

Measuring the Costs of Injury in New Zealand



First published in May 2004 by the Department of Labour

www.dol.govt.nz

Wellington

New Zealand

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ISBN 0-478-28003-3

Acknowledgements

This report was prepared by members of the inter-agency Costs of Injury Working Group. Jaimie Legge (Labour Market Policy Group 'LMPG', Department of Labour) was the project manager. Core working group members who contributed to the report were: Clare Dominick (Accident Compensation Corporation 'ACC'), Angela Pidd (New Zealand Health Information Service 'NZHIS', Ministry of Health), Joanne Leung (Land Transport Safety Authority 'LTSA'), Sarah Crichton, Jo Burton (LMPG), Rashmi Rajan (Occupational Safety and Health, Department of Labour), and Fiona Conlon (Statistics New Zealand).

Additional support and advice were received and appreciated from the Costs of Injury Steering Group members: Geoff Bascand, Julian Silver (LMPG), Dr Jagadish Guria (LTSA), Richard Hurn (Ministry of Transport), Peter Aagaard (NZHIS), Darrin Goulding, Rachel Depree, Tim Richards (ACC), Paul Brown, and Darren Evans (Statistics New Zealand).

We would like to acknowledge the internal support provided by a range of officials at agencies represented on both the working and steering groups.

Finally, we would like to gratefully acknowledge the valuable contribution made by international peer reviewers: Dr Ted R. Miller (Pacific Institute for Research and Evaluation, United States), Delia Hendrie (Lecturer, School of Population Health, The University of Western Australia), and Dr Paul Scuffham (Senior Consultant, York Health Economics Consortium, United Kingdom).

Abstract

Measuring the costs of injury is integral to making proper decisions about preventing and managing the effect of injuries in New Zealand.

Measurement is complex because it depends on what is being measured and is confounded by the specific outcomes that different government agencies are trying to achieve. While consistent decision making across agencies is desirable, ensuring that those decisions are based on consistent information is paramount.

This report sets out a basic framework to navigate through this complexity and identify the state of current information to support consistent measurement of costs of injury.

The report finds that current information is scattered and incomplete, but that a sound information base exists which could be built on to produce a range of key injury cost statistics to support decision making across different agencies.

Further work is identified in the report. In some cases this work is substantial. Relative priorities and funding opportunities would first need to be identified before any investment could take place.

Contents

Executive summary	8
Structure of report	14
Purpose	15
Scope	17
Objectives and approach	17
Background and strategy	18
Section 1: The Costs of Injury Framework	21
Section 2: Issues with measuring costs	24
Availability of data: data collection, integration and modelling.....	24
Access to data.....	24
Choosing between data	25
Aggregating data.....	25
Lifetime costs and discount rates.....	25
Attributing costs to injury	26
Defining injury	27
Section 3: Treatment and rehabilitation costs	28
Introduction	28
Types of treatment and rehabilitation costs: who pays, and what information is needed? ...	28
Issues with measuring treatment and rehabilitation costs	30
What information is available on treatment and rehabilitation costs?.....	31
Description of sources of treatment and rehabilitation cost information	32
Quality of information on treatment and rehabilitation costs.....	42
Measurement of treatment and rehabilitation costs, further work, and priorities	46
Populating the costs of injury framework	52
Conclusion	53

Section 4:	Output and productivity costs.....	55
	Introduction.....	55
	Loss of earnings and value of unpaid work: who pays and what information is needed?	55
	Loss of revenue and friction costs: who pays and what information is needed?	58
	Description of information sources and quantum of output and productivity costs.....	61
	Quality of information on output and productivity losses.....	70
	Measurement of output and productivity losses, further work and priorities.....	71
	Populating the costs of injury framework	77
	Conclusion.....	78
Section 5:	Human costs	80
	Introduction.....	80
	Who pays and what information is needed?	80
	Issues with measuring human costs	82
	Measurement approaches	83
	Quantum.....	97
	Further work and priorities	97
	Populating the costs of injury framework	102
	Conclusion.....	103
Section 6:	Total costs of injury	105
	Introduction.....	105
	Measurement	105
	Quantum.....	107
	Further work and priorities	107
Section 7:	Recommendations	109
	Introduction.....	109
	Evaluating 'high priority' work.....	112
	Evaluating 'medium priority' work.....	113
	Evaluating 'low priority' work.....	113
	Conclusion.....	114

