score		Action level	
	Standard	Profiling	Standard	Profiling
1	10	4	High	Medium
2	10	6	High	Medium
3	10	1	High	Negligible
4	9	1	High	Negligible
5	10	1	High	Negligible
6	10	3	High	Low

All of the six manual handling operations on standard beds were identified as being high risk, meaning that action to control the risk is necessary immediately. The REBA scores were reduced in all of the manual handling operations carried out on electric profiling beds. None of the operations on profiling beds scored higher than medium risk. The REBA scores for the operations involving the profiling beds were between 40% and 90% lower than the scores for the same operations using the standard beds. This represented a clear and substantial reduction in the level of risk. Specifically, the use of profiling beds reduces the risk from high to negligible in three of the operations; *sitting a patient up in bed, lying a patient down in bed and transfer in bed ready for feeding.*

The analysis of the components of each of the manual handling operations identified the raising and lowering of the backrest on standard beds to be the only component rated as high risk. This agreed with the work previously done

by Birtles and Williams. However this rating was frequently allocated in association with other actions e.g. *Backrest taken down by one carer, other carer supports and backrest pulled down and patient laid down.*

The action of raising the bed using the foot pedal was rated as a medium risk and occurred frequently where standard beds were used.

The action of sitting a patient up using a belt and a two person pull also occurred regularly throughout the tasks often twice within the same operation and in itself was rated as a medium risk. This component only occurs on profiling beds when a patient was being assisted out of bed. The only other component that was rated medium risk when profiling beds were used was the positioning of the bedpan under the patient. Other than these two instances the components of the operations that are common to both types of bed were either of negligible or low risk.

Although the REBA risk level can be increased where a task is frequently carried out this only applies when the frequency of the operation reaches 4 times per minute. The REBA scores in this study did not therefore take into account the sometimes significant number of times employees conduct the manual handling operations.

#### **4.4 Nursing time.**

The total potential nursing time saving for each of the wards at Princess Of Wales Hospital if the manual handling operations had been carried out on profiling beds is shown in table 4.13. The calculation used the potential nursing timesavings for each patient handling task (See table 3.8) and the numbers of manual handling operations recorded in the questionnaires.

**Table 4.13** Potential time saving per ward.

<b>Manual handling operation</b>	<b>Ward 1</b>	<b>Time saved (s)</b>	<b>Ward 8</b>	<b>Time saved (s)</b>	<b>Ward 9</b>	<b>Time saved (s)</b>
Assisting patient into bed*	702	0	166	0	19	0
Assisting patient on/off bed pan	917	13755	25	375	6	90
Assisting patient out of bed	566	0	186	0	19	0
Feeding a bed patient	148	31524	5	1065	4	852
Lying patient down in bed	1081	77832	134	9504	11	132
Sitting patient up in bed	1247	59856	290	13920	33	1584
Turning a patient in bed	1589	122353	219	16863	21	1617
<b>TOTAL</b>		<b>305320</b>		<b>41727</b>		<b>4275</b>

\*These are effectively the same operation though timesavings could be gained if the patient is the sitting up at the start/end of the task.

**Table 4.14** Total time saved

<b>Ward</b>	<b>Time saving</b>
1	84h 48m 40s
8	11h 35m 27s
9	1h 11m 15s
<b>TOTAL</b>	<b>97h 35m 22s</b>

The figure given in the table 4.14 is derived from the actual returns from the questionnaires. Extrapolating the figure for each ward to account for the shifts for which no questionnaires were returned the total potential time saving rises to 117h 8mins.

In reality the timesavings would be substantially higher because the above calculation does not take into account the substantial reduction in the number of manual handling operations that is achieved.

#### 4.5 Nursing Cost

The figures for conceptual cost savings shown in tables 4.15 and 4.16 represent the saving associated with the reported manual handling operations within the survey period of one week and one year respectively on the three wards at the Princess of Wales Hospital. If we use the average hourly rate and extrapolate for the shifts when no questionnaires were returned the conceptual cost saving for three wards over one week could be £1,058.82. For a period of one year the conceptual cost saving for the three wards could be £55,058.64.

