

# Victorian nurses back injury prevention project Evaluation report

December 2004



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## Foreword

The Victorian Nurse Back Injury Prevention Project (VNBIPP) was established in October 1998 to provide funding for health care organisations to assist them to implement programs to prevent back injuries amongst nurses. An Advisory Committee, consisting of representatives from key industry stakeholders and organisations, was formed to oversee the project, which is administered by the Department of Human Services Nurse Policy Branch.

The project was established in response to growing concern amongst nurses and the industry regarding the unacceptably high rate of back injuries in the nursing profession and the enormous financial and human costs associated with such injuries. When the VNBIPP was initiated, nurses accounted for more than 54 per cent of compensation claims by health industry workers.

The aim of the VNBIPP is three-fold:

- (i) To assist facilities to implement back injury prevention programs based on no lifting principles.
- (ii) To facilitate long term cultural change in health care organisations and among nursing staff. By encouraging new attitudes, the project aims to eliminate unsafe practices that have traditionally led to a high risk of injury amongst nurses.
- (iii) To assist health care organisations to implement effective procedures for risk identification, assessment and control of patient handling injuries among nurses.

This Report provides the results of the external evaluation, commissioned by the Department of Human Services, and undertaken by the University of Ballarat. The evaluation aims to:

- Conduct a longitudinal study of the VNBIPP;
- Further validate the findings of the VNBIPP Evaluation Report 2002 and estimate cost benefits of the VNBIPP;
- Identify key components contributable to success and sustainability of back injury programs within participating health care agencies;
- Develop a standardised and valid instrument for assessing competency in No Lifting practices.

This Government acknowledges the outstanding success of the VNBIPP that has been demonstrated in this Report. The evaluation indicates:

- A 24% reduction in the rate of standard back injury claims by nurses in public health service agencies in Victoria.
- A 41% reduction in the rate of working days lost associated with standard back injury claims by nurses in public health service agencies in Victoria.
- The cost savings to Victorian public health service agencies in the post-implementation period (Mar-01 – Jun-03) are estimated to be \$6.4M per annum (Jun-03 dollars).
- The mean working days lost per claim was reduced from 100 days per claim in the pre-implementation period to 77 days in the post-implementation period, a reduction of 23%.
- The assessed achievement of the cost recovery break even point is within five years of the commencement of the program. The reasonable presumption that there will be ongoing financial benefits and the acknowledged fact that there are many additional unmeasured benefits, represents an excellent return on investment.

I would like to take this opportunity to thank all the VNBIPP Advisory Committee members for their hard work and dedication. The findings of this Report give me great confidence that Victorian nurses are practising in a safer, well equipped work environment where they are valued for their crucial contribution to the health of all Victorians.



Hon Bronwyn Pike MP  
Minister for Health

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## Executive Summary

This evaluation confirms the significance of the Victorian Nurses Back Injury Prevention Project (VNBIPP). There is clear evidence of reductions in the claims incidence rate, days lost due to injury, and workers compensation costs, attributable to the implementation of nurses' back injury prevention programs based on No Lifting principles and supported by the VNBIPP intervention. These findings are consistent with the findings of the previous evaluation in 2002. The conclusions regarding the effectiveness of the intervention are considered to be conservative, because the study was based on data pertaining to all public health services, including wards where back injury prevention programs based on No Lifting principles were not implemented and the intervention was not applied. This is likely to have attenuated the results compared to the earlier evaluation, which was based only on wards where programs had been implemented. For those wards, the effectiveness of the intervention is likely to be greater than is indicated by this evaluation.

A cost-benefit analysis of the intervention using three different models shows that facilities stand to gain significant financial benefits/cost savings by implementing back injury prevention programs based on No Lifting principles. Again, these are conservative estimates, based on savings in the direct costs associated with workers compensation claims. Less tangible benefits, such as personal benefits to the individual nurses who have avoided injury as a result of the project, to their families, friends and colleagues; to patients through reduced risk of injury; to both nurses in general and their patients through increased morale and job satisfaction; and to the society as a whole through the attendant productivity gains, were not included in this analysis, but are no less real or relevant for being more difficult to pinpoint and quantify.

### Key findings

- Over the period of the intervention there was an estimated 24% reduction in the rate of standard back injury claims by nurses in public health service agencies in Victoria.
- Over the period of the intervention there was an estimated 41% reduction in the rate of working days lost associated with standard back injury claims by nurses in public health service agencies in Victoria. Altogether, from Dec-98 to Jun-03, total savings in working days lost are estimated to have been 35,716 days.
- The total cost of the VNBIPP to the Department of Human Services (DHS) and Victorian public health service agencies over the period 1998-2003 was \$24.4M (Jun-03 dollars).
- Three different models were developed to estimate cost savings associated with the VNBIPP. The preferred model, which is considered to be the most realistic, indicates an intermediate level of cost savings. On the basis of this model, the cost savings to Jun-03, due to reductions in compensation payments, lost work time and other ancillary costs, are estimated to be \$23.3M (Jun-03 dollars).
- On this basis the net cost of the VNBIPP to Victorian public health service agencies to Jun-03 is estimated to have been \$1.1M (Jun-03 dollars). The break-even point is estimated to have occurred early in the 2003-04 financial year (five years after the beginning of the program).
- The cost savings to Victorian public health service agencies in the post-implementation period (Mar-01 – Jun-03) are estimated to be \$6.4M per annum (Jun-03 dollars).
- In the immediate post-implementation period the annual savings can reasonably be largely attributed to the initial investment in the intervention. However, to sustain the benefits at this level over the longer term, ongoing support and further expenditure will be required. The annual level of expenditure required to sustain the current level of effectiveness remains unknown, but it is likely to be considerably less than in the initial implementation period, and so ongoing savings should considerably outweigh ongoing costs.
- The mean working days lost per claim was reduced from 100 days per claim in the pre-implementation period to 77days in the post-implementation period, a reduction of 23%.
- The above estimates are based on data for all sections of all Victorian public health service agencies. In the particular locations where the VNBIPP was actually implemented it is reasonable to expect that the benefits will have been more pronounced.
- The estimates of savings are also conservative for another reason; they do not include all indirect monetary costs of injury, and neither do they include intangible benefits to individuals, organisations and the Victorian community.



- The assessed achievement of cost recovery within five years of the commencement of the program, together with the reasonable presumption that there will be ongoing financial benefits and the acknowledged fact that there are many additional unmeasured benefits, represents an excellent return on investment.

## Background and Aims

The Victorian Nurses Back Injury Prevention Project (VNBIPP) was initiated in 1998 with the purpose of addressing the high proportion of back injuries incurred by nurses. Funding was provided over the period 1999–2003 by the Department of Human Services (DHS) to assist with the implementation of nurse back injury prevention programs within public health care facilities. An Advisory Committee consisting of representatives of the Australian Nursing Federation (Victorian Branch), Department of Human Services, Injured Nurses Support Group, Royal College of Nursing Australia (RCNA), WorkSafe Victoria, and employer and employee representatives oversees the project.

The extent of the problem had been previously highlighted in a report that investigated the impact of injuries to nurses (Langford, 1997). As a consequence, the Australian Nursing Federation (Victorian Branch) and the Injured Nurses Support Group sought Government support for an appropriate course of action to reduce the numbers of back injuries being sustained by Victorian nurses. The purpose of the project was to address the level of back injuries to nurses, by eliminating or minimising manual handling when moving patients. The basis for the project was the No Lifting policy adopted by the Australian Nursing Federation (Victorian Branch), which in turn was derived from a model developed by the Royal College of Nursing in the United Kingdom. The No Lifting Policy was a radical departure from previous approaches which had focused on training of nurses in manual lifting techniques, exercise and fitness. These approaches had failed to achieve significant reductions in back injuries amongst nurses, and were identified in the literature as being inconsistent with an ergonomic approach. Cultural change was also a critical part of the policy and of the VNBIPP, which sought to change prevailing perception that back pain was an unavoidable part of the job for nurses, and that nothing could be done about it. Funding was provided by DHS to assist with the implementation and roll out of nurse back injury prevention programs within public health care facilities. This constituted one of the largest single investments in occupational health & safety risk control intervention in Australia's history.

Following an earlier preliminary evaluation (DHS, 2002), the University of Ballarat was contracted by the DHS to:

- conduct a longitudinal study of the VNBIPP;
- further validate the findings of the VNBIPP Evaluation Report 2002 and estimate cost benefits of the VNBIPP;
- identify key components contributable to success and sustainability of back injury programs within participating health care agencies;
- develop a standardised and valid instrument for assessing competency in No Lifting practices.

## Longitudinal Analysis

This evaluation encompassed all 111 facilities which received funding from the DHS VNBIPP over four funding rounds and over the period 1998–2003 since the inception of the project. Sources of information included compensation data from the Victorian WorkCover Authority (VWA); and surveys of industry participants.

The primary longitudinal analysis employed in this evaluation was an analysis of standard claim frequencies and standard claim incidence rates per 1000 equivalent full time nursing staff (EFTNS). The longitudinal methodology employed utilises both analysis of variance (ANOVA) and a time series approach involving multiple regression methods. The ANOVA approach extended the pre-post comparisons made in a previous evaluation (DHS, 2002).

When the periods before and after initial implementation of the VNBIPP were compared, it was concluded that a statistically significant reduction had occurred in mean quarterly standard back injury claim incidence rates per 1000 EFTNS ( $F = 13.83$ ,  $p < 0.0005$ ). Mean quarterly standard back injury claim rates were estimated to be 3.473 claims/1000 EFTNS before initial implementation and 2.647 claims/1000 EFTNS after initial implementation. This represents a 24% reduction in standard back injury claims/1000 EFTNS by nurses in public health service agencies in Victoria.

This result was further supported by an analysis which examined trends within the periods before, during and after initial implementation. There was no statistically significant trend in quarterly back injury claim rates in the 5-year period before

implementation of the VNBIPP. However, the claim rate declined at a statistically significant rate during the initial implementation period. In the period after initial implementation the quarterly claim rate again stabilised at a new lower level.

Mean quarterly working days lost associated with standard back injury claims were reduced from 346 days/1000 EFTNS before initial implementation to 204 days/1000 EFTNS after initial implementation. This represents a 41% reduction in working days lost associated with standard back injury claims by nurses in public health service agencies in Victoria. Estimated total savings in days lost between December 1998 and June 2003 are estimated to be 35,716 days.

The mean working days lost per claim was also reduced from 100 days per claim in the pre-implementation period to 77 in the post-implementation period, representing a reduction of 23%. This would appear to indicate a reduction in the severity of injuries as well as the rate of injuries, although there may be other contributing factors beyond the scope of this evaluation, such as changes in the management of injuries or rehabilitation procedures.

Changes in the costs of claims are difficult to estimate because lags in finalising claims result in uncertainty in the more recent post-implementation compensation data. Two indirect estimates have been made of the eventual percentage reduction in annual cost of claims per 1000 EFTNS, after all claims have been finalised. These estimates are 24% (based on the reduction in the claims incidence rate, which assumes no change in the average cost per claim) and 41% (based on the reduction in the annual working days lost per 1000 EFTNS, which implies reductions in both the number of claims and the average cost per claim).

These results are broadly consistent with those of the previous evaluation (DHS, 2002); however the estimated changes are less pronounced than those reported in that evaluation. This difference may be explained by the substantial differences in the two methodologies used. The previous evaluation was based on injury data obtained directly from agencies, and was specifically targeted at the wards in which the No Lifting program was implemented in the 27 agencies funded under round 2 of the VNBIPP. Data from 72 wards was analysed, but it was not reported what proportion of participating wards this represented. The evaluation involved a timeframe of three years - two years pre-implementation and one year post-implementation. The present evaluation was based on standard back injury claims data from VWA pertaining to all 111 agencies, and spanning a 10-year period pre-, during and post- the VNBIPP initial implementation period. It is to be expected that the maximum benefit would occur in specifically targeted wards, and that these benefits would be diluted when the whole sector is considered. Furthermore, in the present evaluation, explicit adjustments were made for the uncertainties inherent in the more recent post-implementation compensation data, for changes in the size of the workforce, and for the time value of money over the period. For these reasons, it is considered that the conclusions drawn in this evaluation are robust and applicable to nurses in the Victorian public health service sector as a whole.

## Cost-benefit analysis

Cost benefits were assessed by comparing the estimated costs of the VNBIPP intervention and the estimated cost savings resulting from reductions in expenditure incurred due to back injuries. The cost-benefit analysis is predominantly focused at the societal level, because the VNBIPP was limited to publicly funded agencies, and because the most readily quantifiable aspects of both the funding of this intervention and the resulting cost savings (benefits) involve agencies at State level. Costs and benefits at the organisation or enterprise level have also been incorporated in aggregated form.

No direct costs were incurred by individuals in this intervention. Cost savings (benefits) at the individual level are to some degree transferred to societal level by insurance, and are thus included in societal level calculations to the extent that they are factored into compensation payments. It is recognised that other less tangible benefits can result from reductions in human costs at societal, organizational and individual levels, beyond those costs which are represented in monetarised form in claims data. However, there is no agreement about how to quantify such intangible benefits in a cost-benefit analysis (Mossink, 1999) and they have not been included in this evaluation.

Data on compensation paid to date did not provide a valid basis for direct cost comparisons because of the long lag between initial lodgement and final closure of a claim in many cases. In the absence of reliable data on the status of claims, models were developed for deriving indirect estimates of changes in total compensation payments.

Within the scope of the cost-benefit analysis model used, the total cost of the VNBIPP intervention over the period (Dec-98 - Jun-03) is estimated to be \$24.4M (Jun-03 dollars). This includes the contribution made by the facilities who

co-contributed to the costs of purchase of equipment, training, consultancy fees and administrative costs. This expenditure reflected a legal responsibility under OH&S legislation for employers to implement measures to eliminate or minimise manual handling injuries, and was also promoted under the project in order to encourage ownership and commitment by facilities. Estimated cost savings for the same period calculated using three different models are \$13.5M, \$23.3M and \$38.7M. The corresponding estimates for the overall financial outcome are a net cost of \$10.9M, net cost of \$1.1M and net cost savings of \$14.3M.

The disparity in these estimates results from different assumptions about the underlying processes. This variability is in turn a consequence of a lack of reliable recent compensation data, due to lag effects, which necessitates the use of indirect models founded on different assumptions. Other factors contributing to the difficulty of making accurate and valid comparisons were:

- great variability in both the cost of individual claims and in the claims incidence rates from agency to agency and from year to year
- a lack of comprehensive data on staff numbers, which necessitated a separate modelling exercise in order to estimate staff numbers from available remuneration data.

The intermediate estimate of cost savings is considered likely to be the most accurate, and has been adopted. According to this model, the net cost of the VNBIPP to Jun-03 was \$1.1M, and the break-even point occurred early in financial year 2003-4, around 5 years after the commencement of the project.

The annual cost savings in the post-implementation period are estimated to be \$6.4M (Jun-03 dollars). However, the annual expenditure required to sustain the project at this level of effectiveness is unknown.

Finally, it should also be stated that, over and above the uncertainties in the estimates due to incomplete or ambiguous data, and the uncertainties due to unexplained random variation between agencies and between time periods, this analysis of cost-benefit is inherently conservative for another reason. All sources of costs of the VNBIPP, being relatively easy to identify at the level of DHS and the health agencies, have been incorporated in the analysis. However, the calculation of benefits has been limited to readily quantifiable cost savings at organisational and societal level, and to the savings in those individual human costs which are taken into account when determining compensation payments. To the benefits derived from reduction in these monetarised costs can be added the less tangible personal benefits to the individual nurses who have avoided injury as a result of the project; to their families, friends and colleagues; to both nurses in general and their patients through increased morale and job satisfaction; and to the society as a whole through the attendant productivity gains. These additional dimensions of benefit are no less real for being more difficult to pinpoint and quantify.

### Components for Success and Sustainability

Components have been identified which are perceived by industry informants (CEOs, DONs and/or Program Co-ordinators) to contribute to success and sustainability. Those factors perceived as contributing to the success of the program included: a sound philosophical base which promotes a risk management approach, high order risk controls and ergonomic principles; well designed facilities; ready availability and accessibility of well designed and easy to use equipment; and integrated and effective training programs which emphasised No Lifting principles and techniques. Organisational support was also mentioned as an important factor contributing to program success. Two main factors emerged as major requirements for future sustainability. These were on-going support from management and outside bodies such as DHS and the Australian Nursing Federation (ANF), as well as on-going training. Isolation from main centres of activity was also cited as an inhibiting factor by a number of rural agencies. This perception was supported by evidence of consistently higher claims rates in country areas.

The two major factors identified as being barriers to success and future sustainability included lack of funding, both within facilities and from external sources, and physical constraint issues such as inappropriate design and lack of storage space. Other factors such as resource issues, staffing issues, allocated time for program co-ordinators, staff complacency and the need to maintain the momentum established by the VNBIPP, were also mentioned relatively frequently.

There was a perception among members of the VNBIPP Advisory Committee that the intervention had succeeded to various degrees in different locations. It was suggested that differences in organisational environments and implementation processes may have influenced the degree of success and the sustainability of that success. These issues were addressed in an illustrative comparison of two cases: one more successful in terms of the primary outcome measure used in the longitudinal study (quarterly back injury claims/1000 EFTNS), and one less successful. The two cases were matched for size, capacity, service delivery, geographical context and available resources.

It was concluded that the large differences in spending in relation to the categories *Administration* and *Other* were likely to reflect program management differences between the two locations. In responses to the survey of agencies, the agency which exhibited a substantial reduction in claims rate reported an organisational commitment to the program and a willingness to empower staff and include them in decision making. Issues such as sustainability and the need for the organisation to enthusiastically embrace the No Lifting policy were clearly important. Terms such as 'open mindedness', 'staff enthusiasm' and staff involvement were included in the responses made, and it appeared that the VNBIPP and the No Lifting policy had influenced the culture of the organisation. Conversely, the responses from the agency which exhibited no reduction in claim rate seemed to reflect a more traditional OH&S approach based on a more 'mechanistic' or systems-oriented perspective, with a focus on equipment, facilities and legislation. Issues addressed included concern for the cost of the policy implementation, need for a regular maintenance program, need for equipment storage and the need to adhere to OH&S legislation. Whilst no direct causal relationship has been established, these differences may well represent potential explanatory indicators for the different patterns of quarterly back injury claims by nurses in different agencies.

### An Instrument for Assessing Competency in No Lifting Practices

An instrument has been developed to aid in the assessment of competency of nursing staff in patient handling utilising No Lifting principles and techniques. It was designed with regard to the following principles elicited from a working party of industry informants:

- The instrument should emphasise the No Lifting philosophy, principles and techniques.
- The instrument should be relatively short and simple to use.
- The scope should encompass: knowledge of policies and procedures; understanding of principles; and skills.
- The instrument should be both generic in form, and capable of adaptation to local contexts.
- The assessment criteria should be clearly delineated, but not spelt out in prescriptive detail.
- The instrument should provide a framework which is potentially applicable in all facilities, all units, and at all levels of the training/testing/accreditation/certification hierarchy.

In accordance with these principles, the instrument which has been developed:

- includes a common core of knowledge, understanding and skill-based competency items based on No Lifting principles, with provision for the addition of further facility-specific and unit-specific skill-based items;
- includes generic specifications for assessing competence; and
- makes reference to secondary sources for all substantive details of required competencies. These sources include the publications *Transferring People Safely* (WorkSafe Victoria, 2002), *Manual Handling Regulations*, 1999, *Manual Handling Code of Practice* (WorkSafe 2000), Australian Nursing Federation (Victorian Branch) No Lifting Policy, 2003, together with facility training manuals and other facility-specific and unit-specific documentation.

The instrument has undergone limited initial field testing and has been assessed positively.