Annexes 116

Annex 1:	funding of public health acute services – how is it calculated?.....	116
Annex 2:	costweights and casemix – a brief summary.....	119
Annex 3:	role of the information manager	122

Figures

Figure 1:	Summary of state of (and potential to improve) information on costs of injury	10
Figure 2:	Costs of Injury Framework.....	21
Figure 3:	Template for summarising information on the state of, and potential to improve, information on costs of injury.....	23
Figure 4:	Treatment and rehabilitation costs – key questions and statistics	30
Figure 5:	Cost elements to be considered in determining the total treatment and rehabilitation costs of injury	31
Figure 6:	Summary of sources of treatment and rehabilitation cost information	39
Figure 7:	Treatment and rehabilitation cost indicators – measurement, further work, and priority	46
Figure 8:	Summary of state of (and potential to improve) information on the treatment and rehabilitation costs of injury.....	52
Figure 9:	Loss of earnings – key questions and indicators.....	57
Figure 10:	Revenue loss and friction costs – key questions and indicators.....	60
Figure 11:	Output and productivity cost indicators – measurement, further work, and priority.....	71
Figure 12:	Summary of state of (and potential to improve) information on the output and productivity costs of injury	77
Figure 13:	Human costs – key questions.....	81
Figure 14:	Different concepts and indicators used to describe human costs.....	82
Figure 15:	Human cost indicators – definitions, measurement approaches, and viability	83
Figure 16:	Summary of state of (and potential to improve) information on the human costs of injury.....	102
Figure 17:	Total costs of injury – key questions, indicators, and measurement.....	106
Figure 18:	Summary of costs of injury indicators.....	110
Figure 19:	Summary of further work and priorities	111

Executive Summary

The report is the culmination of the second phase of the costs of injury project

The costs of injury project resulted from a successful bid for funding from the cross-departmental research pool from the Ministry of Research, Science, and Technology in 2002–2004.

The first phase of the project involved a review of alternative cost methodologies undertaken by Business and Economic Research Limited (BERL) in 2002, a review of agencies' costs of injury information needs, undertaken by the Department of Labour, and a Costs of Injury Symposium in 2002.

The key message that emerged from the Symposium was that a clear direction needed to be set for the project over the next 5–10 years.

The second phase of the project, therefore, involved the development of a Costs of Injury Strategy. A Costs of Injury Framework was identified as an achievable output for the Strategy. To assist with refining this Framework, a stock-take was commissioned in 2003 from BERL, and an investigation of a method to estimate the cost of inpatient care was commissioned in 2003 from Injury Research Prevention Unit (IPRU) at Otago University.

This report builds on this recent work and has been jointly undertaken and supported by the Department of Labour, Accident Compensation Corporation (ACC), NZHIS, Land Transport Safety Authority (LTSA), the Ministry of Transport, and Statistics New Zealand.

Next steps

This report is intended as a basis for ongoing inter-agency discussion to identify and agree upon a programme of work and progress reporting for implementing the Costs of Injury Framework presented in this paper.

The report does not recommend the order in which items of work should be tackled, or who should tackle them. This depends on agencies' specific interests and benefit-cost analysis of investing in improving costs information, as well as their current work and research commitments. These are all driven by wider government priorities.

Ideally, the report will provide a basis for allocating responsibility for different areas of work (either within current baselines or with additional funding that would need to be sought). As a minimum, the report should be used to inform agencies' future planning and budgeting decisions to identify comparative advantages in improving information, synergies with related areas of work and research, opportunities for funding, and unnecessary duplication of effort.