**Table 4.15** Conceptual cost savings.

Nursing Grade	Hourly Rate	Extrapolated Conceptual Cost Saving (£)		
		Ward 1	Ward 8	Ward 9
Average	8.75	875.67	148.08	11.53

**Table 4.16** Per annum conceptual cost savings (£).

Ward 1	Ward 8	Ward 9
45534.84	7696.04	599.56

Princess of Wales Hospital has a total of ten Medical Wards and five Surgical Wards, which include two Orthopaedic Wards. If the figures gained for the three wards in the study were then extrapolated for the Medical and Surgical Directorates as a whole the savings increase further. Therefore, the total conceptual cost saving for nursing time for all surgical and medical wards for one year was potentially £120,153.40 as shown in table 4.17.

**Table 4.17** Per annum conceptual cost savings for all wards (£)

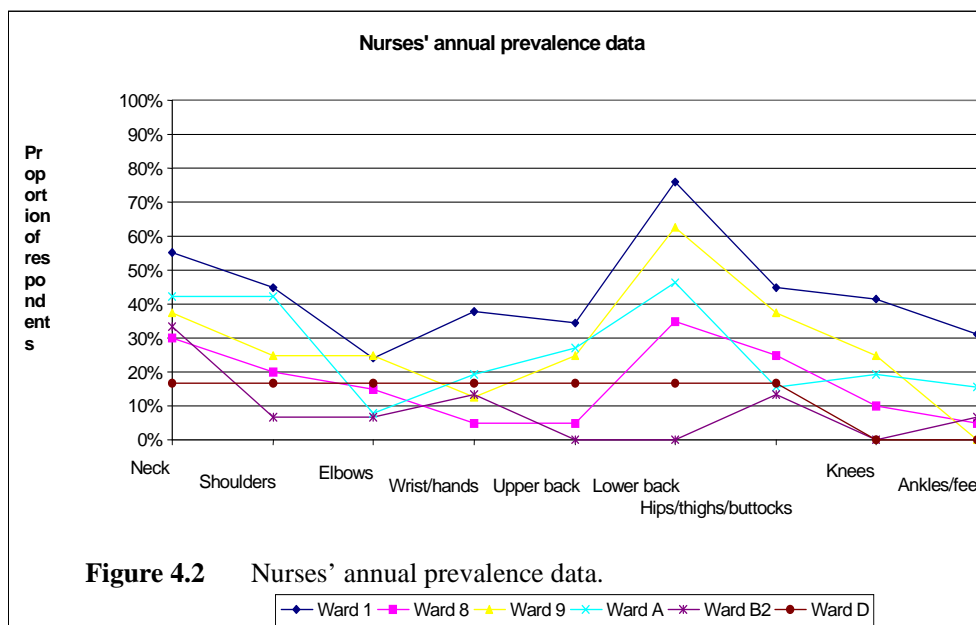
Orthopaedic Wards	Surgical Wards	Medical Wards
91069.68	23088.12	5995.60



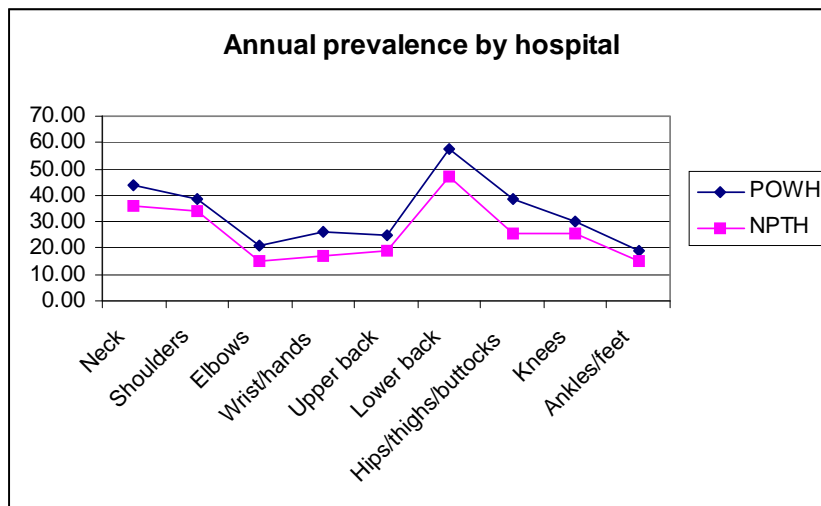
This figure would be sufficient to fund 7.04 full time nursing staff on an average salary for one year and could be translated into 1619 working days or the release of nursing staff for over eight hundred, two day, manual handling training courses per annum.