Issues for Future Consideration

This report adds to the growing body of evidence supporting the very considerable benefits to be gained from such interventions as the VNBIPP. Much of the existing evidence relates to small scale implementations involving up to six locations, (Engkvist, 2001, Passfield, et al, 2003, Collins et al 2004). This evaluation and its predecessor (DHS, 2002) relate to a large scale intervention in more than 100 locations across the State of Victoria. The cost benefits analysis has demonstrated an excellent return on the initial investment at all levels: individual nurses, health service agencies and the broader Victorian community. This is despite the acknowledged limitations of the evaluation methodology with regard to the indirect monetary costs of injury and the intangible benefits to individuals, organisations and the Victorian community. To maximise the potential benefits the VNBIPP needs to be introduced into all sectors of the health industry. In addition, the current momentum needs to be sustained and maintained within those agencies who have participated in the VNBIPP. This will require leadership at all levels and consideration of a range of issues identified in this evaluation including:

- facilitators and barriers to sustainability;
- funding and resourcing;
- equipment purchasing policies and procedures;
- workplace design;
- ongoing support by outside bodies, for example, DHS, ANF;
- ongoing monitoring to ensure effective maintenance and sustainability of programs.

In particular the two factors most cited as requirements for future success and sustainability were continued funding and the need for the requirements of a No Lifting regimen to be considered as an integral part of future workplace design.

With regard to ongoing evaluation of projects of this nature, this report has identified the difficulties involved in evaluating such interventions, and particularly in attributing outcomes to specific components or aspects of the intervention, because of the high level of variability and the long time lags inherent in injury data. Both of these limitations can best be addressed by continuing the longitudinal evaluation further into the future. The methodology developed in this evaluation could be extended into the future with relatively little demand on individual facilities for extra data. A consistent relationship has been shown to exist over a 10-year period between EFTNS and VWA remuneration data. So long as this relationship remains valid, then only records of ongoing expenditure on No Lifting programs would be required, with ongoing collection of injury data at a central level such as VWA assisting in the long term monitoring and evaluation of the intervention. Consideration should be given to instituting arrangements to enable supplementary evaluation in the future.

The methodological framework developed in this evaluation provides a model that could also be usefully applied to the evaluation of other large scale occupational health and safety interventions.

The two evaluations of the VNBIPP, whilst their conclusions are in general agreement, have utilised different approaches. The first evaluation was sharply focused. The conclusions were based on one funding round and the data were more finely grained at ward level, but this fine detail was difficult and costly to obtain, and impossible to obtain completely. The second evaluation was global in scope - organizationally and temporally - and more cost-effective because of its greater reliance on VWA data. However, ward-level detail was not available, and more highly-aggregated data still proved difficult or impossible to obtain retrospectively from many facilities.

In order to better prepare for evaluations of large programs such as the VNBIPP, it is strongly recommended that evaluation data requirements be identified at the time that a project is being designed, and that appropriate record keeping, data management and reporting requirements be specified as a condition of grant funding. Appropriate professional advice about evaluation and data requirements should be obtained as an integral part of program development.

Abbreviations, acronyms and terminology

ANF	Australian Nursing Federation
CEO	Chief Executive Officer
DALY	Disability-adjusted life years
DHS	Department of Human Services
DON	Director of Nursing
EFTNS	Equivalent Full Time Nursing Staff
HALY	Health-adjusted life years
KPI	Key Performance Indicator
NCVER	National Centre for Vocational Education and Research
NIOSH	National Institute for Occupational Safety and Health (USA)
NOHSC	National Occupational Health and Safety Commission
OHS	Occupational Health and Safety
OSHA	Occupational Safety & Health Administration (USA)
QALY	Quality-adjusted life years
TOOCS	Type of Occurrence Classification System
VNBIPP	Victorian Nurses Back Injury Prevention Project
VWA	Victorian WorkCover Authority
WDL	Working Days Lost
WTA	Willingness to accept
WTP	Willingness to pay

Throughout this report, the terms **agency** and **facility** are used interchangeably to refer to the public health service organisations funded under the VNBIPP. The term **campus** is used generically to represent the first level of organisational subdivision within an agency or facility. This corresponds to the VWA **workplace** identification.



## 1. Introduction

### 1.1 Background

- 1.1.1 The Victorian Nurses Back Injury Prevention Project (VNBIPP) was initiated in 1998 with the purpose of addressing the high proportion of back injuries incurred by nurses. The extent of the problem had been previously highlighted in a report that investigated the impact of injuries to nurses (Langford, 1997). As a consequence, the Australian Nursing Federation (Victorian Branch) and the Injured Nurses Support Group sought Government support for an appropriate course of action to reduce the numbers of back injuries being sustained by Victorian nurses. The purpose of the project was to address rising injury numbers in nurses, by eliminating or minimising manual handling when moving patients. The basis for the project was the No Lifting policy adopted by the Australian Nursing Federation (Victorian Branch) which in turn was derived from a model developed by the Royal College of Nursing in the United Kingdom. Funding was provided by the Department of Human Services (DHS) to assist with the implementation and roll out of nurse back injury prevention programs within public health care facilities. This constituted one of the largest single investments in occupational health & safety risk control intervention in Australia's history.
- 1.1.2 DHS through the VNBIPP has currently provided over \$8.35 million in funding to Victorian public health care facilities over the period 1998-2004, to implement back injury prevention programs based on No Lifting principles. The program has been directed at eliminating or minimising manual handling when moving patients. This has been achieved through the provision of patient handling aids and equipment, and education in No Lifting principles and techniques. Importantly, critical components of the VNBIPP were directed at encouraging cultural change and ownership by nurses. These included raising the awareness of nurses, encouraging nurses to be proactive in identifying hazards and reducing risks of injury in the workplace, educating nurses in patient risk assessment, encouraging patient independence and mobility, and encouraging patients to assist in their own transfers. Additionally, organisational commitment was sought at all levels, thereby facilitating long term cultural change throughout the health service industry.
- 1.1.3 Following an earlier evaluation of the VNBIPP (DHS, 2002), the University of Ballarat was contracted by the DHS to undertake a retrospective longitudinal evaluation through a statistical analysis of injury and claims data, as well as seeking to identify key factors for success and sustainability. The evaluation team was also required to develop and validate a competency assessment tool for nursing staff with regard to No Lifting work practices.
- 1.1.4 University of Ballarat personnel involved in the project, and their affiliations and specialisations, were Prof Dennis Else (VIOASH Australia; Occupational Health & Safety), Peter Martin (School of Information Technology and Mathematical Sciences; Statistics), Dr Jack Harvey (School of Information Technology and Mathematical Sciences; Statistics & Program Evaluation), Dr John Culvenor (VIOASH Australia; Ergonomics), Prof Warren Payne (School of Human Movement and Sport Sciences; Human Factors), Prof Sally Wellard (School of Nursing; Nursing) Assoc Prof John McDonald (Centre for Health Research and Practice; Health Program Evaluation) and David Borys (VIOASH Australia; Occupational Health & Safety).
- 1.1.5 Four rounds of funding have been made by DHS under the VNBIPP, during the period 1998-2003. The results of the first two rounds of funding have been evaluated by an analysis of claims data and surveys of participating nurses (DHS, 2002), supplemented by an unpublished survey by DHS at the time of the fourth funding round.
- 1.1.6 The previous evaluation study (DHS, 2002), framed in terms of data aggregated across all participating facilities, reported a 48% reduction in injury rates, a 54% reduction in annual cost of claims, and a 74% reduction in annual 'days lost' due to injury. Determinants of success and sustainability were identified and discussed at length, on the basis of the information from surveys of program co-ordinators and nurses, but no conclusions were drawn about the relative contributions of the different components of the program. This was recommended as an issue for future evaluation (DHS, 2002, P29).
- 1.1.7 It was also noted in the evaluation report (DHS, 2002, P29) that collection of comprehensive detailed data from individual health care agencies was arduous. A simpler approach was recommended, using only lost time injury data available from Victorian WorkCover Authority (VWA) databases (DHS, 2002, P29). Reference was also made to inconsistency in the assessment of patient handling requirements (DHS, 2002, P2) and in competency assessment (DHS, 2002, P24).

### 1.2 Aims

- 1.2.1 Specifically, the requirements of this evaluation included the following deliverables:
  - a. conduct a longitudinal study of the VNBIPP;
  - b. further validate the findings of the VNBIPP Evaluation Report 2002 and estimate cost benefits of the VNBIPP;
  - c. identify key components contributable to success and sustainability of back injury programs within participating health care agencies;
  - d. develop a standardised and valid instrument for assessing competency in No Lifting practices.

### 1.3 Scope

- 1.3.1 The previous evaluation focused primarily on immediate impacts of the first two funding rounds involving 25 facilities. The scope of the present evaluation included all rounds, and utilised a 10 year timeframe, beginning some five years before the first funding round, for longitudinal evaluation of impacts and outcomes involving all facilities funded under the VNBIPP.
- 1.3.2 With respect to the first two deliverables, the timeframe of the evaluation has spanned a period before the commencement of the VNBIPP, the initial implementation period and the period after initial implementation. Comparisons have been made between injury rates in different groups of employees, and between the incidence of back injuries and other types of injury. The available data was not sufficiently detailed to enable meaningful comparisons to be made between funded and non-funded locations at particular points in time. This is likely to have attenuated the results compared to the earlier evaluation, which was based only on wards where programs had been implemented. However, the approach adopted is considered to present an accurate picture of the global outcomes across Victorian public health services.
- 1.3.3 To enable valid comparisons, numbers of claims were converted to standardised incidence rates. Staffing data supplied by a subset of the agencies was combined with VWA data to derive a model which was used to estimate incidence rates for all agencies.
- 1.3.4 Whilst it would have been desirable to make these comparisons at the level of wards (locations), this was not feasible for the following reasons:
  - a. VWA data are only available at workplace (campus<sup>1</sup>) level.
  - b. The VNBIPP Advisory Committee and agency representatives advised that data at the level of wards were incomplete.
  - c. Agency representatives advised that obtaining retrospective data at the level of wards would be difficult.
 Consequently, campus level data were used throughout the analysis.
- 1.3.5 With respect to the third deliverable, a survey of agencies enabled the identification of components which are perceived by CEOs, DONs and/or Program Co-ordinators to contribute to success and sustainability. This issue was further investigated in an illustrative comparison of two agencies: one very successful in terms of the primary outcome measure used in the longitudinal study, and one much less successful.
- 1.3.6 With respect to the fourth deliverable, after considerable consultation with DHS, the VNBIPP Advisory Committee and a working party of industry informants, it was agreed that a generic assessment instrument should be developed in the form of a "secondary checklist", which does not itself embody the specifications of competent performance, but rather provides a consistent framework for competency assessments referenced to existing resources such as published WorkSafe guidelines (WorkSafe Victoria, 2002).

<sup>1</sup>The term campus was used generically to represent the first level of organisational subdivision within an agency. This corresponds to the VWA workplace identification.

## 1.4 Potential Confounding Factors

- 1.4.1 Caution must be exercised when interpreting the results of the longitudinal analysis. The validity of the longitudinal analysis is limited by various factors that act to distort the claims distributions across time in ways which are difficult or impossible to quantify. These include:
- a. the effect on claims data of pre-existing or chronic conditions;
  - b. the effects of staff mobility and changing skill mix;
  - c. the effects of health service re-configurations;
  - d. the effect of casual employment through nursing agencies, and the consequent difficulty or impossibility of assigning VWA claims to facilities;
  - e. the exacerbation of point d. by changes in patterns of casual employment throughout the study period;
  - f. the effects of changes in policy governing ratios of nursing staff to patients
  - g. the fact that available claims data did not include self-insurers, whose data is provided to VWA only on a quarterly basis, is less detailed than for other insurers, and cannot be released;
  - h. the extent of any industry culture of "carrying" low-level injuries;
  - i. the lag between injury & claim, which can reportedly be up to several years and which is extremely variable;
  - j. the fact that common law claims tend to be larger in magnitude and delayed for longer periods than standard claims;
  - k. the lack of a clear indication in the VWA data that a claim has been finalised; and
  - l. the fact that the implicit inclusion in the study of wards which did not have a no lifting program would tend to obscure the real reductions achieved in participating wards.
- 1.4.2 The accuracy of the longitudinal analysis is also dependent on the accuracy of incidence rates, which had to be estimated on the basis of incomplete data supplied by a subset of agencies.

## 2. Literature review

### 2.1 General Evaluation of OHS Intervention Programs

- 2.1.1 The systematic evaluation of injury initiatives with appropriate scientific tools is an important requirement if the discipline of occupational safety is to be advanced and applied confidently in the workplace (Robson et al., 2001). Effective evaluation of OHS interventions requires researchers and practitioners to make use of these tools to provide proper scientific evidence, which in turn is needed to build a relevant knowledge base. Evidence based decision making relies upon the provision of proper scientific evidence.
- 2.1.2 The National Institute for Occupational Safety and Health (NIOSH) has published an extensive guide to evaluation of OHS interventions (Robson et al., 2001) which has wide international recognition. However, whilst this document is largely devoted to quantitative methods, the focus is mostly on clear-cut pre- and post-intervention comparisons. More subtle longitudinal analysis techniques are only briefly discussed in an appendix. Inferential techniques for rate ratios and rate differences are discussed, but it is pointed out that these techniques are only appropriate in the absence of trend in the historical data. Where trend is evident the suggestion was to use regression techniques and in particular time series analysis using autoregressive integrated moving average (ARIMA) models to account for autocorrelation in the data.
- 2.1.3 The Australian National Centre for Vocational Education and Research guide to evaluating the effectiveness of training interventions (Doucouliagos and Sgro, 2000) presented a much more thorough treatment of time series and multiple regression methods, which are appropriate when:
- a. the intervention occurs in stages over a period of time;
  - b. the response to the intervention is gradual; and
  - c. factors other than the intervention are also influencing the response variable.
- 2.1.4 Doucouliagos and Sgro made use of dummy variables (including seasonal effects) in a multiple regression analysis to assess the impact of training upon performance. This technique enabled the impact of training (dependent variable) to be separated from the seasonal, autoregressive and time trend effects. A methodology was also given with respect to cost-benefit analysis or return on investment (ROI). Costs were analysed according to direct and indirect costs associated with training and compared to benefits arising from training. As they reported a series of case studies, the cost benefits were assessed at the company level.
- 2.1.5 The technique of piecewise linear regression with dummy variables has previously been employed by one of the authors in an evaluation of a seven-year program of OHS interventions in a multinational engineering company (Stacy, 2003).

### 2.2 Evaluation of Interventions Relating to Back Injuries

- 2.2.1 The manual lifting and transferring of patients exposes nursing staff to high physical loads and it is this exposure to high physical loads that is related to back injuries in nurses (Engkvist et al. 1992). The traditional approach of teaching safe manual handling techniques to nurses has been ineffective in reducing the risk of patient handling injuries (Carlton, 1987, and other studies cited in DHS, 2002). Garg et al. (1992) identified many of the factors associated with failures in previous approaches to manual handling amongst nurses. Given the reported failures of "safe lifting" approaches, No Lifting represents a more radical paradigm which should result in a decrease in the risk of these injuries. No Lifting programs involve replacing manual lifting and transferring of patients with modern hoists and other patient transfer devices. Patient independence and mobility are promoted, and patients are encouraged to assist in their own transfers. Other critical components of No Lifting programs include ownership by nurses, procedures for regular assessment and review of patients' physical mobility and cognitive abilities and their handling needs, a safe physical environment, and a cultural shift in attitudes which previously accepted back pain as part of the job. Such programs, using employee management advisory teams (participatory-team approach), have been implemented in nursing homes and hospitals in order to reduce injuries to health care workers resulting from manual and transferring of patients (Garg, 1999).

2.2.2 The VNBIPP Evaluation Report (DHS, 2002) referred to a well-established link between exposure to high physical loads and back injuries in nurses. It has been recommended that where possible the manual lifting of residents be eliminated or minimised in order to reduce injuries and their associated costs to the staff concerned (OSHA, 2003; ANF (Victorian Branch), 2003). OSHA recommended several steps for effective implementation whilst recognizing the need to tailor programs to specific facilities:

- a. provide management support;
- b. involve employees;
- c. identify problems;
- d. implement solutions;
- e. address reports of injuries;
- f. provide training; and
- g. evaluate ergonomics efforts.

2.2.3 The OSHA guidelines (OSHA, 2003) provided the following references for further information about ergonomics and the prevention of work-related musculoskeletal disorders in nursing homes:

- a. Feletto and Graze (1997) developed general guidelines for preventing back injury due to the lifting and moving of patients, with practical suggestions focused on those who actually lift and move patients. Their guide discusses the scope of the back injury problem in health care, how to analyse the workplace, how to identify and implement improvements, and how to evaluate results. It also includes checklists that can assist in analysing the work environment.
- b. The Department of Veterans Affairs (Nelson, 2001) described a comprehensive program developed to prevent musculoskeletal disorders related to resident lifting and repositioning. Assessment criteria and flowcharts for selecting equipment were included as well as techniques for safe lifting and repositioning based on resident characteristics.
- c. The National Institute for Occupational Safety and Health (NIOSH, 1997) described the basic elements of a workplace program aimed at preventing work-related musculoskeletal disorders. They included techniques, methods, reference materials, etc., that may help in program development.

These references are descriptive guidelines for programs aimed at minimising or preventing back injury in the workplace, particularly related to manual handling, and did refer to evaluation of interventions.

2.2.4 Two particular case studies were reported in the OSHA guidelines (OSHA, 2003) where policies aimed at eliminating the lifting of patients have been implemented and have resulted in substantial reductions in injury rates and costs.

- a. The 100-bed Wyandot County Nursing Home in Upper Sandusky, Ohio, implemented a policy of performing all assisted resident transfers with mechanical lifts, and purchased electrically adjustable beds. Workers' compensation costs were reportedly reduced from an average of \$140,000 (US) per year to less than \$4,000 per year, though the scope of the evaluation was not clear. Reduced costs for absenteeism, overtime and staff turnover were also reported.
- b. In a similar intervention at Schoellkopf Health Center in Niagara Falls, New York, workers' compensation costs were reportedly reduced from an average of \$84,533 (US) per year to \$6,983 per year. Lost work days dropped from 364 to 52 per annum.

2.2.5 A major study of registered and enrolled nurses and carers in South Australian aged care facilities and hospitals identified several factors that impacted significantly on the risk of an employee suffering a work-related injury or illness (Gaetjens, 2003). A number of issues were identified as priorities for resource allocation in terms of reducing workplace injury risk in aged care facilities and hospitals:

- a. employee training;

- b. addressing safety issues for all tasks, but particularly those associated with slippery/wet floors and person handling tasks;
- c. minimising awkward moves and difficult postures by maximising the available workspace and providing adequate and suitable mechanical aids that are readily available, easily accessible and well-maintained.

The study also showed a strong and statistically significant association between claim rates and inter-personal conflict at the workplace. Workplaces with high levels of conflict were shown to have had claims rates 1.7 times that of workplaces with low levels of conflict.

Gaetjens (2003) developed a Poisson regression model to investigate the relationship between claim rates and factors associated with employees and the workplace environment. The primary focus was the risk of a worker's compensation claim.

2.2.6 The implementation of a No Lifting policy into the ward and critical areas of a Queensland public hospital resulted in a significant reduction in the number of workers compensation claims per month (Passfield et al 2003). In particular, this study reported a significant reduction in the proportion of back injuries arising from the manual handling of patients.

2.2.7 In the Victorian context, and within temporal scope of the VNBIPP, a study of the implementation of a program aimed at eliminating the lifting of patients in a private aged care environment by the Australian Nursing Federation (Victorian Branch) reported a 71% reduction in overall injury rates, a 59% reduction in days lost due to injury and a 60% reduction in the cost of VWA claims within 6 months of implementation (Ashford, et al, 2003). This study involved 30 facilities and analysis of more than 1500 survey questionnaires. Many of the issues of concern raised in the report were aligned with those raised in the South Australian report (Paragraph 2.2.5) and in the VNBIPP Evaluation Report of 2002.

A pre-post naturalistic design was used in the study. Changes in proportions were tested using chi-square tests whilst changes in monthly rates of incidents and days lost per month were tested within facilities using t-tests. It was argued that standardisation for size of facility was not necessary as comparisons were to be made within facilities pre- and post-implementation. A cost-benefit analysis was also conducted based upon a fixed reduction applied to premiums, days lost and costs associated with numbers of claims. Averages based upon pre-implementation periods were used as the basis for estimating savings. No standardisation was made for changes in the size of the workforce over time.