Information on the costs of injury is necessary to assist with managing the incidence and severity of injuries in New Zealand

Costs of injury provide an important and readily interpretable insight into the relative *impact* of injuries on New Zealanders.

Government agencies require cost information to inform a wide range of economic and social decision-making including:

- Deciding whether to invest in injury prevention, rehabilitation, and compensation initiatives and if so, how much
- Setting and evaluating outcomes and priorities for allocating resources between different injuries
- Deciding who should bear the costs of injury.

A Costs of Injury Framework is used to explore the current state of information

The Framework is based on cost categories and perspectives. Cost categories include resource costs—costs relating to treatment and rehabilitation and loss of output or productivity—and human costs. Cost perspectives refer to who bears the costs in the first instance, and include individuals and their families, employers, government, and society.

A series of key statistics and indicators are identified from key policy questions in the report to support each cost category-perspective combination in the Framework. They provide a useful tool to simplify what needs to be measured and what output would be produced. The statistics, in turn, provide a sound basis for policy and research purposes, as well as developing outcome indicators.

This report explores information on consequential costs of injury only. (Further work is required to explore the preventive costs of injury.)

Information on the costs of injury is scattered and incomplete, but has real potential to be improved

Generally, the report found that current information for measuring the *resource costs* of injury to government is noticeably better than for individuals and employers and, as a result, society. In contrast, current information for measuring the *human costs* to individuals is noticeably better than for employers and government, but is not complete or consistent across injury sectors.¹

Care needs to be taken with measuring total costs (eg total costs to society) because of issues with aggregation across different cost categories and perspectives.

¹ A monetary value of statistical life is used in the transport sector, while qualitative costs have been identified for workplace injuries.

Significantly, the report identifies real potential to improve information on resource costs for individuals and, to a lesser extent, employers. This is by using administrative data, either in its existing form or with the aid of data-integration or economic modelling.

Improving information on human costs, however, requires further exploratory work and a reasonable resource commitment before a decision can be made about the most suitable measurement approach or approaches to develop.

Figure 1: Summary of state of (and potential to improve) information on costs of injury

Cost categories:	Cost perspectives:			
	Individuals and family	Employers	Government	Society
Treatment and rehabilitation costs	Poor (Medium)	Poor (Low)	Good (Medium)	Poor (Medium)
Output and productivity costs	Poor (High)	Poor (Medium)	Good (Low)	Poor (Medium)
Human costs	Moderate (Medium)	Poor (Low)	Poor (Low)	Moderate* (Medium)
Total costs	Poor (Medium)	Poor (Low)	Poor (High)	Poor (Medium)

* Aggregate measure is used

Figure 1, above, summarises the findings in the report on the current state of information in respect of each of the different combinations of cost categories and perspectives, and (in brackets) the potential for improving that information. This potential is rated low, medium, or high to reflect the expected cost and effort of improving information and quality of and need for improved information. Areas of real potential to improve information are bolded. The shaded areas represent areas that are considered not worth exploring, either because the expected cost and effort of improving information is considered too great, or because the information is unlikely or does not need to be improved to a significant extent.

A range of further work is identified to produce the cost information identified

This work includes new or improved data collection, data integration, economic modelling, proper research of the pros and cons of internationally recognised measurement approaches, and consideration of the applicability of overseas cost estimates.

There is a range of complex issues with measuring costs that will affect the ability to produce some of the key statistics in the short term. These issues include: technical feasibility, privacy and data security, as well as consideration of cost or benefit-cost issues.

A significant factor with measurement is whether sufficient base data already exists, or whether additional base data needs to be created or analytical models need to be developed to ‘enhance’ the base data. With integration and modelling, there is some uncertainty as to the additional information gain.

Where base data exists, or can successfully be created, the expectation is that Statistics New Zealand, in their new role as Information Manager, will be responsible for managing this cost data as part of the injury database they are developing, and for the ongoing production and reporting of injury cost statistics using this data. Recent work by Statistics New Zealand has confirmed that the creation of an injury database, based on a pilot dataset of integrated ACC and NZHIS data, is feasible.