**4.6 Musculoskeletal disorders.**

The results indicate that there was a higher annual prevalence of musculoskeletal discomfort in Ward 1 where the manual handling activity was significantly higher than the other wards.



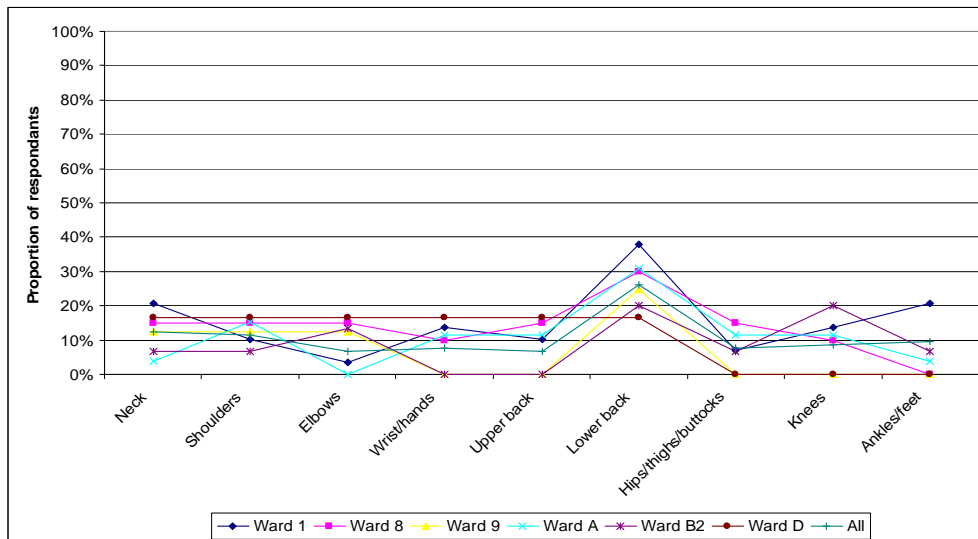
In all categories, with the exception of elbows, identified in the questionnaire Ward 1 had the highest annual prevalence of musculo-skeletal discomfort. Ward 1 had an annual prevalence for lower back pain of 75%, followed by Ward 9 that had an annual prevalence of 63%. The highest annual prevalence for a ward equipped with profiling beds was found in Ward A (43%), Figure 4.2.



**Figure 4.3** Nurse's annual prevalence by hospital

The difference in prevalence of injury is more clear when the figures are examined at hospital level. Figure 4.3 above shows the prevalence rates by hospital, here there is a clearly elevated incidence in of musculo-skeletal discomfort in Princess of Wales Hospital.

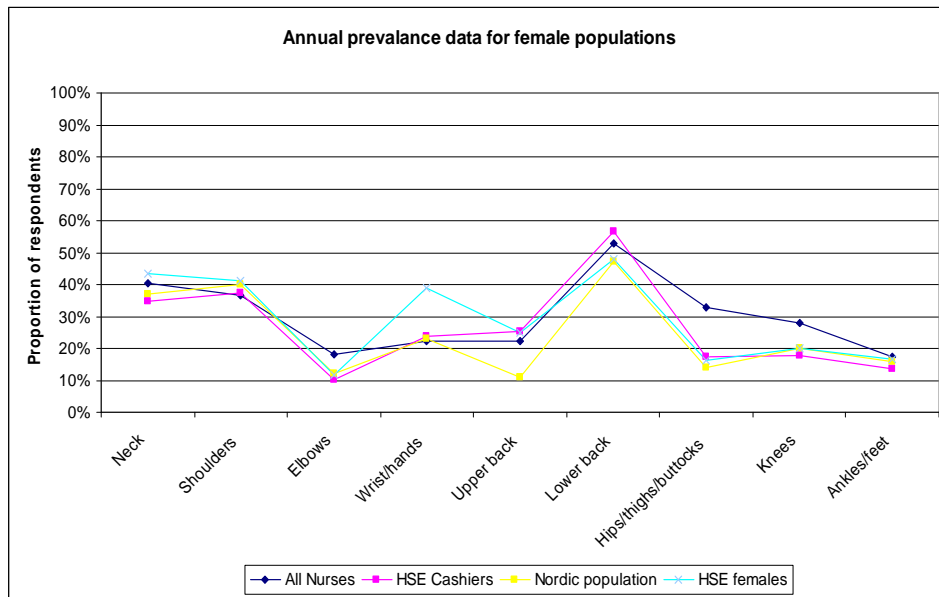
However this pattern was not repeated for annual disability (i.e. discomfort has resulted in the respondent not being able to carry out their usual tasks), where the incidence was more constant across all wards. Ward D had a markedly higher annual disability than the other wards for to wrist/ hand (50%) and upper back (35%) discomfort. Ward 8 also had a significant annual disability for upper back discomfort (30%), figure 4.4.