2.2.8 Engkvist (2004) studied the accident process preceding back injuries among nurses working within a single network of seven hospitals in Melbourne during 2000-2001 (within both the temporal and organizational scope of the VNBIPP). During the study 179 nurses reported an overexertion injury to the back, of whom 127 were included in the study. The injuries mostly involved patient transfer (109). Most of these were planned transfers (92) and yet in most cases no transfer devices were used (78). Engkvist reported that the lack of availability of transfer devices was the most common reason for their non-use. The use of transfer devices was not completely protective against injury, as 22 injuries arose from planned transfers where transfer devices were used. This study of individual nurses was designed as a prospective dynamic-population-based study and used cluster analysis techniques to identify "patterns of contributing factors for the accident process."

2.2.9 In a related study, Engkvist compared one hospital where No Lifting had been introduced and two control hospitals with similar wards where No Lifting had not been implemented (Engkvist, 2001). The results showed clear benefits from the adoption of No Lifting. At the No Lifting hospital, the nurses used patient transfer devices in the majority of patient transfers (60% vs 0%), and had significantly fewer back injuries (14% vs 29%), less back pain (50% vs 61%) and less absence from work due to musculo-skeletal pain (18% vs 28%) than nurses in the control hospitals.

- 2.2.10 Collins et al. (2004) reported on a "best practices" musculoskeletal injury prevention program consisting of mechanical lifts and repositioning aids, a zero lift policy and employee training, instituted in six US nursing homes in 1998. Injury rates and injury-related costs and benefits were compared for three years pre- and post-intervention. Significant reductions were reported in resident handling injury incidence rates (61% reduction) and workers compensation claims (46% reduction). Based on post-intervention savings in workers compensation costs, it was estimated that the initial investment in equipment and training was recovered in less than three years.

## 2.3 Cost-benefit Analysis

- 2.3.1 Olsen, Smith and Harris (1999) distinguish three methods of evaluating health programs: *cost effectiveness*, in which the benefits are expressed in context-specific physical units, such as fractures avoided; *cost utility*, based on more broadly applicable generic measures of health outcome such as health-adjusted life years (HALY), disability-adjusted life years (DALY) and quality-adjusted life years (QALY) (see Phillips and Thompson, 2003); and *cost benefit*, in which all costs and benefits, including but not limited to health benefits, are expressed in monetary terms.
- 2.3.2 Cost-benefit analysis involves a comparison of the estimated costs of an intervention and the estimated benefits expressed in monetary terms, often in the form of cost savings resulting from reductions in expenditure. This comparison can also be characterised in terms of *return on investment* (National Centre for Vocational Education and Research (NCVER), 2000; Collins et al., 2004). The European Agency for Safety and Health at Work (Mossink, 2002) distinguished between costs and benefits at three levels: *society*, *company*, and *individual*. Mossink (1999) also distinguished between *monetarised* costs and *human* costs, the latter being those costs for which it is difficult to assign monetary values. It is important to note that human costs can occur at all three levels. For example, reduced quality of life is primarily an individual cost, reduced productivity might be regarded an organizational cost, whilst reductions in an individual's capacity or morale leading to reduced quality of care for patients or reduced involvement in wider community activities might be regarded as societal costs. Attempts have been made to quantify individual human costs via measures such as HALY, DALY, QALY, and to assign monetary values using methods such as willingness to pay (WTP) and its converse willingness to accept (WTA) (see Olsen, Smith and Harris, 1999). Researchers such as Kempen et al. (1997) have reported that back problems have considerable impact on quality of life. However, Mossink (1999) has concluded "*There is no generally accepted method for calculating a monetary value for permanent health effects, pain and suffering, the quality of life and (healthy) life expectancy. Clearly no market prices exist for these commodities. Methods like WTP or WTA ... are criticised not only because different studies yield different results, but also because they pretend to measure what they cannot measure.*" Notwithstanding this difficulty, some allowance for these individual human costs may be factored into compensation payments, and hence be incorporated into a cost-benefit analysis at the societal level.

## 2.4 Competency Assessment

- 2.4.1 When analysing lifting and repositioning tasks the importance of assessing the needs and abilities of patients has been stressed (OSHA, 2003). Several protocols for such assessment have been developed by the U.S. Department of Health and Human Services – Centers for Medicare and Medicaid Services (CMS) and the Veterans Health Administration and the Department of Defense. It was noted in the previous VNBIPP evaluation report (DHS, 2002) that the use of standardised instruments for assessing patient handling requirements will help prevent the issues arising from inconsistent instrument use. Patient transfer checklists have been incorporated in a guide to managing risk in patient handling published by WorkSafe Victoria (WorkSafe Victoria, 2002).
- 2.4.2 However, there is a need to develop and test standardised methods to assess competency in No Lifting practices as a priority to ensure the uniformity of nursing practices (DHS, 2002). Skills observation checklists have been proposed as potential tools for use in competency assessment (SAIF Corporation, 2002).

## 2.5 Summary

- 2.5.1 In summary, much of the literature reviewed was either purely descriptive, or involved studies and evaluations of specific issues associated with injuries to nurses (for example Gaetjens, 2003 and Enkvist, 2004). There is very little literature dealing specifically with evaluating the effectiveness of major health interventions such as the VNBIPP. To date, evaluations of OHS interventions have generally tended to involve only short-term comparisons, and even the most widely recognised international guide to evaluation methodology (Robson et al., 2001) is predominantly limited to evaluations of clear-cut pre- and post-intervention comparisons. For this longitudinal evaluation, we have chosen to adopt a more sophisticated multiple regression methodology articulated in the Australian National Centre for Vocational Education and Research guide (Doucouliagos and Sgro, 2000), and previously employed by one of the authors in an evaluation of a seven-year program of OHS interventions in a multinational engineering company (Stacy, 2003). In relation to cost-benefit analysis, we have been guided by Mossink's (1999, 2002) collation of evidence for the European Community in relation to best practices for assessing the cost benefits of occupational health and safety interventions, in particular the recognition of compensation payments as an appropriate if imperfect monetarised indicator of a range of societal and individual costs.

3. Methodology

3.1 Data Sources

- 3.1.1 This evaluation encompassed all 111 facilities which received funding from the DHS VNBIPP over four funding rounds and over the period 1998-2003 since the inception of the project. Sources of information included compensation data from VWA; and surveys of industry participants.
- 3.1.2 Table 1 shows a summary of the data which was in existence prior to the present evaluation. The data regarding DHS funding and the VWA data provided a consistent basis for longitudinal analysis. The data sets resulting from the Round 2 evaluation and the Round 4 questionnaire did not encompass all of the funding rounds and did not directly address the key deliverables for the current evaluation. In order to collect consistent longitudinal data to supplement the DHS and VWA data, it was necessary to survey the agencies. A survey instrument was devised specifically for addressing the required deliverables.

Table 1: Summary of availability of data

Data/Details	Pre VNBIPP	Round 1	Round 2	Rounds 3a/b	Round 4	Coverage
DHS Funding	N/A	Yes	Yes	Yes	Yes	Not all at Campus level
VWA: Claims, Remuneration & Premiums	Yes	Yes	Yes	Yes	Yes	At Campus level
Previous Evaluation Round 2	This evaluation was specific to those facilities funded in Round 2 (28), and accordingly dealt with the deliverables established at that time. Co-ordinators provided information at Ward Level.					
Program/Policies	No	Yes	Yes	No	No	Partial
Refresher Training	No	Yes	Yes	No	No	Partial
Program Costs (Own)	No	Yes	Yes	No	No	Partial
Claims Data	No	Yes	Yes	No	No	Partial
Total Hours Worked	No	Yes	Yes	No	No	Partial
Effective Full Time staff	No	Yes	Yes	No	No	Partial
DHS Round 4 Questionnaire	This questionnaire was devised as a filtering device for the Round 4 funding program for equipment only (Jan 2003). Responses (48) were scored (weighted ranks) for compliance.					
Program Coordination	No	Yes	Yes	Yes	No	Partial
EFTNS	No	Yes	Yes	Yes	No	Partial
% Roll-out	No	Yes	Yes	Yes	No	Partial
% Staff trained	No	Yes	Yes	Yes	No	Partial
Equipment purchased	No	Yes	Yes	Yes	No	Partial
Staff Consultation	No	Yes	Yes	Yes	No	Partial
Program Sustainability	No	Yes	Yes	Yes	No	Partial
Program Evaluation	No	Yes	Yes	Yes	No	Partial

N/A = Not Applicable

Victorian WorkCover Authority (VWA) Data

- 3.1.3 In accordance with a recommendation from the previous evaluation report, standard claims data were obtained directly from VWA. A standard claim is one where either a worker requires at least ten days off work, or medical and like expenses exceed a threshold value (currently \$495). Common law claims were included in these data but not identified as such. Minor claims were excluded from this study due to the difficulty of obtaining comprehensive and reliable retrospective data for individual agencies and campuses.
- 3.1.4 VWA provided the evaluation team with three major data sets:
- a. *Total remuneration and premiums* by current workplace address by financial year (1993/1994 to 2002/2003). Attempts were made by VWA to link all the predecessors to the current workplace and the remuneration and premium took into account the predecessors. No indexation was applied by VWA to the remuneration or premium data.
  - b. *Standard claim information* for claims reported from July 1993 to June 2003 (details as at August 31st 2003). The claims were assigned to the most recent workplace name and address but predecessor details were also supplied, if applicable.
  - c. *Dictionary of claim codes* for mechanism of injury, nature of injury/disease, bodily location, agency of injury and occupation, with comments where necessary. The claim file included the code only.
- 3.1.5 Various adjustments were made by VWA so that the historical data could be meaningfully compared to the more recent data. Only those historical claims that fitted today's legislation were included in the data sets. This removed any potential bias resulting from legislative changes in the definition of a standard claim. The following points were noted and adjusted for (remapped) where required:
- a. The Australian Bureau of Statistics' classification for coding claims was used by VWA until the end of June 1998.
  - b. From July 1998 VWA changed over to the National Occupational Health & Safety Commission's Type of Occurrence Classification System (TOOCS). Existing VWA codes were mapped to the new TOOCS codes (and old codes were overwritten).
  - c. In July 2000 Victoria introduced a more detailed version of the TOOCS codes. Extended codes were introduced in response to user requests for greater detail and clarity. The longitudinal analysis in this report is of necessity based upon aggregated claims, i.e. the more detailed codes of recent claims (post July 2000) have been aggregated to the level of the earlier less detailed codes. For example, "back claims" includes the categories "upper back", "lower back", "back (other & multiple)" and "back - unspecified", corresponding to body-location categories 310, 311, 318 and 319. The category "Nurses" includes nurse managers, nurse educators & researchers, registered nurses, midwives, mental health nurses and disability nurses.
  - d. On 1 July 2002 the Nature of Injury/Disease Classification System for Victoria (VCODE) was introduced. The VCODE codes were mapped to TOOCS codes by VWA. This field was not used in this evaluation analysis.
- 3.1.6 In summary, the following VWA codes were used to define Nurses, Back Injuries, Neck/Shoulder Injuries and Wrist/Knee/Ankle Injuries. The latter two categories were included for reference purposes in the analysis.

Table 2: Summary of standard VWA codes used in analysis

Definitions	Standard VWA Codes					
Nurses	2321	2322	2323	2324	2325	2326
Back	310	311	318	319		
Neck/Shoulder	210	218	219	610	660	
Wrist/Knee/Ankle	450	530	550			



## Agency Survey Data

- 3.1.7 A survey was designed and sent to 92 agencies via an email package that included an introductory/explanatory letter and an EXCEL spreadsheet (see Appendix 1). The interactive spreadsheet consisted of five protected worksheets, each designed such that information provided by the agencies was entered in specified unprotected cells. Some historical information dating back to 1993 was requested to enable valid longitudinal comparisons for a period before and after the implementation of the VNBIPP. The spreadsheet requested the following information:
- Details of the Chief Executive Officer (CEO), the Director of Nursing (DON) and No-Lifting Co-ordinator, or their respective equivalents.
  - Summary of campus details.
  - Campus funding & expenditure details from 1998/99 to 2002/2003.
  - Financial year estimates for each campus of hours worked, staff numbers, etc.
  - Equipment audit for each campus.
  - An open-ended response section providing opportunities for comments regarding successes and barriers in the past and the future with respect to the No Lifting program.
- 3.1.8 A summary of the five worksheets is provided below.

*Worksheet 1:* Contact details for CEO, DON and Program Co-ordinator, as well as length of time in current position. An open response section was also provided for details regarding how each organisation was currently maintaining and sustaining the back injury prevention program.

*Worksheet 2:* Campus name, address and VWA-ID was provided for each agency based upon the VWA data received. The purpose of each campus and whether or not they received DHS funding was requested.

*Worksheet 3:* This worksheet required a lot of detailed information dating back to the 1993/94 financial year. The first part of the worksheet requested details on expenditure of VNBIPP funds as well as local funds on training, equipment, administration and "other" with respect to the program implementation. For "Other", things such as refurbishing, renovating, re-plumbing, etc. were specified.

Historical financial year estimates on staff numbers, hours worked, etc were requested to the extent that records would permit. Whilst some information from VWA on remuneration (without superannuation) and premium payments was available, more detailed staffing information was required for the purposes of calculating claim incidence rates.

*Worksheet 4:* This consisted of a basic equipment audit for each campus. Information on planned targets and current numbers was requested, with the planned targets referring to needs as initially assessed by the training consultants.

*Worksheet 5:* This comprised open-ended responses providing opportunities for comments regarding successes and barriers in the past and the future with respect to the back injury prevention program. Some indicative examples were provided.

- 3.1.9 With regard to the details of each agency and its campuses and VNBIPP funding history, duplication of reporting on the part of Agency staff was minimised by including as much data as possible from existing DHS and VWA sources. However, in some cases the campus details and the assignment of funding to campuses was incomplete or inaccurate due to name changes and other organisational changes. Agency staff were asked to review these details and make any changes or additions necessary.
- 3.1.10 To minimise duplication of effort, some key fields were linked across worksheets, so that any changes made to the agency or campus names and addresses in worksheets 2 and 3 were automatically updated in the later worksheets. These later linked cells were "locked", and could not be edited independently. To assist in the completion of the spreadsheet, a hypothetical example was included as part of the email package sent to each agency.

- 3.1.11 After several rounds of follow-up emails and telephone calls over a two month period, returns were received from 52 agencies. Two agencies submitted survey returns after the analysis had been completed. Many of the agencies had difficulties in providing the information requested in the time frame permitted for various reasons, as follows:
- Incomplete and/or out-of-date contact details for agency personnel. This problem was made worse by senior staff changes, email address changes, etc.
  - Incomplete and/or not up-to-date details for agencies and/or campuses. This problem was made worse by name changes, amalgamations, etc.
  - Internal staffing changes with respect to job responsibilities, etc.
  - Lack of an accessible standardised data collection process.
  - Changes in software technologies in the last five years.
  - Changes in management processes in the last five years, particularly in outsourcing of payroll, insurance, etc.

## Ethics

- 3.1.12 Approval was granted by the University of Ballarat Human Research Ethics Committee to analyse de-identified data provided by VWA and to re-analyse de-identified data from previous evaluations provided by DHS.

## 3.2 Procedures

### Longitudinal Analysis

- 3.2.1 The primary longitudinal analysis employed in this evaluation is an analysis of frequencies of claims for back injuries to nurses<sup>2</sup>, and the corresponding claim incidence rates per 1000 equivalent fulltime nursing staff (EFTNS). A secondary longitudinal analysis is based on the associated working days lost (WDL) and WDL per 1000 EFTNS.
- 3.2.2 Whilst data on compensation paid to date were available for each standard claim, these data did not provide a valid basis for direct cost comparisons because of the reportedly long lag between initial lodgment and final closure of a claim in many cases, and the consequent likelihood that the compensation figures for more recent years considerably underestimate the eventual total costs. In the absence of reliable data on the status of claims, models were developed for deriving indirect estimates of changes in total compensation payments.
- 3.2.3 The longitudinal methodology employed utilises both analysis of variance (ANOVA) and a time series approach involving multiple regression methods. The ANOVA approach extends the pre-post comparisons made in the previous evaluation (DHS, 2002). The time series methodology is consistent with the time series approach briefly alluded to in the NIOSH guidelines for evaluation of interventions (Robson et al., 1991) and discussed in more detail by Doucouliagos and Sgro (2000). This methodology has also been used previously by members of the Ballarat research team (Stacy, 2003).

### Cost-benefit Analysis

- 3.2.4 Cost benefits were assessed by comparing the estimated costs of the VNBIPP intervention and the estimated cost savings resulting from reductions in expenditure incurred due to back injuries. This is a similar approach to that used by Collins et al. (2004). The cost-benefit analysis is predominantly focused at the societal level, because the VNBIPP was limited to publicly funded agencies, and because the most readily quantifiable aspects of both the funding of this intervention and the resulting cost savings (benefits) involve agencies at State level. Costs and benefits at the organisation or enterprise level have also been incorporated, but aggregated across the whole sector, and thus in effect also at the societal level. As was alluded to in paragraph 3.2.2, it was necessary to estimate cost savings indirectly using a number of models developed for the purpose.

<sup>2</sup>The previous evaluation report (DHS, 2002) as well as examining numbers of back injury claims, also considered other broader categories: all claims; manual handling claims associated with patient transfer and repetitive movement; and all claims for sprains and strains of joints and adjacent muscles. In each case back injuries constituted the majority of claims, and so it was not surprising that similar patterns of change were reported in all cases. In the light of this, it was decided to base the present analysis on back injuries only. Not only did these constitute the primary target of the intervention, but this also avoided the risk of confounding the effects of this particular intervention with any other factors that might have contributed to changes in the numbers in broader classes of musculoskeletal injury.

3.2.5 No direct costs were incurred by individuals in this intervention. Cost savings (benefits) at the individual level are to some degree transferred to societal level by insurance, and are thus included in societal level calculations to the extent that they are factored into compensation payments. It is recognised that other less tangible benefits can result from reductions in human costs at societal, organizational and individual levels, beyond those costs which are represented in monetarised form in claims data. However, there is no agreement about how to quantify such intangible benefits in a cost-benefit analysis (Mossink, 1999) and they have not been included in this evaluation.

Identification of Components Contributing to Success and Sustainability

- 3.2.6 There are two aspects to this issue. The first is to identify components perceived to contribute to success and sustainability. The second is to seek objective evidence supporting these perceptions by relating the success and sustainability "performance" of individual agencies to indicators related to the identified components.
- 3.2.7 The first aspect was addressed by eliciting qualitative information from CEOs, DONs and/or Program Co-ordinators from each agency as part of the survey of agencies.
- 3.2.8 For an evidence-based analysis to be feasible, relevant indicators must exist, data about them must be available, and there must be differences in the performance of different agencies i.e. in the degree to which the VNBIPP intervention had succeeded in different locations. This aspect was addressed in an illustrative comparison of two cases: one very successful in terms of the primary outcome measure used in the longitudinal study, and one much less successful.

Development and Testing of an Instrument for Assessing Competency

3.2.9 After considerable consultation with DHS, the VNBIPP Advisory Committee and a working party of industry informants, it was agreed that a generic assessment instrument should be developed in the form of a "secondary checklist", which does not itself embody the specifications of competent performance, but rather provides a consistent framework for competency assessments referenced to existing resources such as published WorkSafe guidelines (WorkSafe Victoria, 2002).