Finally, the range of measurement approaches presented in the report should not be considered exclusive, particularly where further work to explore those approaches is recommended.

The primary source of cost information is administrative data from the ACC

Some useful cost statistics could readily be produced by ACC, including:

- Individuals’ loss of pre-injury earnings from injuries that are compensated by ACC (also a proxy for total loss of pre-injury earnings)
- Treatment and rehabilitation costs of injuries to ACC (both actual and lifetime costs).

Administrative data from the New Zealand Health Information Service (NZHIS), Inland Revenue Department (IRD), and the Ministry of Social Development (MSD) also provide substantial insights into costs associated with treatment and rehabilitation and loss of output and productivity.

Linking ACC data with these other data sources offers the most potential for measuring these costs—particularly at a confidentialised unit record level, which is necessary to generate average information across a range of injury and population groups. The main areas of potential are improved information about hospital inpatient costs, comparison of pre and post injury incomes and potential incomes to individuals, and indicators of severity/incapacity of injury, including improved ‘volume’ estimates of loss of life and life expectancy. Statistics New Zealand has recently confirmed that ACC and NZHIS data can be integrated to a suitable level of quality and confidentiality.

By way of contrast, the survey-based estimate of the New Zealand Value of Statistical Life (VOSL) for transport injuries is the only current source of information on human costs. Qualitative information on human costs exists for workplace injuries from recent case study research by the Department of Labour and ACC, including individual, family, and employer costs.

A range of cost statistics could be produced from linking ACC with other administrative data

The following statistics are currently (or could potentially be) produced from ACC administrative data, or from linked ACC and NZHIS administrative data. As such, a case could be made for the Information Manager to take responsibility for their production and reporting:

- Individuals' loss of pre-injury earnings from injuries that are compensated by ACC
- Actual treatment and rehabilitation costs to government agencies from injuries.

The following statistics and indicators could also be produced from available administrative data, but would require a significant investment in resources and expertise, and the collaborative effort of many individuals and agencies. Assessment of the value of these statistics and indicators to decision-making and surveillance, relative to their costs, would be required before engaging in further work. This could include the development of definitions, assessment of technical feasibility, and coordination of standards and classifications.

- Individuals' actual loss of pre-injury earnings from injuries
- Individuals' loss of potential earnings from injuries
- Individuals' pre-injury and potential earnings from injuries that are compensated by MSD
- Employers' actual loss of revenue and/or profit from injuries
- Lifetime treatment and rehabilitation costs to government agencies from injuries
- Individuals' level of permanent impairment from injuries
- Total costs of injuries to government
- Total costs of injuries to society (an amalgamated estimate from available administrative data and the New Zealand VOSL).

The report has identified that significant information gaps would still remain

These gaps are in respect to the costs of outpatient and emergency services to government; most treatment and rehabilitation costs to individuals; friction costs to employers; and human costs to individuals. In the main, survey information offers the best potential to address these gaps. Future developments in hospital outpatient and emergency department administrative databases are also a possibility.

There is also a significant information gap in terms of human costs to society outside the transport sector. A thorough review of different methodologies for measuring these costs is required before an approach can be selected.

Other cost indicators could be produced to address these gaps

The following indicators require substantial work, which may overlap with work agencies are already undertaking (not necessarily in relation to injuries). Development of these indicators may best be undertaken by an independent working group or task force and it is recommended that they are scoped properly by interested agencies and additional funding sought:

- Human costs of injuries to society for non-transport sectors—including, but not limited to, investigation of the following:
 - Willingness to pay-based VOSL, either using contingent valuation (eg the New Zealand VOSL) or revealed preference theory (eg wage-risk analysis)
 - Potential to monetise health outcome measures such as quality or disability adjusted life years (QALYs and DALYs) or life years lost to injury (LLIs)
- Treatment and rehabilitation costs to individuals from injuries
- Friction costs to employers from injuries
- Total costs of workplace injuries to employers.