**Figure 4.4** Nurses' annual disability data.

There was no discernable difference in the incidence of self-reported musculo skeletal disability between the two hospitals. An examination of the profile of the staff working within the hospitals provides indicators why this may be the case. Prior to Neath Port Talbot Hospital opening approximately two years ago the majority of staff there worked in the Neath General Hospital using the standard NHS beds. The average age of respondents at Neath Port Talbot hospital was 37 years (39 for POW) and having worked within healthcare for on average 7.5 years.

Figure 4.5 compares the annual prevalence data for all the nurses in the study with data collected from other populations (general female population, cashiers and Nordic population). This shows the nurse population studied had an increased risk of injury to the elbows (55% higher), hips/thighs/buttocks (100%) and knees (40%).



**Figure 4.5** Comparison of annual prevalence.

#### 4.7 Patient experience.

The views of a total of 88 patients were obtained using the bed modernisation survey questionnaire and individual face-to-face interviews, 44 in each hospital. The breakdown for individual wards is shown in table 3.14.

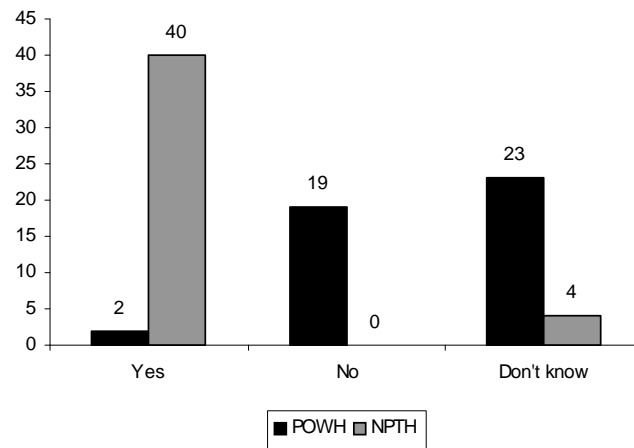
Table 4.8 and 4.9 and figures 4.6 and 4.7 show the responses given by patients in each ward when asked if they felt the bed improved their stay for the hospitals and wards respectively. Overall, of the 69% ( $n=61$ ) who expressed a preference, 69% ( $n=42$ ) indicated that they felt the bed had improved their stay in hospital. At the hospital level this was much more significant with only 48% ( $n=21$ ) expressing a preference at Princess of Wales hospital, compared to 91% ( $n=40$ ) at Neath Port Talbot. Of those who expressed a preference, only 10% ( $n=2$ ) felt that the bed had improved their stay at Princess of Wales. This contrasts with 100% ( $n=40$ ) of patients at Neath Port Talbot hospital who felt that the bed had improved their stay.