4. Longitudinal analysis of outcomes

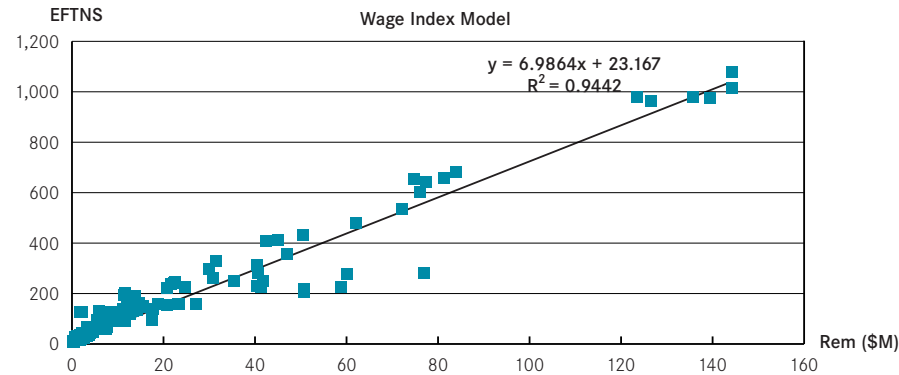
4.1 Relationship between Remuneration, EFTNS & Hours Worked

- 4.1.1 The analysis was based on the 10-year period July 1993 – June 2003. VWA provided claims data for this period, together with total remuneration figures for each agency by financial year (FY). All remuneration figures were re-expressed in June 2003 dollars, using Victorian Female Average Weekly Earnings as the index.
- 4.1.2 In order to correct for the effects of a changing staffing base, standardised claims incidence rates were calculated. This computation required EFTNS numbers for each agency for the 10-year period. For various reasons (see 3.1.10) no agency was able to provide a complete set of the requested data. While 50 agencies supplied data for the financial years 2000/2001 to 2002/2003, only four agencies provided data for all years from 1993/1994 to 2002/2003. Table 3 shows the correlations between the remuneration and staffing measures for each of the ten years. These data were used to develop a strong regression model (see Figure 1) describing the relationship between EFTNS staff and remuneration data supplied by VWA. The resulting regression equation was then used to estimate EFTNS for each agency throughout the 10-year period.

Table 3: Correlations between EFTNS, hours worked (survey data) and remuneration (VWA) by FY

	Correlations between remuneration and staffing measures									
	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03
EFTNS	0.9999	0.9972	0.9999	0.9901	0.9994	0.9787	0.9792	0.9657	0.9658	0.9572
Hrs	0.9999	0.9972	0.9999	0.9901	0.9990	0.9776	0.9730	0.9581	0.9560	0.9508
n	4	4	4	7	10	21	32	49	49	49

Figure 1: Regression model for predicting EFT nursing staff based upon remuneration (wage index adjusted)



- 4.1.3 The model selected to estimate EFTNS based upon the remuneration data supplied by Work-Cover is as follows:
- Estimated EFTNS = 23.167 + 6.9864 × Adjusted Remuneration.*
- In the absence of comprehensive data, it was considered that with an  $R^2$  value of 0.9442 this model was adequate for the purposes of estimating EFTNS. Using this model EFTNS estimates for the stated financial years were obtained (see Table 4). A decline in estimated EFTNS from 15800 in 1993-94 to 14624 in 1999-2000, followed by a marked increase in EFTNS in the ensuing 3 years, is apparent. The magnitude of the increase (3000 EFTNS) corroborates recent claims by DHS that an extra 5000 nurses have been placed into health service centres across the state during this period. DHS estimates current EFTNS to be 17600 which lends support to the estimates obtained from this model.

Table 4: EFTNS estimates based upon the above model

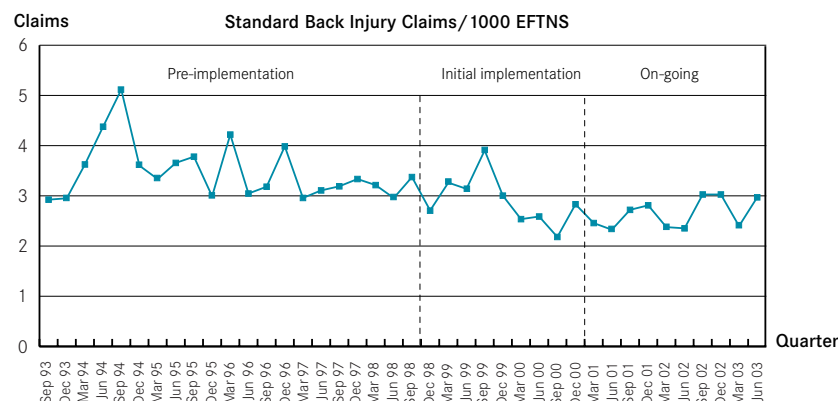
Financial Year	Remuneration \$106	Wage Index	Remuneration (Adjusted)	Estimated EFTNS
93-94	1462.1027	0.6474	2258.3566	15800.95
94-95	1463.2157	0.6720	2177.3607	15235.08
95-96	1531.5596	0.6991	2190.8375	15329.23
96-97	1601.7399	0.7256	2207.3644	15444.70
97-98	1637.5036	0.7599	2154.7714	15077.26
98-99	1671.1480	0.7875	2122.1109	14849.08
99-00	1740.4297	0.8328	2089.9086	14624.10
00-01	2048.8351	0.8708	2352.8925	16461.42
01-02	2217.2259	0.9225	2403.6134	16815.77
02-03	2424.9997	0.9688	2503.0298	17510.33

## 4.2 Longitudinal Analysis: Time Series and Multiple Regression Methods

4.2.1 The longitudinal analysis was based on quarters, because it was considered that there were adequate claims data to support a finer granularity than years, and that an analysis by years would be unnecessarily coarse. The required quarterly estimates of EFTNS were estimated by interpolation of the annual estimates. Claims were allocated to quarters on the basis of the report date. The alternative of using date of injury was rejected because of the wide variation in the elapsed time between injury and report date (see Figure 7). This, together with anecdotal evidence from a range of industry sources about a culture of carrying injuries, suggests that the interpretation of injury date is likely to vary from case to case, whereas report date is consistent and well defined. The effect of this decision is to treat on the same basis claims resulting from recent injury events and claims resulting from aggravation of older injuries.

4.2.2 Because of the relatively small numbers of claims per quarter at many of the smaller agencies, it was considered that the data could not support a valid statistical analysis based on individual agencies. The analysis was based on data aggregated across all agencies. (i.e. total quarterly claims divided by total estimated quarterly EFTNS for all agencies.) Figure 2 shows the quarterly numbers of nurses back injury claims per 1000 EFTNS for the period 1993-94 to 2002-03. Total claims per quarter are plotted in Appendix 2.

Figure 2: Plot of standard nurses back injury claims/1000 EFTNS by quarter



4.2.3 Due to the staged nature of the implementation of the program a judgment had to be made about defining the limits of the implementation period. Evidence from the surveys indicated that the earliest date of commencement of staff training was August 1998. By the end of September 1998, less than 10% of those who returned surveys had commenced training. This figure had increased to 80% by December 2000. On the basis of this information, three time periods were defined: pre-implementation, initial implementation and ongoing implementation. These are summarised in Table 5 and indicated on Figure 2.

Table 5: Periods defined with respect to project implementation

	Pre-Implementation	Initial Implementation	Ongoing
Model 1	Sep-93 – Sep-98	Dec-98 – Dec-00	Mar-01 – Jun-03

4.2.4 Table 6 summarises the means of the number of claims per 1000 EFTNS according to the time periods as defined in Table 5. An initial statistical analysis of these data showed that there were statistically significant violations of the key assumptions of normal random error with constant spread. In order to validate the standard statistical procedures in such cases, a standard practice is to take logarithms of the dependent variable (Neter et al, 1996). In this instance, the skew was so pronounced that it was necessary to take logarithms twice.<sup>3</sup> Hence the dependent variable for the subsequent analyses was  $\log(\log(\text{claims}/1000 \text{ EFTNS}))$ .

Table 6: Mean quarterly nurses back injury claims per thousand EFTNS for the defined periods

Variable	Sep 93-Sep 98	Dec 98-Dec 00	Mar 01-Jun 03
claims/1000 EFTNS	3.473	2.906	2.647
$\log(\log(\text{claims}/1000 \text{ EFTNS}))$	-0.274	-0.344	-0.379

4.2.5 Initially a one-way analysis of variance was carried out on  $\log(\log(\text{claims}/1000 \text{ EFTNS}))$  using the periods defined in Table 5 in order to compare with the results from the previous evaluation (DHS, 2002). There were statistically significant differences in average quarterly claims between the defined time periods ( $F = 13.83$ ,  $p < 0.0005$ ). Tukey's post hoc tests showed significant reductions relative to the pre-implementation period in both the implementation and on-going periods. These results support the findings from the previous evaluation. However, no account is taken of any trend in the data within each period.

4.2.6 Secondly, a piecewise linear regression model (Neter et al., 1996) was fitted to the dependent variable  $\log(\log(\text{claims}/1000 \text{ EFTNS}))$ . The explanatory variables or predictors in this model included time, to allow for an initial trend, and also two indicators or "dummy variables" (Doucouliagos and Sgro, 2000) to represent any differences in the slope of the trend line at the two boundaries between the three designated periods. In accordance with standard time series methods (Makridakis et al., 1998), extra autoregressive terms were also investigated, but these made no improvement to the fit of the model. The resulting model conformed to the standard statistical assumptions underlying such analyses (the residuals were normally distributed with constant variance and no autocorrelation). The results are summarised in Table 7. The predictor *Time* represents the initial trend, and the two indicators *Ind1* and *Ind2* represent the differences in the slope of the trend line at the two boundaries between the three designated periods. The fitted regression model is overlaid on the data in Figure 3, on both the log-log scale (where each segment is linear) and on the scale of the original data (where each segment is of exponential form and hence slightly curved).

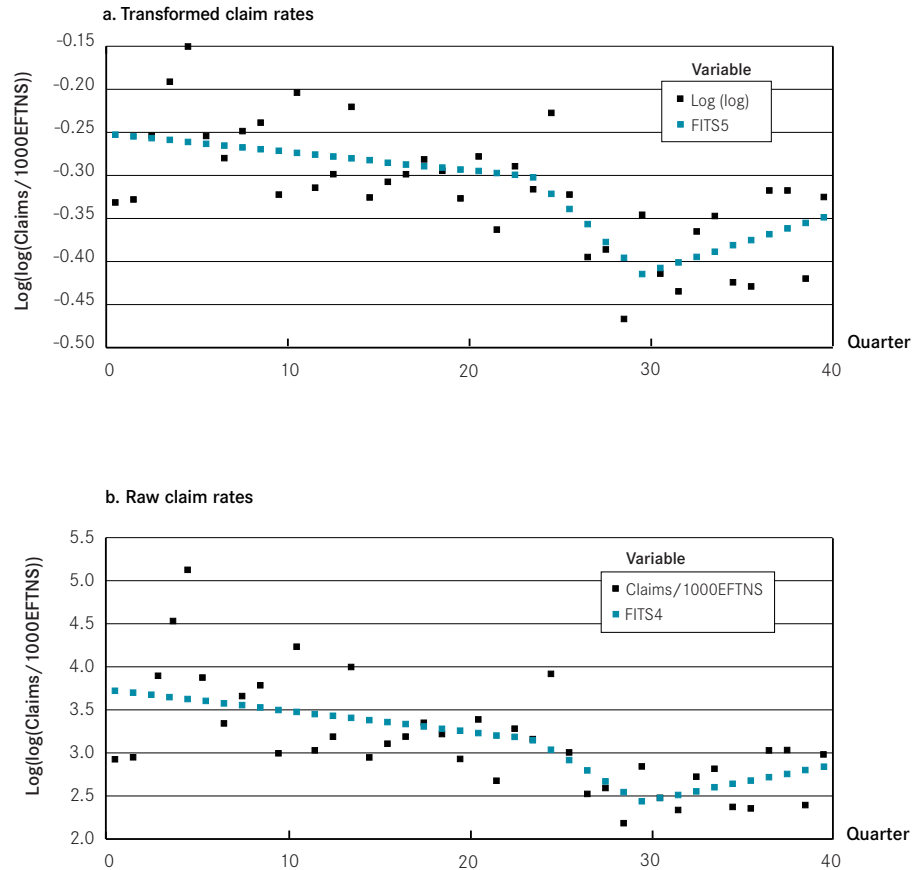
<sup>3</sup> Another common transformation for use in such circumstances is the reciprocal transformation. This produced almost identical results, but was not used because the order of the dependent variable is reversed, making results less intuitive when presented graphically.

Table 7: Results of a piecewise regression for log(log(claims/1000 EFTNS))

Regression Model:  $\text{Log}(\log(\text{Claims}/1000 \text{ EFTNS})) = -0.252 - 0.002 \text{Time} - 0.011 \text{Ind1} + 0.017 \text{Ind2}$

Predictor	Coef	SE Coef	T	P
Constant	-0.25217	0.02245	-11.23	0.000
Qtr	-0.001819	0.001656	-1.10	0.279
Ind1	-0.010554	0.004708	-2.24	0.031
Ind2	0.017129	0.006905	2.48	0.018

Figure 3: Plots of fitted regression model overlaid on quarterly data



4.2.7 The regression model is a moderately good fit, explaining around half the quarter-to-quarter variation in the transformed claim rates ( $R^2 = 51.6\%$ ). Statistically significant changes in claim rates have occurred between each of the defined time periods. A slight downward trend is apparent in  $\text{log}(\log(\text{claims}/1000 \text{ EFTNS}))$  before the introduction of the VNBIPP (trend rate =  $-0.002$  per quarter) but this was not statistically significant ( $p = 0.279$ ). The greater variability of the claims rates in the earlier years is apparent in the plot of Figure 3. However the variability is asymmetrical – the maximum quarterly value fell throughout the period whilst the minimum stayed stable. The apparent trend is attributable to the greater variability (and specifically the higher maxima) in the earlier years. Whether there were any systematic causative factors underlying the reduction in variability throughout this period is unknown. However, regardless of this, the trend is greatly reduced (and is not statistically significant) after adjustment for the change in variability. As a consequence of the above it is concluded that, notwithstanding the possible existence of a prior trend, in the absence of any evidence of a reduction in the "floor" level of claims rates prior to Sept-98, it is reasonable to attribute any downward trend in claims rates since Sept-98 to the VNBIPP intervention, involving back injury prevention programs based on No Lifting principles.

4.2.8 During the initial implementation period, the downward trend in the transformed claim rate increased significantly (change in trend =  $-0.011$ ,  $p = 0.031$ ; new trend =  $-0.002 - 0.011 = -0.013$ ). In the post-implementation period the downward trend in the transformed claim rate was reversed, to a statistically significant degree (change in trend =  $+0.017$ ,  $p = 0.018$ ), resulting in a slight upward trend (new trend =  $-0.013 + 0.017 = +0.004$ ); however this resulting trend was not statistically significantly different from zero. These results confirm that transformed claim rates trended downward significantly during the initial implementation period. There is also some indication of a reactive "bounce" in the ongoing period after initial implementation, which potentially signifies a threat to sustainability of the gains made in the initial implementation period. However, at this time the evidence for this is not conclusive.

### 4.3 Other Trends of Potential Interest

4.3.1 The traces in Figure 4 are based upon VWA standard claims data and show the relationship between back injury claims made by nurses and other types of claims made by nurses, in relation to total agency claims and total nurses claims. The other musculoskeletal categories have been included as there was concern expressed by members of the VNBIPP Advisory Committee regarding the possibility of an increase in these types of injuries due to changes in the approach to manual handling, poor maintenance of patient handling equipment, inappropriate or inadequate storage of equipment, wrong floor coverings, etc. There is little evidence of any such increase; however, there are noticeable upward trends in stress claims by all staff and by nurses.

Figure 4: Selected claims as a proportion of total agency

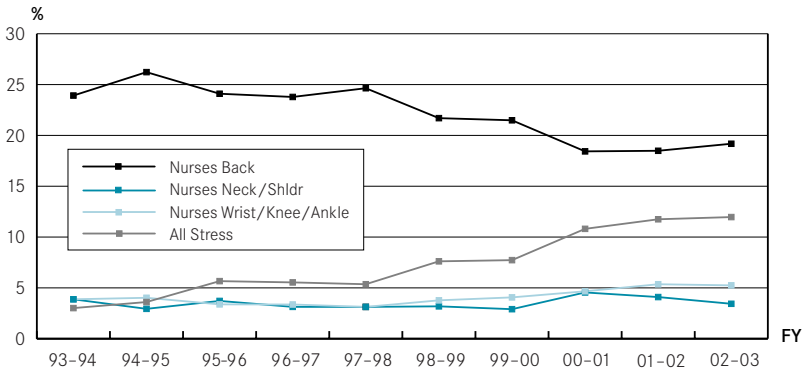
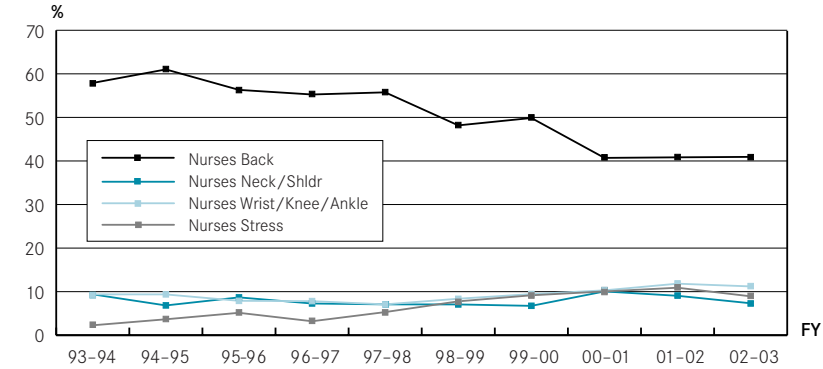
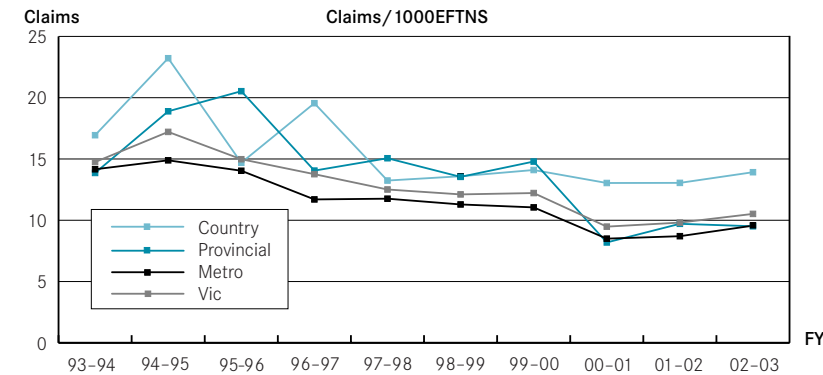


Figure 5: Selected nurses claims as a proportion of total



4.3.2 Agencies were categorised as *Country*, *Provincial* (Geelong, Ballarat, Bendigo and Wodonga) or *Metropolitan*, Figure 6 shows VWA data on nurses back injury claims for each group, compared to the State-wide trend. Several points of potential interest emerge from this graph. Firstly, the figures for Metropolitan agencies are consistently lower than the state-wide results. Secondly, there has been a marked decline in claims from the provincial centres since the 1999/2000 financial year. Thirdly, and perhaps most importantly, is the pattern of claims for the country agencies. The large variation pre 1997/98 has not been maintained; however the number of claims per 1000 EFTNS has remained relatively constant since 1997/98. An ANOVA for the period 2000/01-2002/03 showed the claims for the Country centres to be significantly higher than both Provincial and Metropolitan centres ( $p < 0.0005$ ).

Figure 6: Nurses back injury claims for Country, Provincial, Metropolitan and Victoria

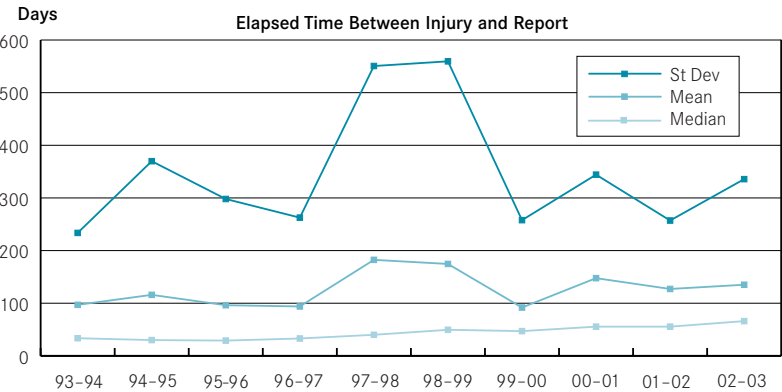


4.3.3 This raises the question as to the effectiveness of the VNBIPP in these centres when compared to their provincial and metropolitan counterparts. The isolation of country centres was mentioned in several survey responses as one of the potential barriers to the overall success of the VNBIPP. Comments from these country centres focused not so much on the training programs themselves as on the supporting services associated with the program. Some of the specific comments made were:

- Geographical location for leasing of equipment.
- Backfill availability.
- Rural area and some training sessions held in Melbourne.
- Distance of travel for educator and staff to attend programs – additional costs – potential lack of exposure to most recent developments.
- Limited opportunities to attend metropolitan based update education on new and best practice.