The following indicator is unlikely to be reliably or efficiently measured, therefore a ‘go slow’ approach is recommended:

- Human costs of injuries to society for non-transport sectors:
 - Development of proxies such as the rate of divorce and change in accommodation or area of living
 - Description of individuals’ experiences of injuries, and their family and friends’ associated experiences (eg as part of future case-studies)
 - Investigation of happiness measures.

A ‘modular’ approach is recommended for populating the Costs of Injury Framework

This means that a mix of administrative and survey data and analytical approaches would be used to produce the injury cost statistics. A modular approach also requires that there be a process in place to ensure common understanding and agreement as to where independently developed measures map to the Framework.

This approach is considered preferable to developing a single methodology for measuring costs for two main reasons. First, a solid information base exists and there is considerable scope to use this information better. Second, agencies have diverse information needs and a single methodology for measuring costs is unlikely to adequately cater for this diversity.

The main advantage of this approach is that it is pragmatic. Different agencies could take responsibility for producing different parts of the Framework, according to their comparative advantage with injury cost information, existing work commitments, and specific areas of interest.

The main disadvantage is that a single, comprehensive database of injury costs would not be produced, and that without active and effective coordination, the approach could become ad hoc, rather than modular.

Structure of Report

The report begins with some introductory sections outlining the purpose, scope and specific objectives, and background.

The report then sets out the Costs of Injury Framework and issues with measuring costs, which provide the analytical base for the report.

The main body of the report is divided into four sections, based on the key elements in the Costs of Injury Framework:

- Treatment and rehabilitation costs
- Output and productivity costs
- Human costs
- Total costs.

The following questions are discussed in each section and summarised in the context of the Costs of Injury Framework:

- What cost information is needed? (cost statistics and indicators)
- What cost information is available? (data and cost measurement)
- What work is required to measure costs?
- What are the relative priorities for undertaking that work to produce a Costs of Injury Framework?

The report concludes with a recommendations section. This section summarises the cost statistics and indicators and work identified in the report to measure them. It also weights the work to determine an overall direction and programme of work to produce the Framework.

Purpose

WHY the report has been undertaken

This report is the result of a recommendation to the New Zealand government in 2001 from the Injury Data Review² that that further work be carried out on cost information.

Consistent with the general finding in the Review, information on injury cost information is scattered and incomplete. Government agencies use different tools to measure, broadly, the same types of costs, and they base their cost estimates on different data. Much of the information available is generated for administrative purposes only, so it meets the operational needs of specific agencies rather than their wider policy needs.

The cost indicators proposed in the Review, however, only reflect some of the components of the total cost of injury to society, and do not reflect the array of outcome indicators and policy and research questions that information on costs of injury can be used for.

Government agencies require cost information for a wide range of decisions regarding the allocation of resources to manage the incidence and severity of injury in New Zealand, including:

- Deciding whether and how much to invest in injury prevention, rehabilitation, and compensation initiatives
- Setting and evaluating outcomes and priorities for allocating resources between different injury management programmes
- Deciding who should bear the costs of injury.

It should be noted from the outset that cost information is only an input into decision making—cost information is not an end in itself and does not dictate a specific allocation of resources by either the government or non-government. Any allocation of resources will involve a weighted consideration of other factors such as the incidence of injuries, costs of mitigation, and welfare effects. The benefits of expenditure in injury management would also need to be considered.

Ultimately, achieving consistency in the measurement of injury costs information was considered important for the wider review of cost information, rather than consistency in decision-making.

There are issues with achieving consistency, however.

The types of decisions outlined above can be made at both a macro and micro level—that is, across injury sectors and within an injury sector.