**Table 4.18** Do you feel the bed improved your stay? (Trust and hospital).

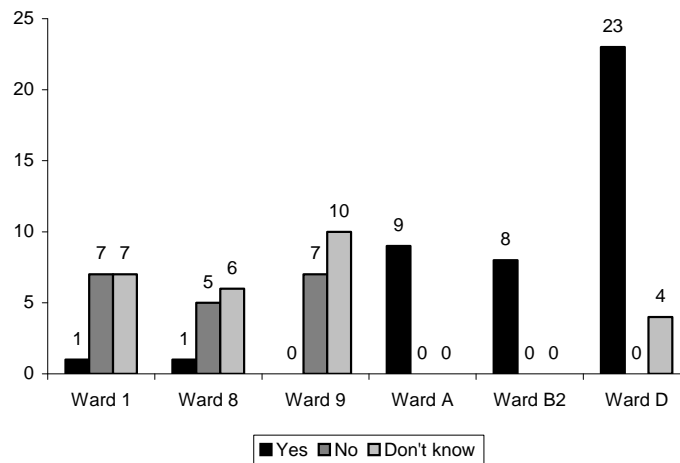
	Yes	No	Don't know
<b>Trust</b>	42	19	27
<b>Princess of Wales</b>	2	19	23
<b>Neath Port Talbot</b>	40	0	4

**Table 4.19** Do you feel the bed improved your stay? (Ward).

	Yes	No	Don't know
<b>Ward 1</b>	1	7	7
<b>Ward 8</b>	1	5	6
<b>Ward 9</b>	0	7	10
<b>Ward A</b>	9	0	0
<b>Ward B2</b>	8	0	0
<b>Ward D</b>	23	0	4



**Figure 4.6** Do you feel that the bed improved your stay? (Hospital).



**Figure 4.7** Do you feel that the bed improved your stay? (Ward).

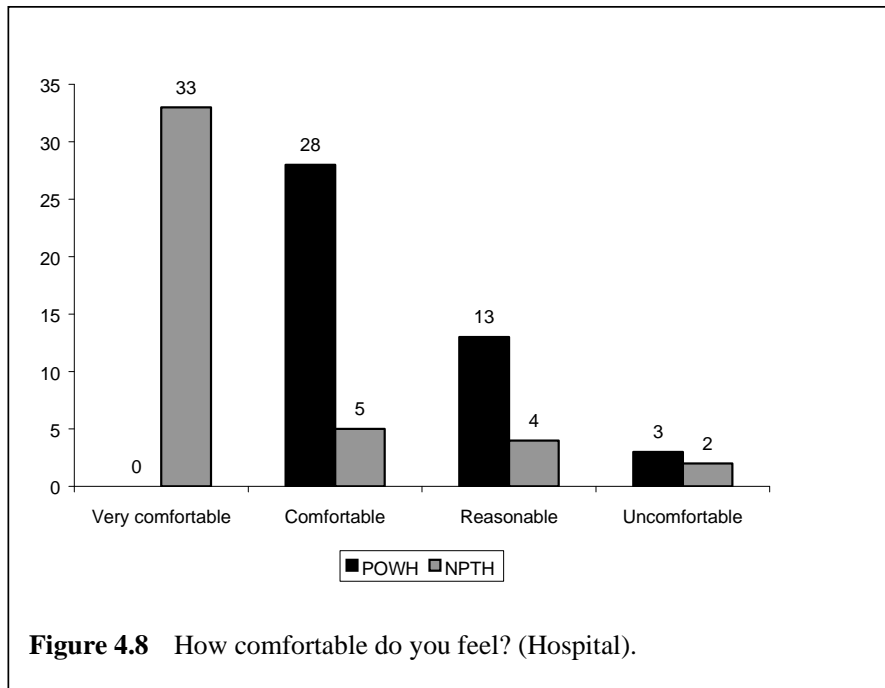
Further. All of the patients using profiling beds indicated that the bed had improved their stay in hospital. Conversely, 90% of patients using standard beds indicated that the bed had not improved their stay in hospital.

The large majority (75%,  $n=66$ ) of individuals questioned indicated that they were either comfortable or very comfortable whilst staying in hospital. With an equal amount indicating each (37.5%,  $n=33$ ). Of the remainder, 19% ( $n=17$ ) felt reasonable and 6% ( $n=5$ ) felt uncomfortable. None of the individuals questioned indicated feeling very uncomfortable during their stay.

At the hospital level a closely corresponding number and percentage of individuals questioned indicated feeling at least reasonably comfortable, being 93% ( $n=41$ ) for Princess of Wales hospital and 95% ( $n=42$ ) for Neath Port Talbot. A relatively small, but equally corresponding, number of individuals questioned indicated feeling uncomfortable, 7% ( $n=3$ ) for Princess of Wales and 5% ( $n=2$ ) for Neath Port Talbot. Tables 4.20 and figure 4.8 show the patient responses for the Trust and each hospital.