4.3.4 Figure 7, based upon VWA data, shows that the median number of elapsed days between injury date and report date for nurses back injury claims has risen gradually from around 30 in 1993/94 to 70 in 2002/03. The variation in the number of elapsed days between injury date and report date is very large (as indicated by the standard deviation), particularly in the period 1997-99, and has a noticeable effect upon the mean number of elapsed days between injury date and report date. Among all nurses back claims lodged during the 10 year period, the maximum elapsed time was 4883 days, or more than 13 years. This illustrates the presence of long time lags in data pertaining to injuries which may in some cases be incremental in their onset, and which may be "carried" for considerable periods of time. This factor adds to the difficulty of detecting changes and attributing outcomes to a particular program in the short term, until the history has "washed out" of the system.

Figure 7: Differences between injury date and report date for nurses back injuries





5. Cost-benefit analysis

5.1 Cost-benefit Analysis Model

5.1.1 This evaluation reports the net cost of the VNBIPP intervention, calculated as the cost of implementing the program less the savings resulting from the program in expenditure incurred due to back injuries. As outlined in Section 3.2, only costs which could be expressed in monetary terms were included. Cost benefits were assessed with reference to the time periods defined in Table 5. Both the costs of the intervention and the savings that result are broken down into their component parts as follows:

$Cost_{net} = Cost_{intervention} - Cost_{savings}$   
where

$Cost_{intervention} = Cost_{DHS} + Cost_{agencies}$

$Cost_{DHS} = Cost_{grants} + Cost_{DHS\ administration}$

$Cost_{agencies} = Cost_{extra\ equipment} + Cost_{facilities\ administration} + Cost_{training\ time} + Cost_{other}$

$Cost_{savings} = \Delta Cost_{back\ injuries} = \Delta Cost_{standard\ claims} + \Delta Cost_{minor\ injuries} + \Delta Cost_{indirect\ costs}$

and the symbol Δ (delta) represents difference, or in this context, reduction.

Note that the extra equipment cost refers to equipment purchased by facilities over and above grant-funded purchases.

Only the DHS grants costs are known. All other costs were estimated on the basis of the following sources:

$Cost_{grants}$	DHS
$Cost_{DHS\ administration}$	DHS
$Cost_{extra\ equipment}$	Survey of agencies
$Cost_{facilities\ administration}$	
$Cost_{training\ time}$	
$Cost_{other}$	
$\Delta Cost_{standard\ claims}$	Various statistical models (see Sections 4.2 and 5.2)
$\Delta Cost_{minor\ injuries}$	Proportion of $\Delta Cost_{standard\ claims}$
$\Delta Cost_{indirect\ costs}$	Calculated from WDL

5.2 Cost-benefit Calculations

5.2.1 Each of the terms in the cost-benefit analysis model is now addressed in turn. All monetary values have been expressed in Jun-03 dollars. Adjustment has also been made for the changing size of the workforce throughout the period.

$\Delta Cost_{DHS}$

5.2.2 The costs of implementing the no lift program consist of the grants made to the agencies and to the associated administrative costs to DHS. During the period Sep-98 – Jun-03, the Victorian Government has contributed \$8.3M (Jun-03 dollars) to the VNBIPP, which includes \$7.9M in grants and \$0.4M for administrative and ancillary costs.

$\Delta Cost_{agencies}$

5.2.3 The agencies' costs have been estimated on the basis of the survey data obtained from the survey of agencies. From responses to questions about expenditure, estimates of the ratio of "own" funds to VNBIPP funds supplied were obtained. These ratios are given in Table 8. They show that on average, for every dollar in funding provided for the period 1998/99 to 2002/03 Victorian health agencies contributed \$2.04 of their own funds.

Table 8: Ratio of agencies' own funds to DHS funds

Expense	VNBIPP	Own	Ratio	Ratio to VNBIPP total
Training	898897	2138705	2.38	0.45
Equipment	3182925	6359023	2.00	1.34
Administration	151903	811668	5.34	0.17
Other	525084	421009	0.80	0.09
Total	4758809	9730405	2.04	2.04

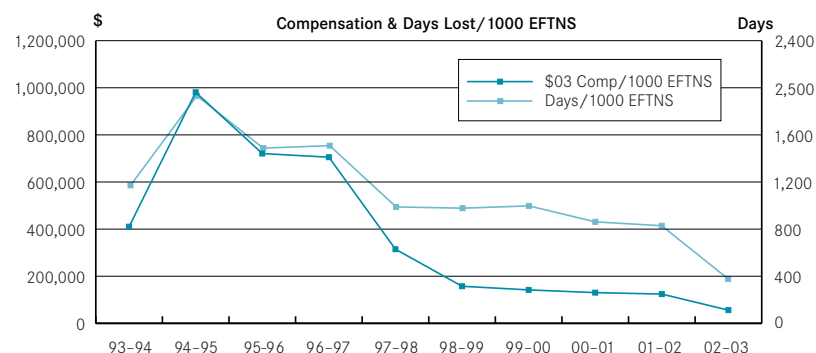
5.2.4 The ratios in the last column of Table 8 have been used to estimate the expenses incurred by the agencies in relation to the listed aspects associated with implementation of the program.

$\Delta Cost_{standard\ claims}$

5.2.5 The left half of Table 9 shows the raw VWA data describing numbers of back claims by nurses in each financial year, and the consequential total WDL and total compensation paid to date by VWA. The right half of the table shows the corresponding values after adjustment by CPI and the associated equivalent full time staffing numbers for each financial year.

Table 9: Measures of claims, WDL and compensation

FY	Claims	WDL	Comp \$	Comp \$03	Claims /1000 EFTNS	WDL /1000 EFTNS	Comp \$03 /1000 EFTNS
93-94	216	18,222	5,100,480	6,485,598	13.67	1153.22	410,456
94-95	241	29,383	12,297,479	14,943,939	15.82	1928.64	980,890
95-96	214	22,621	9,329,833	11,048,999	13.96	1475.68	720,780
96-97	205	23,123	9,220,884	10,892,697	13.27	1497.15	705,271
97-98	189	14,575	4,049,911	4,743,704	12.54	966.69	314,626
98-99	184	14,190	2,024,600	2,337,186	12.39	955.61	157,396
99-00	185	14,267	1,878,946	2,076,133	12.65	975.58	141,966
00-01	162	13,784	2,028,491	2,147,302	9.84	837.35	130,445
01-02	176	13,511	2,031,749	2,088,043	10.47	803.47	124,172
02-03	201	6016	981,892	981,892	11.48	343.57	56,075

**Figure 8: Comparison of compensations paid and WDL per 1000 EFTNS**

5.2.6 Total compensation paid to date (in \$03/1000 EFTNS) and days lost per 1000 EFTNS are plotted by financial year in Figure 8. The aggregate figures are plotted by financial year in Appendix 2.

5.2.7 As a preliminary, it is noted that reductions in all three workforce-standardised rates (claims/1000 EFT, WDL/1000 EFT and compensation/1000 EFT) occurred in 1997/98, the year before the intervention commenced. No evidence as to the cause of this has been found in this evaluation. Quite large year-to-year fluctuations occurred in the pre-intervention period, and this may well have been a continuation of that process – a random downward fluctuation which would not have been maintained had the intervention not commenced in the following year. Alternatively, it may have been related to the processes which led to the intervention. An intervention never occurs in a contextual vacuum; awareness of an issue gradually increases (in this case through the work of Langford (1997) and the ANF) until an intervention is instituted. It might be conjectured that during this period of increasing awareness, practices change to the extent that can be achieved under existing conditions, and that some improvement in performance might thus occur in advance of the more marked improvement brought about by the eventual intervention. However, in the absence of any evidence to support such a hypothesis, for the purposes of the present analysis the reductions which occurred in 1997/98 are regarded as part of the pattern of unexplained variation in the pre-intervention period.

5.2.8 The first approach to estimating cost savings (Model 1) is based on actual compensation payments to date. It is considered that this approach overestimates cost savings. Whilst it is apparent that the compensation payments arising from more recent years are far less than for previous years, VWA advise that there are in many cases long lags between initial lodgment and final closure of claims. Hence it is likely that the compensation figures for more recent years considerably underestimate the eventual total costs. Consideration was given to circumventing this problem by using only compensation data for claims which had been finalised. However, VWA is not able to clearly identify such claims.<sup>4</sup> Nor are actuarial estimates of final compensation payments available for individual claims. In the absence of such direct information, two further approaches have been used to derive indirect estimates of the change in compensation payments.

5.2.9 The first of these (Model 2) is based on the change in the claims incidence rate (see Figure 2). The assumptions underpinning this approach are:

- Only the rate of claims has changed.
- Severity of injuries has not changed.
- Costs of treatment have not changed in real terms.
- Hence, the average magnitude of individual compensation payments has not changed.

This approach is considered to be conservative i.e. likely to underestimate the true cost savings.

5.2.10 Intermediate between these two approaches is an approach (Model 3) based on the data about working days lost (WDL), which has fallen more than the claims rate but not as much as the compensation rate. The rationale here is that data about WDL are likely to be finalised in a much shorter timeframe than total compensation cost, since it is considered that it is more likely that costs will continue to accrue beyond the period in which working time is lost than for the converse to occur. It is conjectured that the apparent reduction in WDL/1000 EFTNS (Table 9 and Figure 8) is predominantly a real effect, with only the drop in 2002-03 being confounded with the lag effect of open claims. On this basis the average annual WDL/1000 EFTNS is used as a surrogate indicator for the unknown eventual final compensation costs/1000 EFTNS throughout the whole period up until 2001-02. The assumptions underpinning this approach are:

- WDL are likely to be finalised within one year of a claim being made.
- Compensation costs are directly proportional to WDL. There is strong evidence in support of this in the data for the period 1993-94 to 1996-97.

5.2.11 The details of each calculation follow. In each case, the estimated compensation (in Jun-03 dollars) paid for each quarter throughout the period is first expressed as compensation per 1000 EFTNS, then the rate of savings is estimated for each quarter, and finally the estimated savings rates are applied to the estimated EFTNS for each quarter.

5.2.12 The pre-implementation period 1993/4 to 1997/8 has been used to establish benchmarks for numbers of claims and WDL. The benchmark statistics are:

- Mean quarterly compensation/1000 EFTNS = \$152,800
- Mean quarterly claims/1000 EFTNS = 3.473
- Mean quarterly WDL/1000 EFTNS = 345.7
- Mean WDL/claim = 99.6

#### **Model 1. Reduced severity: compensation data taken at face value**

5.2.13 We estimate cost savings in terms of compensations paid as follows. For the post implementation period Mar-01 – Jun-02, the average quarterly compensation /1000 EFTNS was \$31,230, which represented a reduction of 79.56% when compared to \$152,800 for the benchmark period. This savings ratio is applied in full across the whole post-implementation period of 10 quarters (Mar-01 – Jun-03) and by stepwise graduated amounts during the implementation period (9 quarters). Based upon the quarterly estimates of EFTNS for the 9-quarter implementation period this represents graduated savings totaling \$9,881,332. Based upon the quarterly estimates of EFTNS for the 10-quarter post-implementation period, estimated savings are \$21,448,718. Altogether since Dec-98 total savings are estimated to be \$31,330,050.

5.2.14 The estimated annual savings in WDL is calculated using the data for WDL/1000 EFTNS. For the post implementation period Mar-01 – Jun-02, the average WDL/1000 EFTNS was 203.7 days, which represented a reduction of 41.08% when compared to 345.7 days for the benchmark period. Based upon the quarterly estimates of EFTNS for the 9-quarter implementation period this represents graduated savings totaling 11,265 days. Based upon the quarterly estimates of EFTNS for the 10-quarter post-implementation period, estimated savings are 24,451 days. Altogether since Dec-98 total savings in WDL are estimated to be 35,716 days.

#### **Model 2. Constant severity: average compensation/claim assumed constant**

5.2.15 We estimate cost savings in terms of compensations paid as follows. For the post implementation period Mar-01 – Jun-03, the average quarterly rate of 2.647 claims/1000 EFTNS (Table 6) represents a reduction of 23.79% when compared to 3.473 claims/1000 EFTNS for the benchmark period. If the number of claims is reduced by 23.79% then we assume that compensations paid and days lost and will be reduced by a similar amount in the post implementation period (10 quarters) and by stepwise graduated amounts during the downward trend of the implementation period (9 quarters). The estimated quarterly saving/1000 EFTNS is 23.79% of the benchmark figure of \$152,800. Based upon the quarterly estimates of EFTNS for the 9-quarter implementation period this represents graduated savings totaling \$2,954,094. Based upon the quarterly estimates of EFTNS for the 10-quarter post-implementation period, estimated savings are \$6,412,246. Altogether since Dec-98 total savings are estimated to be \$9,366,339.

<sup>4</sup> VWA advised that closure of a claim is not necessarily an indication of final settlement; a claim that has been closed may subsequently be re-opened.

5.2.16 The estimated quarterly savings in WDL/1000 EFTNS = 23.79% of 345.7 = 82.2 days. Based upon the quarterly estimates of EFTNS for the 9-quarter implementation period this represents graduated savings totaling 6,522 days. Based upon the quarterly estimates of EFTNS for the 10-quarter post-implementation period, estimated savings are 14,156 days. Altogether since Dec-98 total savings in WDL are estimated to be 20,678 days.

**Model 3: Reduced severity: average compensation/WDL assumed constant**

5.2.17 In this model the reduction in WDL is used as the basis for estimating savings rather than the reduction in the number of claims. For the post implementation period Mar-01 – Jun-02, the average WDL/1000 EFTNS was 203.7 days, which represented a reduction of 41.08% when compared to 345.7 days for the benchmark period. We assume that compensations paid will be reduced by a similar amount in the post implementation period (10 quarters) and by stepwise graduated amounts during the downward trend of the implementation period (9 quarters). The estimated quarterly saving/1000 EFTNS is 41.08% of the benchmark figure of \$152,800. Based upon the quarterly estimates of EFTNS for the 9-quarter implementation period this represents graduated savings totaling \$5,102,421. Based upon the quarterly estimates of EFTNS for the 10-quarter post-implementation period, estimated savings are \$11,075,469. Altogether since Dec-98 total savings are estimated to be \$16,177,890.

5.2.18 The estimated annual savings in WDL is calculated similarly as for Model 1. Based upon the quarterly estimates of EFTNS for the 9-quarter implementation period this represents graduated savings totaling 11,265 days. Based upon the quarterly estimates of EFTNS for the 10-quarter post-implementation period, estimated savings are 24,451 days. Altogether since Dec-98 total savings in WDL are estimated to be 35,716 days

5.2.19 It is also worth noting that not only has the WDL/1000 EFTNS been reduced; so too has the average WDL per claim, from 99.6 days per claim in the pre-implementation period to 77.0 days in the post-implementation period, a reduction of 23%. This would appear to indicate a reduction in the severity of injuries as well as the rate of injuries although there may be other contributing factors beyond the scope of this analysis, such as changes in the management of injuries or rehabilitation procedures.

**Δ Cost<sub>minor injuries</sub>**

5.2.20 Cost savings associated with minor injuries were estimated as 2% of savings estimated for standard claims. This figure is based on the ratio of minor claims costs to standard claims costs in data from the previous evaluation, and the reported finding that "program effects on standard and minor claims were comparable" (DHS, 2002, p29).

**Δ Cost<sub>indirect costs</sub>**

5.2.21 Estimates of the indirect costs associated with days lost from the workforce due to injury have been estimated using an average rate of \$20/hour (Grade 2, Year 2 nurse) for temporary or casual staff replacement, with 20% on-costs. The indirect cost associated with one day lost due to injury is thus \$20 x 1.2 x 8 = \$192. Whilst not all days lost due to injury results in the replacement of nursing staff, advice from representatives from a number of facilities was that this is almost always the case. Accordingly, indirect cost savings for staff replacement have been estimated for each of the models using a figure of 95% of estimated WDL.

**5.3 Cost-benefit Analysis: Summary and Discussion**

5.3.1 Tables 10 and 11 provide a summary of the estimated costs and benefits, in Jun-03 dollars. Within the scope of the overall model of paragraph 5.1.1, the total cost of the VNBIPP intervention over the period (Dec-98 – Jun-03) is estimated to be \$24.4M (Jun-03 dollars). Estimated cost savings for the same period calculated using the three different models range from \$13.5M to \$38.7M, with the overall financial outcome ranging from a net cost of \$10.9M to net cost savings of \$14.3M.

5.3.2 The disparity in these estimates results from different assumptions about the underlying processes. This is in turn a consequence of doubts about the accuracy of recent compensation data due to lag effects, which necessitates the use of indirect models founded on different assumptions.

5.3.3 Other factors contributing to the difficulty of making accurate and valid comparisons were:

- a. great variability in both the cost of individual claims and in the claims incidence rates from agency to agency and from year to year
- b. a lack of comprehensive data on staff numbers, which necessitated a separate modelling exercise in order to estimate staff numbers from available remuneration data.

**Table 10: Cost of the intervention**

Cost item	\$M (Jun-03)
<b>DHS</b>	
Grants	7.9
DHS Administration	0.4
Total Cost DHS	8.3
<b>Agencies</b>	
<b>Equipment</b>	3.5
Administration	10.5
Training time	1.3
Other	0.7
Total cost to agencies	16.1
<b>Total cost of intervention to date</b>	<b>24.4</b>

**Table 11: Cost-benefit analysis summary**

	Model 1	Model 2	Model 3
Basis of calculation	Compensation	Claims	WDL
Cost savings to date	\$M (Jun-03)	\$M (Jun-03)	\$M (Jun-03)
<b>Implementation (Dec-98 - Dec-00)</b>			
Standard claims	9.9	3.0	5.1
Minor injuries	0.2	0.1	0.1
Associated costs	2.1	1.2	2.1
Total savings for implementation period	12.2	4.3	7.3
<b>Post-implementation (Mar-01 - Jun-03)</b>			
Standard claims	21.4	6.4	11.1
Minor injuries	0.4	0.1	0.2
Associated costs	4.6	2.7	4.6
Total savings for post-implementation period	26.4	9.2	15.9
<b>Total to date(Dec-98 - Jun-03)</b>			
Standard claims	31.3	9.4	16.2
Minor injuries	0.6	0.2	0.3
Associated costs	6.8	3.9	6.8
<b>Total cost savings to Jun-03</b>	38.7	13.5	23.3
<b>Total cost to Jun-03</b>	24.4	24.4	24.4
<b>Net cost to Jun-03</b>	-14.3	10.9	1.1

- 5.3.4 The most optimistic estimate of cost benefits (Model 1) is based on taking the compensation data at face value, i.e. regarding compensation payments to date as being complete and final. Whilst it is certain that this approach overestimates cost savings, to what degree it does so is not known. At the other extreme, Model 2 is based on the assumption that only the rate of claims has changed, and that there has been no reduction in the severity of injuries. This approach is considered to be conservative and almost certain to underestimate the true cost savings, although again to what degree is not known. The third, intermediate approach (Model 3) is based on the assumption that the WDL data are accurate, and not contaminated by long-term lag effects as are the compensation data. The fact that WDL have fallen faster than claims indicates that the severity of injuries has been reduced, though to a lesser extent than suggested by the compensation data. Anecdotal evidence from a range of industry sources supports the notion that both injury frequency and severity have been reduced – that the average cost per claim is not as large as it used to be and WDL due to injury are not as great as they used to be. It is concluded that the intermediate estimate of cost savings based on Model 3 is likely to be the most accurate, and is to be preferred.
- 5.3.5 According to this model, the net cost of the VNBIPP to Jun-03 was \$1.1M, and the break-even point occurred early in financial year 2003-4, around 5 years after the commencement of the program.
- 5.3.6 The estimated pay-back period is sensitive, not only to assumptions about the extent of reduction in severity of injuries, but also to the level of ongoing expenditure (for equipment purchase, maintenance, training and administration) by both DHS and the agencies themselves.
- 5.3.7 The cost savings to Victorian public health service agencies in the post-implementation period (Mar-01 – Jun-03) are estimated to be \$6.4M per annum (Jun-03 dollars).<sup>5</sup> In the immediate post-implementation period these annual savings can reasonably be largely attributed to the initial investment in the intervention. However, to sustain the benefits at this level over the longer term, ongoing support and further expenditure will be required. The annual level of expenditure required to sustain the current level of effectiveness remains unknown, but it is likely to be considerably less than in the initial implementation period, and so ongoing savings should considerably outweigh ongoing costs.
- 5.3.8 Finally, it should also be stated that, over and above the uncertainties in the estimates due to incomplete or ambiguous data, and the uncertainties due to unexplained random variation between agencies and between time periods, this analysis of cost-benefit is inherently conservative for another reason. All sources of costs of the VNBIPP, being relatively easy to identify at the level of DHS and the health agencies, have been incorporated in the analysis. However, the calculation of benefits has been limited to readily quantifiable cost savings at organisational and societal level, and to the savings in those individual human costs which are taken into account when determining compensation payments. To the benefits derived from reduction in these monetarised costs can be added the less tangible personal benefits to the individual nurses who have avoided injury as a result of the project; to their families, friends and colleagues; to patients through reduced risk of injury; to both nurses in general and their patients through increased morale and job satisfaction; and to the society as a whole through the attendant productivity gains. These additional dimensions of benefit are no less real for being more difficult to pinpoint and quantify.

<sup>5</sup> Calculated as 40% of the savings for the 10 quarter post-implementation period.

## 6. Components for success and sustainability

### 6.1 Components Identified in the Survey of Agencies

- 6.1.1 The survey sent to the agencies (see paragraphs 3.1.7 to 3.1.11) had a section devoted to identifying key components contributing to success and sustainability of back injury prevention programs within their particular organisation. Key components were classified according to the following areas:
- factors in the external environment;
  - factors in the organisational environment;
  - design and suitability of the physical work environment;
  - design and suitability of equipment suitability;
  - acceptance & implementation of rules & procedures;
  - knowledge & competence of staff.
- 6.1.2 For each of the classifications above survey respondents were asked to identify features or components that either contributed to the success of the program in their agency, or could be regarded as barriers to success. This process was completed in the two contexts of present (current) and future sustainability.
- 6.1.3 To stimulate thought and engagement, a sample response was given in 16 of the 24 (6 x 4) cells. Such "seeding" of comments can improve the response rate, but it introduces bias by presenting ideas which can simply be reflected back. The impact of this bias was minimised by choosing what were considered to be uncontroversial and obvious responses. Perhaps of more interest were the other "original" responses. A summary of responses can be seen in Table 12. Emboldened responses in Table 12 are those that were included as sample responses. It should be noted that in most cases, individual responses were quite specific and detailed, and not simply reiterations of the examples provided. The percentages shown are the number who mentioned each point expressed as a percentage of the number responding to that particular category. Of a total of 52 survey responses, the number of responses in each cell of Table 12 varied from 30 to 52. Because the survey was addressed jointly to CEOs and DONs, the responses received were considered to be authoritative and to accurately reflect the views of management of the agencies surveyed.
- 6.1.4 The key issues identified as contributing to the perceived current success of the program may be summarised as follows:
- this was a good idea readily accepted by staff;
  - a sound philosophy that presented an opportunity for changes in workplace design;
  - availability of well-designed & easy to use equipment;
  - integrated and effective training program;
  - organisational support.
- 6.1.5 With regard to perceived barriers to current success four main points were identified:
- physical constraints, e.g. environmental, building, space, floors, etc (usually associated with older structures);
  - lack of funding at both internal and external levels;
  - resource issues (time, staff, equipment);
  - staff complacency & resistance to change.
- 6.1.6 The identification of factors required for future success & sustainability of the program was reasonably wide-spread, however, two factors emerged more so than others. These were
- ongoing support (including management, DHS, ANF, time allocation, commitment to staff, funding);
  - ongoing training.

Table 12: Summary of survey comments

	To date		Future sustainability			
	Success factors	%	Barriers	%	Success factors	%
Factors in the EXTERNAL ENVIRONMENT (Including Strategic Context and Decision Making)	Acceptance of concept	53	Lack of funding	38	Inclusion in tertiary courses	40
	DHS Funding & support	35	Rural location (isolation)	17	On-going support Mgt,DHS,ANF	23
	ANF Support	18	Lack of community awareness & lack of communication	14	On-going funding	21
	Publicity & Media	14			State-wide implementation	16
Factors in the ORGANISATIONAL ENVIRONMENT (Including Strategic Context & Decision Making)	Top Down Commitment	41	Resource issues (time, staff, eqpt)	32	On-going training	53
	Organisational Support	27	Staff complacency	23	Mgt commitment & support	20
	Integrated Training Package	27	Limited/ Insufficient funds	20	Allocated time for co-ords, etc	20
	Effective Training Program	25	Staff turnover	14	Compliance monitoring	18
Design and suitability of the PHYSICAL WORK ENVIRONMENT	Opportunity to take underlying philosophy into account in new designs and re-developments	74	Physical constraints	77	Adoption of philosophy in new designs and refurbishments.	63
			Lack of storage space	53	Lack of funding	32
			Floor covering issues	23	Inadequate storage	19
			Lack of funding for capital works	19		
Design and suitability of EQUIPMENT	Good design & ease of use	42	Eqpt maintenance, cleaning, repair	28	Establishing an equipment maintenance program	49
	Up-to-date & good range	28	Limited funds for replacing/ buying equipment	28	Establishing policy & procedures for new purchases & up-grades	41
	Trial & evaluation before buying	22	Timely access to eqpt for public clients	28		
	Formal purchasing policy in place	18				
Suitability, acceptance and implementation of RULES AND PROCEDURES	Ready acceptance by staff	63	Complacency/resistance to change	32	Incorporating into policy	29
	Included in policy statements	39	Time for cultural change to occur	23	On-going commitment to staff	29
			Initial lack of understanding of concepts & underlying philosophies	14	On-going annual competencies, audits, training & policy review	24
KNOWLEDGE AND COMPETENCE of staff	Annual competency assessment	27	Lack of resources - time & funding	48	On-going training program	44
	On-going training	20	Assessment, & un-coordinated trng	33	Competencies part of KPI's	30
	Trainers - well trained, accepted	16	Staffing	17	All staff to be trained	23
					Complacency & apathy	15

6.1.7 Other factors of potential interest included:

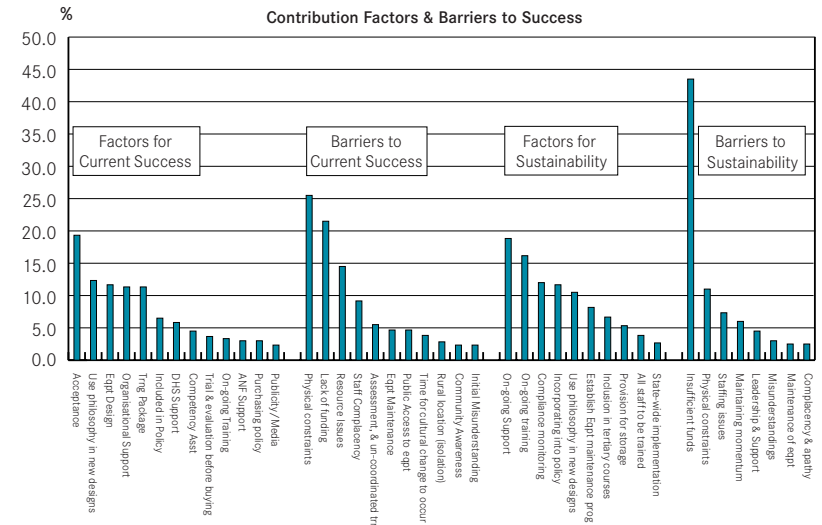
- compliance monitoring (involving on-going annual competencies, audits, training & policy reviews, and including competencies as part of KPIs);
- incorporating philosophy into policy (general policy as well as new purchases).

6.1.8 The two main issues identified as potential barriers to future sustainability were funding (the most strongly differentiated of all responses) and physical constraints of the work place.

6.1.9 Isolation from main centres of activity was also cited as an inhibiting factor by a number of rural agencies. This perception was supported by the consistently higher claims rates in country areas (see Figure 6).

6.1.10 These and other potential barriers are illustrated in Figure 9, which provides a comparison of response frequencies for the categories listed.

Figure 9: Factors identified as contributing to or hindering current success and future sustainability



## 6.2 Relating Agency Characteristics to Performance

6.2.1 There was a perception among members of the VNBIPP Advisory Committee, based on anecdotal evidence and their own observations, that the VNBIPP intervention had succeeded to various degrees in different locations. It was suggested that differences in organisational environments and implementation processes may have influenced the degree of success and the sustainability of that success. In some settings the change in culture may have been better embedded and it may have extended more effectively to long term decision makers with the power to influence decisions about future equipment purchases, processes or human resource practices.

6.2.2 Whilst "success" may be considered to be multi-faceted, the key visible measure of success in this analysis is the rate of back injury claims. Individual comparisons were made between the claims rates of 15 of the larger health services and the state-wide trend, in order to identify two agencies which differed markedly with regard to this criterion. The larger services were used because smaller services had small and volatile claims counts, including high proportions of quarters with no claims. Two particular cases were selected as exemplars on the basis of their very different patterns of quarterly standard back injury claims/1000 EFTNS. The two cases were matched for size, capacity, service delivery, geographical context and available resources. Figures 10 and 11 show the respective traces for both cases in comparison to the state-wide trend.



Figure 10: Nurse back injury claims/1000 EFTNS for Case 1

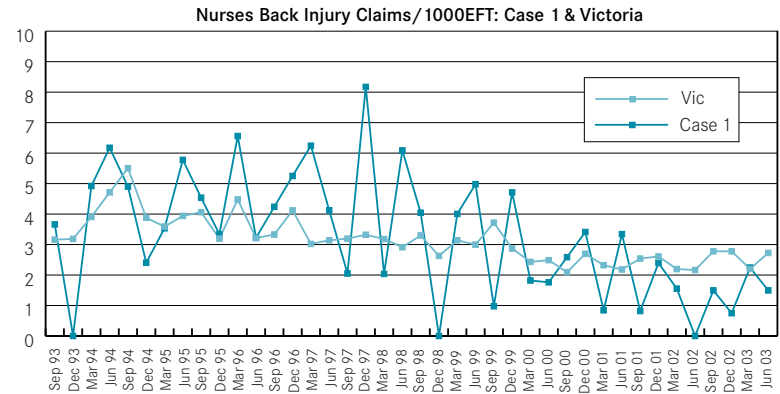
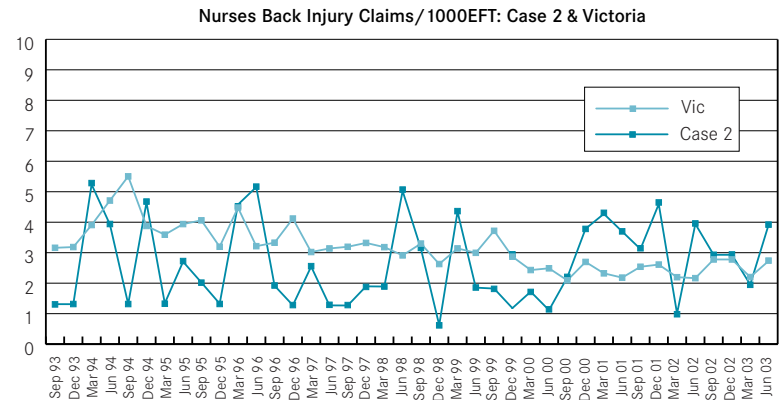


Figure 11: Nurse back injury claims/1000 EFTNS for Case 2



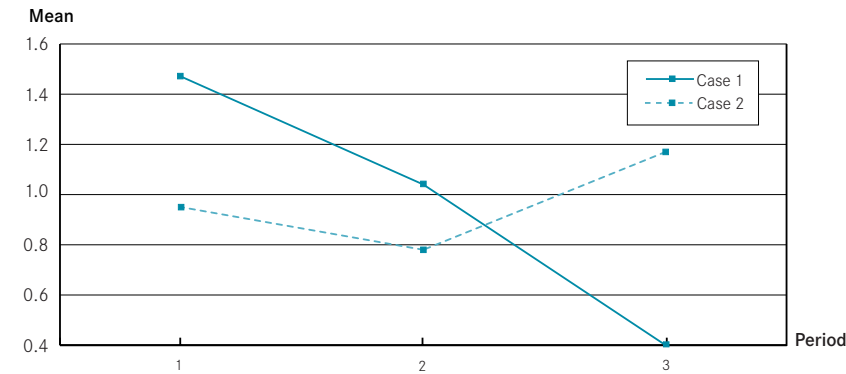
- 6.2.3 From these traces it is evident that for Case 1 there has been a decreasing trend similar to that seen for the state-wide data. This trend is not apparent for Case 2, for which no clear trend is apparent.
- 6.2.4 Table 13 shows the mean quarterly claims incidence rates for both cases for the defined time periods under Model 1 (see Table 6). The decreasing state-wide trend is seen to be amplified in Case 1. Case 2 started off with a lower mean quarterly claims incidence rate but currently has a higher mean rate than the means for both Victoria and Case 1.

Table 13: Mean quarterly claims/1000 EFTNS

Period	Victoria	Case 1	Case 2
1	3.652	4.362	2.598
2	2.836	2.830	2.177
3	2.450	1.494	3.235

6.2.5 This is also seen in the interaction plot (Figure 12) resulting from a 2-way ANOVA of claims/1000 EFTNS by case and period. The results showed a significant interaction between case and period ( $p < 0.001$ )

Figure 12: Interaction plot for Cases 1 & 2 over Model 1 time periods.



6.2.6 Given the demonstrated difference between the two cases, a comparison was made of their respective survey responses to identify key components contributable to success and sustainability. Summaries of their survey comments are given in Table 14.

Table 14: Summary of survey comments for Cases 1 & 2

	Current Success	Current Barriers	Future Success	Future Barriers
Factors in the External Environment				
Case 1	Org'n has accepted the concept of "no lift" as a means of preventing back injuries.	Differing programs at different sites, therefore lack of consistency in the Health Service	Future appointment of XXX-Health No Lift co-ordinator as resource.	Financial constraints
Case 2	acceptance of no lift as best industry practice			
Factors in the Organisational Environment				
Case 1	Positive Management commitment and motivation with allocation of specific EFT at some sites.		Future sustainability needs ongoing designated co-ordinator of policy and continued Exec support. Staff enthusiasm to take part in the program.	Not having campus specific facilitators of "no lift" programs at all sites.
Case 2	Training program extensive, training provided very good.nd	size of Network, time taken to rollout to all staff	Continue with No Lift programs that includes training and adheres to OH & S legislation	Funding for training programs

Table 14: Summary of survey comments for Cases 1 &amp; 2 (cont)

	Current Success	Current Barriers	Future Success	Future Barriers
<b>Design and suitability of the Physical Work Environment</b>				
<b>Case 1</b>	The purchase of new electric beds, lifters and equipment. Re-develop't of our Acute ward – spacious and work-friendly.	Some areas have space restrictions, particularly around bed areas, causing difficulties in implement'n. Age of buildings.	Staff involved in any future workplace redesign prior to it taking place, including storage facilities.	Financial constraints preventing upgrades of aging environments
<b>Case 2</b>	Have new physical environment for most of the organisation	Age, size of rooms in some facilities creates problems with space. Does not allow for manoeuvring of lifting equipment. Diff't floor surfaces in facilities cause problems with moving lifting machines trolleys etc	New buildings in facilities with wards that provide adequate room for moving of lifting equipment, storage of equipment	Older wards will still have problems
<b>Design and suitability of Equipment</b>				
<b>Case 1</b>	Current lifting machines esp the standing transfer machines are appropriate for the tasks required of them. Intro of slide sheets a great innovation.	Diversity of patients requiring a variety of equipment, specific equipment problems at some sites.	Structured approach to future purchases where trial process is undertaken to assess suitability prior to purchase.	Lack of any future DHS funding from VNBIPP project for equipment, and no current internal funding available.
<b>Case 2</b>	Design of equipment satisfactory, especially new equipment	No regular maintenance program to keep equipment maintained.	Equipment maintenance and funding for equipment replacement	
<b>Suitability, Acceptance &amp; Implementation of Rules &amp; Procedures</b>				
<b>Case 1</b>	Staff have embraced the concept. High % of compliance with annual skills competency.	Promoting a culture of change in long serving staff can be a slow process.	Appointment of agency co-ordinator and on-site staff dedicated to implement consistent policies.	Lack of funding for these staff
<b>Case 2</b>	No lift policy well accepted	Resistance by some staff		
<b>Knowledge &amp; Competence of Staff</b>				
<b>Case 1</b>	Enthusiastic and supported staff have a far greater ownership and compliance of policy and correct procedures.	Lack of equipment causing non compliance.	Commitment to ongoing training & implementation through structured training & assessment. Being open minded about future purchases & developments	Lack of managerial coordination of a Back Injury Prevention program.
<b>Case 2</b>		Difficult for all staff to be assessed for competency.		

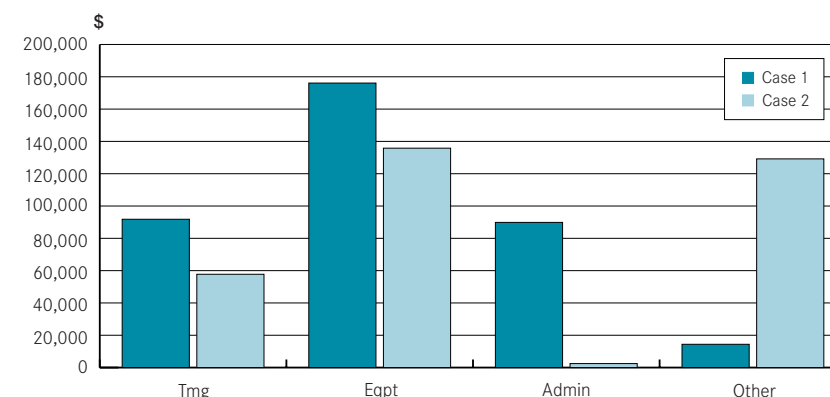
6.2.7 The survey provided 24 opportunities for comments to be made in contexts relating to various aspects dealing with the overall work environment in relation to components contributable to success and sustainability of back injury programs. Case 1 provided 23 comments and Case 2 provided 15 comments. Case 2 provided very little comment with respect to *Factors in the External Environment* and *Knowledge & Competence of Staff*

6.2.8 With respect to *Factors in the Organisational Environment* comments from Case 1 reflected more of a focus upon management of the training program rather than the program itself which was the focus of the comments from Case 2. This may well reflect the fact that Case 2 commenced training in August 2001, whereas Case 1 commenced in February 1999.

6.2.9 Differences are also observed between the comments in relation to *Future Success* with respect to the *Design and Suitability of the Physical Work Environment* and *Equipment*. In both instances the comments from Case 1 reflect a more mature program and tend to be more proactive.

6.2.10 Figure 13 shows the different expenditure patterns for total funds (both DHS funds and facility funds) for both Cases 1 & 2. It should be noted that for Case 2 the large amount spent in the "Other" category was described as "productivity improvement funds".

Figure 13: Comparison of funding and expenditure /1000 EFTNS for Cases 1 &amp; 2



6.2.11 The differences in expenditure for training and equipment may be explained by the 2 years difference in start dates for Cases 1 & 2. However, the larger differences in expenditure for the categories *Administration* and *Other* cannot be explained this way. Rather, these differences are more likely to reflect differences in policy or priority with respect to the VNBIPP. It is understood that administration costs are primarily concerned with No Lifting co-ordinator positions.