**Table 4.20** How comfortable do you feel? (Trust and hospital).

	Very comfortable	Comfortable	Reasonable	Uncomfortable	Very uncomfortable
Trust	33	33	17	5	0
Princess of Wales	0	28	13	3	0
Neath Port Talbot	33	5	4	2	0

**Figure 4.8** How comfortable do you feel? (Hospital).

However, as shown in table 4.20 the spread of responses were visibly different for each hospital. Of those questioned at Neath Port Talbot 75% (n=33) indicated feeling very comfortable compared to 0% at Princess of Wales. The breakdown of each can be seen in table 4.21.

**Table 4.21** How comfortable do you feel? (Ward).

Ward	Very comfortable	Comfortable	Reasonable	Uncomfortable	Very uncomfortable
1	0	7	7	1	0
8	0	10	2	0	0
9	0	11	4	2	0
A	9	0	0	0	0
B2	8	0	0	0	0
D	16	5	4	2	0

None of the individuals questioned indicated feeling either unsafe or very unsafe whilst in hospital, with 31% ( $n=27$ ) indicating they felt very safe, 54% ( $n=48$ ) indicating they felt safe and the remaining 15% ( $n=13$ ) feeling reasonably safe.

Within Neath Port Talbot hospital 61% ( $n=27$ ) of those questioned indicate they felt very safe and 93% ( $n=41$ ) felt at least safe, compared to 0% and 77% ( $n=34$ ) respectively for the Princess of Wales hospital. The responses are illustrated in tables 4.22 and 4.23 and Figure 4.9.

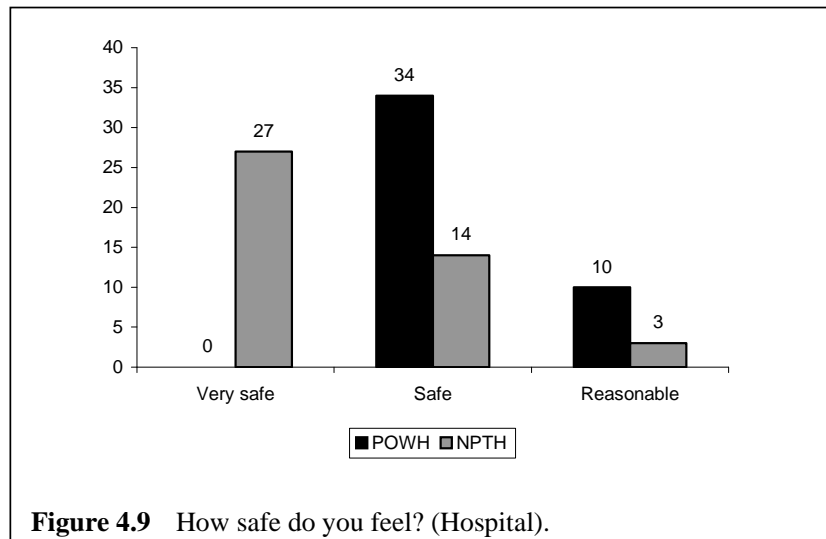
**Table 4.22** How safe do you feel? (Trust and hospital).

	Very safe	Safe	Reasonable	Unsafe	Very unsafe
Trust	27	48	13	0	0
Princess of Wales	0	34	10	0	0
Neath Port Talbot	27	14	3	0	0

**Table 4.23** How safe do you feel? (Ward).

	Very safe	Safe	Reasonable	Unsafe	Very unsafe
Ward 1	0	14	1	0	0
Ward 8	0	8	4	0	0
Ward 9	0	12	5	0	0
Ward A	9	0	0	0	0
Ward B2	8	0	0	0	0
Ward D	10	14	3	0	0





The views expressed by the patients through their responses to the Bed Modernisation questionnaire clearly show a preference toward the electric profiling beds. Clearly their responses to the question “Do you feel the bed improved your stay?” may be affected by whether or not they have had previous experience of both types of bed. This explains the high number, 52% ( $n=23$ ), of patients at Princess of Wales that responded ‘Don’t Know’ to that question.