6.2.12 Specifically, it is apparent from this case study that Case 1 reported an organisational commitment to the program and a willingness to empower staff and include them in decision making. Issues such as sustainability and the need for the organisation to enthusiastically embrace the policy were important enough to warrant mention in the survey return. Terms such as 'open mindedness', 'staff enthusiasm' and staff involvement were included in the responses made. It appears that the VNBIPP and the No Lifting policy had influenced the culture of the organisation. Conversely, Case 2 seemed to reflect a more traditional OH&S approach based on a 'mechanistic' or systems-oriented perspective, with a focus on equipment, facilities and legislation. Issues addressed included concern for the cost of the policy implementation, need for a regular maintenance program, need for equipment storage and the need to adhere to OH&S legislation. Whilst no direct causal relationship has been established, these differences may well represent potential explanatory indicators for the different patterns of quarterly back injury claims by nurses in different agencies.

## 7. An instrument for assessing competency

- 7.1.1 Whilst No Lifting competency assessment tools have been provided to the great majority of facilities by consultants employed during the VNBIPP, a requirement of the present evaluation was the development of a standardised and valid instrument for assessing competency in No Lifting practices, as a reference point for the industry as a whole.
- 7.1.2 The methodology originally proposed by the evaluation team referred to the Worksafe Victoria guidelines publication (WorkSafe Victoria, 2002) as representing "the body of knowledge" with regard to best practice in No Lifting. In particular Tools 2 and 4 in this document deal with the requirements for competency in No Lifting practices, and in fact lists 30 tasks comprising "on bed/off bed" movements with patients "able to assist" or "not able to assist". Whilst Tool 1 (Risk Assessment) is an integral part of the No Lifting program, Tools 1 and 3 are more associated with local implementation policy rather than individual competencies.
- 7.1.3 It was assumed that content validity (i.e. that the instrument relates to the domain to which it is intended to relate) had already been established by extensive consultation during the development of the Worksafe document, although it was recognised that this would require continual updating as equipment changes and procedures are adapted.
- 7.1.4 A program was proposed for development of a generic but comprehensive instrument to be used to assess competency, and for empirically testing the inter-rater reliability, intra-rater reliability and convergent validity of this instrument. It was recognised that for ethical and logistical reasons this empirical testing would necessarily involve controlled simulated environments and surrogate subjects rather than actual patients and nurses.
- 7.1.5 However, after considerable consultation with DHS, the VNBIPP Advisory Committee and a working party of industry informants, it was agreed that a self-contained, detailed and prescriptive assessment instrument was not required. Rather what was required was a generic instrument in the form of a "secondary checklist", which does not itself embody the specifications of competent performance, but rather provides a consistent framework for competency assessments to be made, with reference to existing "primary" resources such as published WorkSafe guidelines (WorkSafe Victoria, 2002), and agency-specific training materials. It was considered essential that such a tool be seen as part of an integrated package of training and assessment.
- 7.1.6 A working party of experienced practitioner/assessors was convened by DHS to advise the evaluation team on the development of this instrument (see Appendix 3 for a list of participants). The working party and the evaluation team agreed on the following principles:
- The instrument should emphasise the No Lifting philosophy, principles and techniques.
  - The instrument should be relatively short and simple to use.
  - The scope should encompass: knowledge of policies and procedures; understanding of principles; and skills.
  - The instrument should be both generic in form, and capable of adaptation to local contexts.
  - The assessment criteria should be clearly delineated, but not spelt out in prescriptive detail.
  - The instrument should provide a framework which is potentially applicable in all facilities, all units, and at all levels of the training/testing/accreditation/certification hierarchy.
- 7.1.7 In order to comply with principle (e) above, and to resolve the competing requirements within principles (c) and (d), it was agreed that the instrument would:
- include a common core of knowledge, understanding and skill-based competency items, with provision for the addition of further facility-specific and unit-specific skill-based items;
  - include generic specifications for assessing competence; and
  - make reference to secondary sources for all substantive details of required competencies.

It was agreed that the secondary sources would include the publications *Transferring People Safely* (WorkSafe Victoria, 2002), *Manual Handling Regulations*, 1999, *Manual Handling Code of Practice* (WorkSafe 2000), Australian Nursing Federation (Victorian Branch) No Lifting Policy, 2003, together with facility training manuals and other facility-specific and unit-specific documentation.

- 7.1.8 The instrument was drafted and refined with reference to relevant publications (including DHS, 2004; NOHSC, 1990), and in consultation with the members of the working party and with key individuals experienced in the development and delivery of training programs compliant with the ANF No Lifting policy. The instrument can be found in Appendix 4.
- 7.1.9 Because the instrument is a secondary tool rather than a primary measuring instrument, the issue of reliability was no longer relevant. However, external validation by practitioners in the workplace is both ethically and logistically feasible. To date, the instrument has been field tested by members of the working party, and feedback has been very positive. It is planned to extend the field testing to other practitioners in the near future.

## 8. Conclusion

### 8.1 Longitudinal Analysis

- 8.1.1 This evaluation encompassed all 111 facilities which received funding from the DHS VNBIPP over four funding rounds and over the period 1998-2003 since the inception of the project. Sources of information included compensation data from VWA; and surveys of industry participants.
- 8.1.2 The primary longitudinal analysis employed was an analysis of standard claim frequencies and standard claim incidence rates per 1000 equivalent full time nursing staff (EFTNS). The longitudinal methodology employed utilises both analysis of variance (ANOVA) and a time series approach involving multiple regression methods. The ANOVA approach extended the pre-post comparisons made in a previous evaluation (DHS, 2002).
- 8.1.3 When the periods before and after initial implementation of the VNBIPP were compared, it was concluded that a statistically significant reduction had occurred in mean quarterly standard back injury claim incidence rates per 1000 EFTNS ( $F = 13.83, p < 0.0005$ ). Mean quarterly standard back injury claim rates were estimated to be 3.473 claims/1000 EFTNS before initial implementation and 2.647 claims/1000 EFTNS after initial implementation. This represents a 24% reduction in standard back injury claims/1000 EFTNS by nurses in public health service agencies in Victoria.
- 8.1.4 This result was further supported by an analysis which examined trends within the periods before, during and after initial implementation. It was concluded that there was no statistically significant trend in quarterly back injury claim rates in the period before initial implementation of the VNBIPP, and that the claim rate declined at a statistically significant rate during the time of initial implementation (transformed slope coefficient =  $-0.013, p = 0.031$ ). In the period after initial implementation the quarterly claim rate again stabilised at the new lower level, and once again there was no statistically significant trend.
- 8.1.5 Mean quarterly working days lost associated with standard back injury claims were reduced from 351 days/1000 EFTNS before initial implementation to 223 days/1000 EFTNS after initial implementation. This represents a 41% reduction in working days lost associated with standard back injury claims by nurses in public health service agencies in Victoria. Altogether, from Dec-98 to Jun-03, total savings in working days lost are estimated to have been 35,716 days.
- 8.1.6 The average working days lost per claim was also reduced from 99.6 days per claim in the pre-implementation period to 77 in the post-implementation period, representing a reduction of 23%. This would appear to indicate a reduction in the severity of injuries as well as the rate of injuries, although it may also be due at least in part to changes in the management of injuries and rehabilitation procedures.
- 8.1.7 Changes in the costs of claims are difficult to estimate because lags in finalising claims result in uncertainty in the more recent post-implementation compensation data. A simplistic analysis of compensation data as it exists indicates a reduction of 80%, however this is not valid due to the lags in finalizing claims. Two indirect estimates have been made of the eventual percentage reduction in annual cost of claims per 1000 EFTNS, after all claims have been finalised. These estimates are 24% (based on the reduction in the claims incidence rate, which assumes no change in the average cost per claim) and 41% (based on the reduction in the annual working days lost per 1000 EFTNS, which implies reductions in both the number of claims and the average cost per claim). The intermediate figure of 41% is regarded as providing the best indication of the true reduction in the costs of claims.
- 8.1.8 These results are broadly consistent with those of the previous evaluation (DHS, 2002); however the estimated changes are less pronounced than those reported in that evaluation. This difference may be explained by the substantial differences in the two methodologies used. The previous evaluation was based on injury data obtained directly from agencies, and was specifically targeted at the wards in which the No Lifting program was implemented in the 27 agencies funded under round 2 of the VNBIPP. Data from 72 wards was analysed, but it was not reported what proportion of participating wards this represented. The evaluation involved a timeframe of three years - two years pre-implementation and one year post-implementation. The present evaluation was based on standard back injury claims data from VWA pertaining to all 111 agencies, and spanning a 10-year period pre-, during and post- the VNBIPP initial implementation period. It might be expected that the maximum benefit would occur in specifically targeted wards, and that these benefits would be diluted when the whole sector is considered.

Furthermore, in the present evaluation, explicit adjustments were made for the uncertainties inherent in the more recent post-implementation compensation data, for changes in the size of the workforce, and for the time value of money over the period. For these reasons, it is contended that the conclusions drawn in this evaluation are robust and applicable to the Victorian public health service sector as a whole. Nevertheless, for those wards in which the VNBIPP was implemented, the effectiveness of the intervention is likely to be greater than is indicated by this evaluation.

### 8.2 Cost-benefit analysis

- 8.2.1 Within the scope of the cost-benefit analysis model used, the total cost of the VNBIPP intervention over the period (Dec-98 - Jun-03) is estimated to be \$24.4M (Jun-03 dollars). Estimated cost savings for the same period calculated using the three different models range from \$13.5M to \$38.7M, with the overall financial outcome ranging from a net cost of \$10.9M to net cost savings of \$14.3M.
- 8.2.2 The disparity in these estimates results from different assumptions about the underlying processes. This is in turn a consequence of doubts about the accuracy of recent compensation data due to lag effects, which necessitates the use of indirect models founded on different assumptions.
- 8.2.3 Other factors contributing to the difficulty of making accurate and valid comparisons were:
  - a. great variability in both the cost of individual claims and in the claims incidence rates from agency to agency and from year to year
  - b. a lack of comprehensive data on staff numbers, which necessitated a separate modelling exercise in order to estimate staff numbers from available remuneration data.
- 8.2.4 The most optimistic estimate of cost benefits is based on taking the compensation data at face value, i.e. regarding compensation payments to date as being complete and final. Whilst it is certain that this approach overestimates cost savings, to what degree it does so is not known. At the other extreme, it can be assumed that only the rate of claims has changed, and that there has been no reduction in the severity of injuries. This approach is considered to be conservative and almost certain to underestimate the true cost savings, although again to what degree is not known. The third, intermediate approach is based on the assumption that the WDL data are accurate, and not contaminated by long-term lag effects as are the compensation data. The fact that WDL have fallen faster than claims indicates that the severity of injuries has been reduced, though to a lesser extent than suggested by the compensation data. Anecdotal evidence from representatives of a number of facilities supports the notion that both injury frequency and severity have been reduced - that the average cost per claim is not as large as it used to be and WDL due to injury are not as great as they used to be. It is concluded that the intermediate estimate of cost savings based on this third model is likely to be the most accurate, and is to be preferred.
- 8.2.5 According to this model, the net cost of the VNBIPP to Jun-03 was \$1.1M, and the break-even point occurred early in financial year 2003-4, around 5 years after the commencement of the program. This result, together with the reasonable presumption that there will be ongoing financial benefits and the acknowledged fact that there are many additional unmeasured benefits, represents an excellent return on investment.
- 8.2.6 The estimated pay-back period is sensitive, not only to assumptions about the extent of reduction in severity of injuries, but also to the level of ongoing expenditure (for equipment purchase, maintenance, training and administration) by both DHS and the agencies themselves.
- 8.2.7 The cost savings to Victorian public health service agencies in the post-implementation period (Mar-01 - Jun-03) are estimated to be \$6.4M per annum (Jun-03 dollars). In the immediate post-implementation period these annual savings can reasonably be largely attributed to the initial investment in the intervention. However, to sustain the benefits at this level over the longer term, ongoing support and further expenditure will be required. The annual level of expenditure required to sustain the current level of effectiveness remains unknown, but it is likely to be considerably less than in the initial implementation period, and so ongoing savings should considerably outweigh ongoing costs.

8.2.8 Finally, it should also be stated that, over and above the uncertainties in the estimates due to incomplete or ambiguous data, and the uncertainties due to unexplained random variation between agencies and between time periods, this analysis of cost-benefit is inherently conservative for another reason. All sources of costs of the VNBIPP, being relatively easy to identify at the level of DHS and the health agencies, have been incorporated in the analysis. However, the calculation of benefits has been limited to readily quantifiable cost savings at organisational and societal level, and to the savings in those individual human costs which are taken into account when determining compensation payments. To the benefits derived from reduction in these monetarised costs can be added the less tangible personal benefits to the individual nurses who have avoided injury as a result of the project; to their families, friends and colleagues; to patients through reduced risk of injury; to both nurses in general and their patients through increased morale and job satisfaction; and to the society as a whole through the attendant productivity gains. These additional dimensions of benefit are no less real for being more difficult to pinpoint and quantify.

### 8.3 Components for Success and Sustainability

- 8.3.1 Components have been identified which are perceived by CEOs, DONs and/or Program Co-ordinators to contribute to success and sustainability. Those factors perceived as contributing to the success of the program included: the program having a sound philosophical base; ready availability of well designed and easy to use equipment; and integrated and effective training programs developed specifically for the purpose. Organisational support was also mentioned as an important factor contributing to program success. Two main factors emerged as major requirements for future sustainability. These were: ongoing support from management and the broader industry including DHS and ANF; and ongoing training. Isolation from main centres of activity was also cited as an inhibiting factor by a number of rural agencies. This perception was supported by evidence of consistently higher claims rates in country areas.
- 8.3.2 The two major factors identified as being barriers to success and future sustainability included lack of funding, both within facilities and from external sources, and physical constraint issues such as inappropriate design and lack of storage space. Other factors such as resource issues, staffing issues, allocated time for program co-ordinators, staff complacency and the need to maintain the momentum established by the VNBIPP, were also mentioned relatively frequently.
- 8.3.3 There was a perception among the members of the VNBIPP Advisory Committee that the VNBIPP intervention had succeeded to various degrees in different locations. It was suggested that differences in organisational environments and implementation processes may have influenced the degree of success and the sustainability of that success. These issues were addressed in an illustrative comparison of two cases: one more successful in terms of the primary outcome measure used in the longitudinal study (quarterly back injury claims/ 1000 EFTNS), and one less successful. The two cases were matched for size, capacity, service delivery, geographical context and available resources.
- 8.3.4 It was concluded that the large differences in spending in relation to the categories *Administration* and *Other* were likely to reflect program management differences between the two locations. In responses to the survey of agencies, the agency which exhibited a substantial reduction in claims rate reported an organisational commitment to the program and a willingness to empower staff and include them in decision making. Issues such as sustainability and the need for the organisation to enthusiastically embrace the policy were clearly important. Terms such as 'open mindedness', 'staff enthusiasm' and staff involvement were included in the responses made, and it appeared that the VNBIPP and the No Lifting policy had influenced the culture of the organization, by fostering the creation of systems which include specific focus on staff involvement and empowerment. Conversely, the responses from the agency which exhibited no reduction in claim rate seemed to reflect a more traditional OH&S approach based on a more 'mechanistic' perspective, with a focus on equipment, facilities and legislation. Issues addressed included concern for the cost of the policy implementation, need for a regular maintenance program, need for equipment storage and the need to adhere to OH&S legislation. Whilst no direct causal relationship has been established, these differences may well represent potential explanatory indicators for the different patterns of quarterly back injury claims by nurses in different agencies.

### 8.4 An Instrument for Assessing Competency in No Lifting Practices

- 8.4.1 An instrument has been developed to aid in the assessment of competency of nursing staff in patient handling utilising No Lifting principles and techniques. It was designed with regard to the following principles elicited from a working party of industry informants:
- The instrument should emphasise the No Lifting philosophy, principles and techniques.
  - The instrument should be relatively short and simple to use.
  - The scope should encompass: knowledge of policies and procedures; understanding of principles; and skills.
  - The instrument should be both generic in form, and capable of adaptation to local contexts.
  - The assessment criteria should be clearly delineated, but not spelt out in prescriptive detail.
  - The instrument should provide a framework which is potentially applicable in all facilities, all units, and at all levels of the training/testing/accreditation/certification hierarchy.
- In accordance with these principles, the instrument which has been developed:
- includes a common core of knowledge, understanding and skill-based competency items based on No Lifting principles, with provision for the addition of further facility-specific and unit-specific skill-based items;
  - includes generic specifications for assessing competence; and
  - makes reference to secondary sources for all substantive details of required competencies. These sources include the publications *Transferring People Safely* (WorkSafe Victoria, 2002), *Manual Handling Regulations, 1999*, *Manual Handling Code of Practice* (WorkSafe 2000), Australian Nursing Federation (Victorian Branch) No Lifting Policy, 2003, together with facility training manuals and other facility-specific and unit-specific documentation.
- 8.4.2 The instrument has undergone limited initial field testing and has been assessed positively.

### 8.5 Issues for Future Consideration

- 8.5.1 This report adds to the growing body of evidence supporting the very considerable benefits to be gained from such interventions as the VNBIPP. Much of the existing evidence relates to small scale implementations involving up to six locations, (Engkvist, 2001, Passfield, et al, 2003, Collins et al 2004). This evaluation and its predecessor (DHS, 2002) relate to a large scale intervention in more than 100 locations across the State of Victoria. The cost benefits analysis has demonstrated an excellent return on the initial investment at all levels: individual nurses, health service agencies and the broader Victorian community. This is despite the acknowledged limitations of the evaluation methodology with regard to the indirect monetary costs of injury and the intangible benefits to individuals, organisations and the Victorian community.
- 8.5.2 To maximise the potential benefits the VNBIPP needs to be introduced into all sectors of the health industry. In addition, the current momentum needs to be sustained and maintained within those agencies who have participated in the VNBIPP. This will require leadership at all levels and consideration of a range of issues identified in this evaluation including
- facilitators and barriers to sustainability;
  - funding and resourcing;
  - equipment purchasing policies and procedures;
  - workplace design;
  - ongoing support by outside bodies, for example, DHS, ANF;
  - ongoing monitoring to ensure effective maintenance and sustainability of programs.



- 8.5.3 In particular the two factors most cited as requirements for future success and sustainability were continued funding and the need for the requirements of a No Lifting regimen to be considered as an integral part of future workplace design.
- 8.5.4 With regard to ongoing evaluation of projects of this nature, this report has identified the difficulties involved in evaluating such interventions, and particularly in attributing outcomes to specific components or aspects of the intervention, because of the high level of variability and the long time lags inherent in injury data. Both of these limitations can best be addressed by continuing the longitudinal evaluation further into the future.
- 8.5.5 The methodology developed in this evaluation could be extended into the future with relatively little demand on individual facilities for extra data. A consistent relationship has been shown to exist over a 10-year period between EFTNS and VWA remuneration data. So long as this relationship remains valid, then only records of ongoing expenditure on No Lifting programs would be required, with ongoing collection of injury data at a central level such as VWA assisting in the long term monitoring and evaluation of the intervention. Consideration should be given to instituting arrangements to enable supplementary evaluation in the future.
- 8.5.6 The methodological framework developed in this evaluation provides a model that could be usefully applied to the evaluation of other large scale occupational health and safety interventions.
- 8.5.7 The two evaluations of the VNBIPP, whilst their conclusions are in general agreement, have utilised different approaches. The first evaluation was sharply focused. The conclusions were based on one funding round and the data were more finely grained at ward level, but this fine detail was difficult and costly to obtain, and impossible to obtain completely. The second evaluation was global in scope – organizationally and temporally – and more cost-effective because of its greater reliance on VWA data. However, ward-level detail was not available, and more highly-aggregated data still proved difficult or impossible to obtain retrospectively from many facilities.
- 8.5.8 In order to better prepare for evaluations of large programs such as the VNBIPP, it is strongly recommended that evaluation data requirements be identified at the time that a project is being designed, and that appropriate record keeping, data management and reporting requirements be specified as a condition of grant funding. Appropriate professional advice about evaluation and data requirements should be obtained as an integral part of program development.