# **CHAPTER FIVE**

## **DISCUSSION OF RESULTS**

A review of literature examined the benefits of electric profiling beds indicating their use led to an increase in patient independence and a corresponding reduction in the level of manual handling activity.

This study found that over the seven-day period staff working in the Princess of Wales (standard beds) carried out more than three times the number of manual handling operations when compared to those working in Neath Port Talbot Hospital (profiling beds).

The authors recognised that the study did not account for any possible variance in the dependency of the patients within each ward at the time of the study. Whilst this had the potential to affect the number of manual handling operations, it was felt there was no reason to believe that a significant reduction in manual handling operations would not be consistently achieved with the use of electric profiling beds. This view was consistently supported by the findings of other studies.

The reduced time needed to perform manual handling operations on profiling beds provided a calculated time saving of 117 hours over the period of the study. The theoretical cost of the nursing time taken up by the additional manual handling operations within the three Princess of Wales wards was calculated as £1,058/week or over £55,000/year. This time saving, if extrapolated for the whole of Princess of Wales Hospital, gave a total theoretical saving of over £120,000/year. This was equivalent to the cost of 91 profiling beds per year.

Following the infection control guidelines set out by NICE<sup>2</sup> and a suggested maximum time of 2 minutes for hand washing to be effective<sup>3</sup> the time saving is equivalent to over 3,500 hand washes within the three wards at the Princess of Wales Hospital within the one week study period.

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<sup>2</sup> NICE Guidelines: Infection Control. Prevention of healthcare-associated infections in primary and community care

<sup>3</sup> Smith-Temple J, Johnson J (1994) Nurses' Guide to clinical procedures (Second Edition)

The study showed that the risk posed to carers from manual handling operations on profiling beds was substantially lower than that presented by the same tasks conducted on standard beds. One element of the manual handling operations studied (raising/lowering the backrest) had already been identified as high risk and requiring corrective action (Birtle and Williams). All the manual handling operations undertaken on standard beds and analysed using REBA were rated as high risk and were therefore needing action to be taken soon. The frequency at which the operations were carried out did not reach the four times a minute necessary to increase the REBA score to very high. However given the level of manual handling operations e.g. up to 77 per shift in Ward 1 POW (1 every 6.2 minutes) and a total 12991 operations over the week, the authors felt certain that there was an increased risk to carers from the cumulative effect of exposure to the manual handling operations.

The identified significant risk reduction from using profiling beds was based on simulated manual handling operations. The simulations demonstrated best practice, conducted by manual handling trainers in an appropriate training environment. The patient was of regular/slight build and was not only compliant but also helpful to those carrying out the manual handling operations. The authors suggest that the risk gap between the two types of bed would be greater still in the real working environment where staff would undoubtedly encounter heavier and more dependent or less compliant patients. Further, poor techniques due to inadequate or un-refreshed training in addition to other work pressures could also place employees at greater risk.

The musculoskeletal survey did not identify a significant increase in prevalence of musculo skeletal injury in Princess of Wales Hospital. However there is an elevated annual prevalence of injury within Ward 1 Princess of Wales Hospital.

Employees within Neath Port Talbot Hospital had worked in the health care sector for an average of eight years, whilst the introduction of profiling beds was a relatively recent event. The authors suggest that this may account for the absence of discernable differences in musculoskeletal injury rates between both sites. The long-term benefits of the use of profiling beds could be evaluated in a longitudinal study following the musculoskeletal health of nursing staff using the different bed types over a period of time.

The nurses as a whole had an elevated incidence of elbow, hips/thighs/buttocks and knee injuries when compared to the average female population.

The responses from patients to the bed modernisation survey clearly demonstrated a preference toward the profiling beds. They reported increased levels of comfort and feelings of safety contributing to an overall improved stay at the hospital.

# **CHAPTER SIX**

## **CONCLUSIONS**

The study found that both the level of manual handling risk posed by individual manual handling operations and the frequency of exposure to those risks were significantly reduced by the provision of profiling beds. Staff in Ward 1 of the Princess of Wales Hospital undertook the highest number of high-risk manual handling operations. The risk arising from this level of activity was realised in an elevated annual prevalence of musculo-skeletal injury.

Attendant to the reduction in risk was a significant saving in nursing time, the equivalent of over eight hundred two day All Wales NHS Manual Handling Training Passport and Information Scheme training sessions per year. The actual value of time released for nursing staff to attend other duties including pastoral care of patients is immeasurable.

The impact of profiling beds on the reduction of manual handling risk is clearly greater where there is a higher level of patient dependency. Where nurses are frequently carrying out manual handling operations, or where individual operations pose a significant risk (e.g. bariatric patients) the authors argue that electric profiling beds are clearly a reasonably practicable measure to reduce risk.

The initial additional cost of providing electric profiling beds rather than standard beds is not grossly disproportionate to the reduction in risk achieved. Further there is a body of work that consistently found a reduced incidence of pressure ulcers savings and identified financial benefits such as reduced pharmacy costs and savings in bed days.

It is also accepted that appropriate bed design and maintenance can contribute to lowering of infection rates. Further, the substantial decrease in the physical contact arising from less frequent patient handling must mean that there is a reduction in the risk of infection transmission.

These benefits, in addition to increased patient independence and improved overall patient experience, make the case for the provision of electric profiling beds in most hospital environments a compelling one.



# REFERENCES

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# APPENDICES



## **Manual Handling Operations Questionnaires**

## **Appendix 2**

### **Health and Safety Executive Musculoskeletal Disorders Survey questionnaire**

## **Appendix 3**

### **Bed Modernisation Survey Questionnaire**

## **Appendix 4**

### **Assessment of patient transfer videos: Standard vs Profiling**

**beds**

**Short Report**

**Simon Monnington**

**ASSESSMENTS OF PATIENT TRANSFER VIDEOS: STANDARD  
VS PROFILING BEDS**

**Author:** Simon Monnington<sup>5</sup>  
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**Date:** 2 September 2004

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<b>Subject:</b>	<b>FOCUS Request/Job No:</b>
	<b>FOCUS Investigation No:</b>
<b>Visited by:</b>	<b>Initiator:</b>
	<b>Area/FMU:</b>
	<b>Request Date:</b>
<b>Persons seen / Position:</b>	<b>Priority:</b>
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## Introduction

I have been requested by Stuart Charles (HMI Services Group, Wales) to carry out desktop assessments of a series of video clips in his project examining differences between standard and profiling beds. This part of the project compares MSD risks. The video clips supplied to me show a range of simulated patient transfers and care tasks. The clips show simulations of the following operations being undertaken with a patient in standard and profiling beds:

7. Sitting a patient up in bed
8. Lying a patient down in bed
9. Turning a patient in bed
10. Transfer onto a bed pan
11. Transfer in bed ready for feeding
- 12. Assisting patient out of bed**

## Assessment approach

Hignett and McAtamney (2000) described a postural analysis tool called Rapid Entire Body Assessment (REBA). This tool was developed to be sensitive to the assessment needs of the healthcare sector.

The REBA system uses look-up tables to derive an overall score of risk based on assessments of individual body areas (trunk, neck, legs and arms), the load or force involved, the activity level and the hold on the load (coupling).

Action levels based on the REBA scores can then be used to determine risk and guide action (Table 1).

**Table 1. REBA action levels (taken from Hignett and McAtamney, 2000)**

Action level	REBA score	Risk level	Action
0	1	Negligible (neg)	None necessary
1	2 – 3	Low	Maybe necessary
2	4 – 7	Medium (med)	Necessary
3	8 – 10	High	Necessary soon
4	11 - 15	Very high	Necessary now

## ASSESSMENT results

**Table 2. REBA scores and action levels for the video simulation operations assessed as single discrete tasks.**

Simulated Operation	Combined REBA Score		Action level	
	Standard	Profiling	Standard	Profiling
1	10	1	High	Negligible
2	9	1	High	Negligible
3	10	3	High	Low
4	10	4	High	Medium
5	10	1	High	Negligible
6	10	6	High	Medium

Table 2 shows the overall REBA scores for each of the video simulation operations. However, to obtain a more detailed picture of the comparative risks each of the simulation operations were broken into component sub tasks and these were assessed. The results of these assessments follow.