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Appendix 1: Victorian Nurses Back Injury Prevention Program Survey

Sheet 1: Agency contact details

Current Agency Name	CEO		DON		No-Lift Co-ordinator
Telephone					
e-mail					
Length of time in current position					
Time allocation budgeted for Co-ordinating No-Lift Program					
How is your organisation currently maintaining and sustaining the No-Lift program?					

Sheet 2: Agency campus details

WorkCover ID    Agency

Summary of campus details:

	WorkCover ID	Current Name	Address	Purpose	VNBIPP Funding? Yes/No
Campus 1					
Campus 2					
Campus 3					
Campus 4					
Campus 5					
Campus 6					
Campus 7					
Campus 8					
Campus 9					
Campus 10					
Campus 11					
Campus 12					
Campus 13					
Campus 14					
Campus 15					
Campus 16					
Campus 17					
Campus 18					
Campus 19					
Campus 20					

Sheet 3: Funding, expenditure, staffing and training by campus

Agency

VNBIPP Grant details

Amount Received

Date Received

1998/99

1999/2000

2000/01

2001/02

2002/03

Campus 1

VNBIPP Grant details

Amount Received

Date Received

1998/99

1999/2000

2000/01

2001/02

2002/03

EXPENDITURE DETAILS

VNBIPP Funds:

No-Lift Training

Equipment

Administration

Other

(For Other, Please Specify)

Own Funds:

No-Lift Training

Equipment

Administration

Other

(For Other, Please Specify)

Financial year estimates

1998/99

1999/2000

2000/01

2001/02

2002/03

Budgeted EFT Nursing Staff

Total Hours Worked by Nursing Staff

The annual total days lost due to back injury claims by nursing staff

The annual total days lost due to all injury claims by nursing staff

Estimate the following as at October 31st 2003

Date of commencement of No-Lift Training

% of nursing staff who have received No-Lift training (either at this campus or elsewhere)

% of nursing staff who have been assessed for competency in No-Lift practices

% of nursing staff who have had refresher training in No-Lift during the past 12 monthsSpecify)

Sheet 4: Equipment audit by CAMPUS

	Campus 1		Campus 2	
	Planned Target	Current Number	Planned Target	Current Number
<b>Beds, trolleys and accessories</b>				
Fully adjustable electric operated beds				
Adjustable electric or hydraulic trolleys				
Bed ropes / Bed sticks				
Overhead bars				
Pressure Mattress				
<b>People lifting equipment</b>				
Electric operated portable hoists & attachments				
Lifting hoist & slings				
Weigh scale attachments				
Jordan frame attachment				
Overhead tracking/ceiling hoists				
<b>Mobility/ ambulating equipment</b>				
Standing walker & slings				
Standing hoist and slings				
Overhead tracking/ceiling hoists				
Carer driven electric drive for wheelchair				
Electric wheelchairs				
<b>Toileting and showering</b>				
Shower chair				
Commode chairs				
Over the toilet frames				
Adjustable shower/bath trolleys				
<b>Slide transfer / Rolling equipment</b>				
Slide sheets				
Pat slide / Hover matt or slippery mattress				
Rolling frames				

Sheet 4: Equipment audit by CAMPUS (cont)

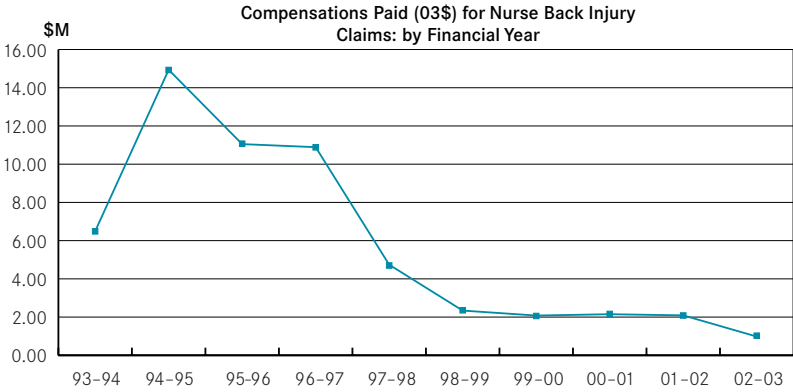
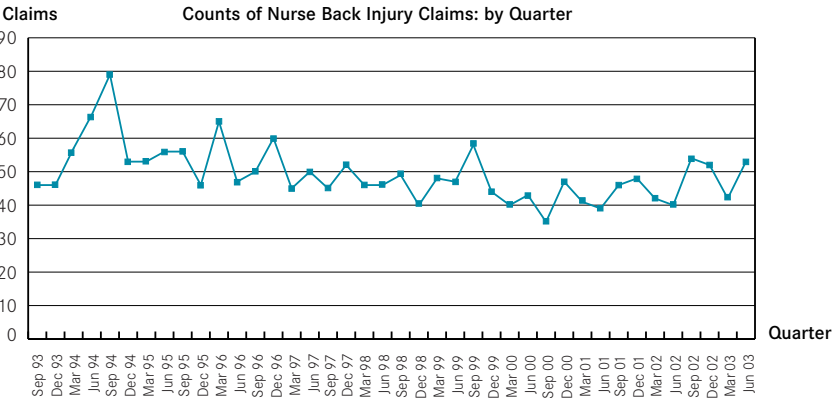
	Campus 1		Campus 2	
	Planned Target	Current Number	Planned Target	Current Number
<b>Seating</b>				
Fully adjustable chairs (gas assist or electric)				
Uplift gas hydraulic sit to stand aide				
<b>Furniture moving equipment</b>				
Bed & trolley moving equipment (eg. Gzunda)				
Chair moving equipment				
<b>Weigh scales</b>				
<i>Additional equipment specific to a clinical area</i>				
<b>Community</b>				
Portable fold down sling hoist				
Turn pad (to assist getting in/ out of cars)				
<b>Maternity</b>				
Fully adjustable electric labour bed				
Height adjustable stools				
Kneeling pads				
<b>Emergency</b>				
Scoop board				
<b>Radiology</b>				
X ray slider				

Equipment list (VNBIPP Advisory Ctee. Dept't Human Services, 2003)

Sheet 5: Success factors and barriers to success

	To date		Future sustainability	
	Success factors	Barriers	Success factors	Barriers
Factors in the EXTERNAL ENVIRONMENT (Including Strategic Context and Decision Making)				
Factors in the ORGANISATIONAL ENVIRONMENT (Including Strategic Context and Decision Making)				
Design and suitability of the PHYSICAL WORK ENVIRONMENT				
Design and suitability of EQUIPMENT				
Suitability, acceptance and implementation of RULES AND PROCEDURES				
KNOWLEDGE AND COMPETENCE of staff				

Appendix 2: Supplementary Plots: Counts and aggregate totals prior to conversion to standardised rates

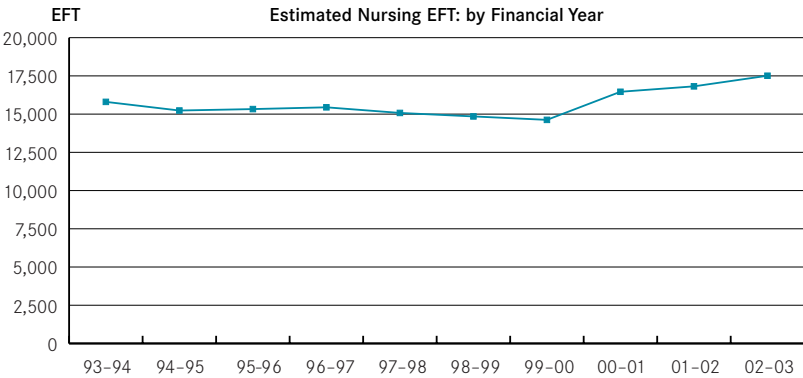
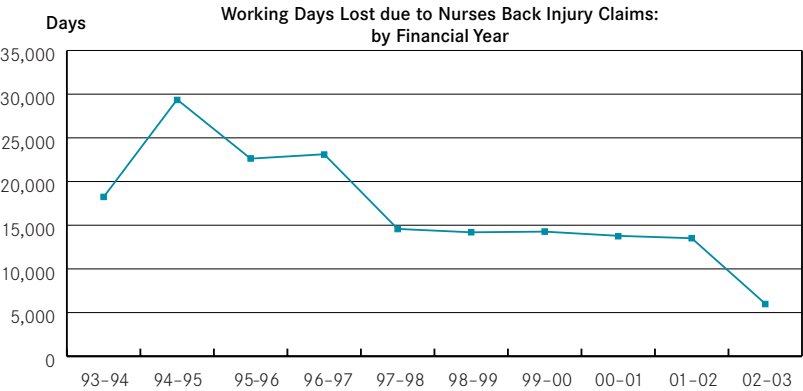


### Appendix 3: Competency Assessment Instrument for a Nurse Back Injury Prevention Program

#### Working Party

A working party of experienced practitioner/assessors was convened by DHS to advise the evaluation team on the development of this instrument. Members of the working party and their affiliations were:

- Kevin Finnigan, Melbourne Health
- Cheryl Carrick, Western Health
- Chris Sanders, St Vincent’s Health
- Katrina Passalacqua, Northeast Health
- Leonie Hancock, Southern Health
- Brendan Cottier, Austin Health





## Appendix 4: Competency Assessment Instrument for a Nurse Back Injury Prevention Program

### Introduction

This competency assessment instrument is designed to aid in the assessment of competency of staff in patient handling utilising no lifting principles and techniques.

### Using This Form

This instrument is designed for use on one occasion. If follow-up or repeated assessments are to be made, a separate form should be used on each occasion. A set of completed forms embodies an employee's competency assessment history. For the purposes of this document a training package is defined to be an appropriate training program that is based upon and supports the principles underlying Victorian Nurses Back Injury Prevention Project.

### What is Competence?

The International Labour Organisation (ILO) web site reports the following definition<sup>1</sup> of competence as applied in Australia: *AUSTRALIA (5): Competence is conceived as a complex structure of attributes necessary for the performance of specific situations. It is a complex combination of attributes (knowledge, attitudes, values and skills) and the tasks that must be performed in determined situations. This, which has been called a holistic approach, to the extent in which it integrates and relates attributes and tasks, permits various intentional actions to occur simultaneously, and considers the context and culture of the work place. It allows us to incorporate the ethics and values as elements of a competent performance.*<sup>2</sup>

### Competency Ratings

This Competency Assessment Instrument provides for the rating of competence at three levels, defined as follows:

Rating	Description
Competent: no prompting required	ALL of the following which are relevant to a particular assessment must be met: <ul style="list-style-type: none"><li>• Demonstrates an understanding of no lifting principles;</li><li>• Meets the stated criteria with no assistance;</li><li>• Performs all essential steps correctly;</li><li>• Demonstrates accuracy and safety in completing the required assessment;</li><li>• Demonstrates sequential process in assessing the patient;</li><li>• Demonstrates sequential process in performing the task;</li><li>• Performs the assessment within an acceptable time frame.</li></ul>
Competent with Prompting: some prompting required and areas for improvement identified	ALL of the following which are relevant to a particular assessment must be met: <ul style="list-style-type: none"><li>• Demonstrates an understanding of no lifting principles;</li><li>• Meets the stated criteria with minimal assistance (may require 1 or 2 prompts);</li><li>• Performs all essential steps correctly;</li><li>• Demonstrates accuracy and safety in completing the required assessment;</li><li>• Demonstrates sequential process in assessing the patient;</li><li>• Demonstrates sequential process in performing the task;</li><li>• Performs the assessment within an acceptable time frame.</li></ul>
Not competent	ANY of the following result in a "Not competent" assessment: <ul style="list-style-type: none"><li>• Unable to demonstrate an understanding of no lifting principles;</li><li>• Requires three or more prompts to complete the assessment task;</li><li>• Assessment task completed in an unacceptable time frame;</li><li>• The patient assessment process lacks sequence or is disorganised;</li><li>• The performance of the task lacks sequence or is disorganised;</li><li>• A breach of safety occurs.</li></ul>

### Additional Resources/References

<sup>1</sup> In this context, competence and competency are synonyms  
<sup>2</sup> <http://www.ilo.org/public/english/region/ampro/cinterfor/temas/complab/xxxx/1.htm#AUSTRALIA>, accessed 6 April 2004

### Additional Resources/References

This document has been developed through the Department of Human Services Victorian Nurses Back Injury Prevention Project (VNBIPP). Primary information sources have been referred to within the form. The following list includes additional sources of more detailed information.

Australian Nursing Federation (Victorian Branch) No Lifting Policy, 2003 ([www.anfvic.asn.au](http://www.anfvic.asn.au))

Australian Nursing Federation (Victorian Branch) *No Lifting Policy Implementation Guide and Checklist, 1998* ([www.anfvic.asn.au](http://www.anfvic.asn.au))

Department of Human Services, 2004. *Implementation Framework for the Introduction/Maintenance/ Extension of Nurse Back Injury Prevention Programs* (available [www.nursing.vic.gov.au](http://www.nursing.vic.gov.au))

Department of Human Services, 2002, *Victorian Nurses Back Injury Prevention Project Evaluation Report 2002*. (available [www.nursing.vic.gov.au](http://www.nursing.vic.gov.au))

Manual Handling Code of Practice (Victoria), 2000 (available from [www.workcover.vic.gov.au](http://www.workcover.vic.gov.au))

The Victorian Occupational Health and Safety Act 1985, s21, s25 (available at [www.ohsrep.org.au](http://www.ohsrep.org.au))

The Occupational Health and Safety (Manual Handling) Regulations 1999, reg 16 (available at [www.eduweb.vic.gov.au/HRWeb/ohs/accp/manual](http://www.eduweb.vic.gov.au/HRWeb/ohs/accp/manual))

WorkSafe Victoria, 2002. *Designing Workplaces for Safer Handling of Patients/Residents: Guidelines for the Design of Health and Aged Care Facilities*. 2nd Edition 2002

(available at [www.workcover.vic.gov.au/dir090/vwa/publica.nsf](http://www.workcover.vic.gov.au/dir090/vwa/publica.nsf))

WorkSafe Victoria, 2002. *Transferring People Safely: a practical guide to managing risk: handling patients, residents and clients in health, aged care, rehabilitation and disability services*.

(available at [www.worksafe.vic.gov.au](http://www.worksafe.vic.gov.au))

### Acknowledgements:

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The development of this competency assessment tool was informed by the WorkSafe Transferring People Safely Guide, together with assessment approaches developed under the O'Shea No Lift System (O'Shea and Associates).

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## Competency Assessment Instrument for a Nurse Back Injury Prevention Program

Employee's name:	Signature	Date
Assessor/Trainer's name:	Signature	Date

C = Competent: no prompting required      P = Competent: some prompting required      N = Not competent

Criteria	Resources	C	P	N	Comments
<b>Objective 1: The employee understands the importance of occupational health &amp; safety and acts in accordance with Manual Handling guidelines and principles of no-lifting</b>					
1.1 The employee demonstrates an understanding of the employer statutory duty of care.	NUM, ANUM Training Package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2 The employee demonstrates an understanding of his/her own duty of care in relation to the Victorian Occupational Health & Safety Act & Manual Handling Regulations.	Training Package, OH&S Rep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.3 The employee demonstrates an understanding of the principles of no-lifting.	Training Package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Objective 2: The employee demonstrates an understanding of risk management in the context of the transfer of Patients/Residents</b>					
2.1 The employee understands the importance and principles of incident reporting and can explain the process for reporting incidents in their workplace.	Training Package  Local procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.2 The employee understands the organisation's Patient Handling policy and its implications	Training Package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.3 The employee can explain the risk management process in the workplace with respect to hazard identification, risk assessment and risk control.	Training Package & <i>Transferring People Safely</i> (WorkSafe) & M/H COP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.4 The employee demonstrates an understanding of risk assessment principles associated with the physical environment, work practices and a patient's/resident's ability to assist.	Training Package & <i>Transferring People Safely</i> (WorkSafe)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.5 The employee understands the importance and procedures involved for proper storage & maintenance of equipment	Training Package, Local procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Objective 3: The employee is able to identify &amp; assess the risks associated with a Patient/Resident according to their needs &amp; abilities</b>					
3.1 The employee is able to: <ul style="list-style-type: none"> <li>identify the Patient/Resident Risk Assessment Form;</li> <li>show where this form is kept;</li> <li>explain how it is used;</li> <li>identify who conducts the assessment.</li> </ul>	Local Procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.2 The employee is able to assess the Patient/Resident's ability to assist with on-bed tasks.	Training Package & <i>/or Transferring People Safely</i> (WorkSafe)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.3 The employee is able to assess the Patient/Resident's ability to assist with off-bed tasks.	Training Package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.4 The employee is able to explain procedures to the patient prior to performing the patient handling task.	Training Package	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.5 The employee understands who to contact for assistance in non-standard/problematic situations.	Local Procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Criteria	Resources	C	P	N	Comments
<b>Objective 4: The employee can use appropriate Patient Handling techniques with Patients/Residents who can assist</b>					
4.1 The employee is able to demonstrate the following for those who <b>can assist with on-bed tasks</b> : <ul style="list-style-type: none"> <li>a) Sitting the Patient/Resident up in bed</li> <li>b) Moving the Patient/Resident up in bed</li> <li>c) Rolling the Patient/Resident in bed</li> <li>d) Sitting the Patient/Resident on the side of the bed</li> </ul>	Training Package & <i>or Transferring People Safely</i> (WorkSafe)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.2 The employee is able to demonstrate the following for those who <b>can assist with off-bed tasks</b> : <ul style="list-style-type: none"> <li>a) Transferring the Patient/Resident from bed to chair</li> <li>b) Transferring the Patient/Resident from chair to bed</li> <li>c) Transferring the Patient/Resident from chair to chair</li> <li>d) Transferring the Patient/Resident from the floor using emergency techniques</li> </ul>	Training Package & <i>or Transferring People Safely</i> (WorkSafe)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Objective 5: The employee can use appropriate no-lifting techniques with Patients/Residents who cannot assist.</b>					
5.1 The employee is able to demonstrate the following for those who <b>cannot assist with on-bed tasks</b> : <ul style="list-style-type: none"> <li>a) Sitting a Patient/Resident up in bed</li> <li>b) Rolling the Patient/Resident</li> <li>c) Moving the Patient/Resident up the bed using the slide sheets</li> <li>d) Turning the Patient/Resident using the slide sheet</li> </ul>	Training Package & <i>or Transferring People Safely</i> (WorkSafe)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.2 The employee is able to demonstrate the following for those who <b>cannot assist with off-bed tasks</b> : <ul style="list-style-type: none"> <li>a) Transferring the Patient/Resident from bed to trolley using an appropriate aid.</li> <li>b) Transferring the Patient/Resident from bed to chair using an electrical hoist.</li> <li>c) Transferring the Patient/Resident from chair to bed using an electrical hoist.</li> <li>d) Transferring the Patient/Resident off the bed using a stretcher frame or an electrical hoist.</li> <li>e) Transferring the Patient/Resident from floor to bed using an electrical hoist.</li> <li>f) Transferring the Patient/Resident from the floor using emergency techniques.</li> </ul>	Training Package & <i>or Transferring People Safely</i> (WorkSafe)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Criteria	Resources	C	P	N	Comments
<b>Objective 6: The employee can use skill sets in specialist/specific settings (such as Hospital in the Home, Birthing Unit, etc).</b>					
With respect to the following organisational unit ( <i>enter name of unit</i> ) <div></div>	Local Procedures				
the employee is able to select appropriate equipment and demonstrate appropriate techniques and procedures for the following unit specific tasks:					
6.1 Task: <div></div>					
• Patients/Residents who can assist;		■	■	■	
• Patients/Residents who cannot assist		■	■	■	
6.2 Task: <div></div>					
• Patients/Residents who can assist;		■	■	■	
• Patients/Residents who cannot assist		■	■	■	
6.3 Task: <div></div>					
• Patients/Residents who can assist;		■	■	■	
• Patients/Residents who cannot assist		■	■	■	

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