There are differences between the type of information required for micro and macro decisions (and potentially the methods adopted to measure that information). For most policy decisions (macro and micro), information on total costs or average costs across

² Department of Labour and Statistics New Zealand (October 2002). *New Zealand Injury Data Review: April 2000 – December 2001*. New Zealand.

injury groups is required and can be attained through analytical modelling or micro simulation. Information on unit or marginal costs to specific individuals is required for some micro policy analysis.

Different agencies also conceptualise injury sectors in different ways, and require cost information conceptualised accordingly.

Documenting the complete array of information on costs of injury required by agencies, and the type of cost information best suited is not practical or strictly necessary. Provided some high-level information needs and measurement approaches can be identified and agreed to, it is possible to rely on a demand-based approach to manage the detail.

WHAT the report does

The report identifies some common ground across agencies' information needs through the Costs of Injury Framework, and a series of supporting high-level cost statistics and indicators, based on key policy questions used in day-to-day analysis. The report also documents a range of issues with measuring costs.

The report thus provides a logical framework for interpreting and analysing existing information on costs of injury in New Zealand and identifying further work to improve that information. At the same time, the report recognises that any further work (and resultant statistics or indicators) will be influenced by the specific information needs of the agency or agencies that champion it. For instance, a partial statistic for a specific injury and/or population group may be produced.

HOW the report will be used

In the first instance, the report will be used to engage agencies around this work identified in the report required to produce the Costs of Injury Framework. This will involve identifying funding opportunities, setting priorities and timeframes, preparing terms of references, and defining ongoing governance and report back arrangements. Specific responsibility for producing and reporting the high-level cost statistics or indicators may also be allocated.

In the second instance, the report will be used as reference tool on the state of existing information in New Zealand on injury costs and the range of approaches to and issues with measuring costs to inform agencies' planning and budgeting processes.

Scope

The report **does** the following:

- Identifies key statistics and indicators of *consequential* costs of injury for different cost categories and perspectives (discussed in section 1 on the Costs of Injury Framework, below)
- Reviews available data (including administrative, survey, and case-study data, and data produced from existing analytical approaches)
- Analyses whether available data can be used to produce high-level cost statistics and indicators identified to support the Framework
- Identifies an overall approach and programme work that should be funded to produce the Framework.

The report **does not** do the following:

- Identify key statistics and indicators of *consequential* costs of injury according to specific injury and person characteristics (although all are assumed to be desirable)
- Identify key statistics or indicators of *preventive* costs of injury
- Produce or estimate the high-level cost statistics and identified to support the Framework
- Specify detailed terms of references for further work
- Formally prioritise or allocate responsibility for further work for funding purposes.

Objectives and approach

The specific objectives of this report, and the approach taken in this report to address those objectives, are:

- **To refine the Costs of Injury Framework set out in the Costs of Injury Strategy**

The report identifies a series of high-level cost statistics and indicators to support each of the elements in the Framework. They are based on key policy questions and international research, informed by the Department of Labour's analysis of different agencies' information needs and BERL's literature review, both undertaken in 2002.

- **To identify the potential for populating the Costs of Injury Framework**

Available data and methodologies are identified for measuring each of the cost statistics and indicators in the report. Building on BERL's 2003 stock-take of available administrative data on injury costs, the report assesses the extent to which that data supports each of the statistics and indicators and the work required.

The work identified in the report is prioritised to rank *related* work, particularly where options or alternatives are identified. The prioritised work is then weighted to produce

recommendations for an overall approach and programme of work to produce the Framework.

Where possible, this report identifies clear cost statistics or indicators and measures that can readily be produced from administrative data that Statistics New Zealand is already collecting to develop an injury database in its role as Information Manager.³ However, there is an outstanding issue about how this information should be used along side less statistically robust data in the Framework and which agency should take responsibility for producing these data and/or providing access to them. BERL's idea of a "Costs of Injury Directory" should be considered further, as a useful construct for considering these issues.

- **To work out the quantum and relativities of injury costs**

Where possible and informative, actual injury costs are identified in the report to assist readers gauge the scale of costs of injury.

Background and Strategy

The costs of injury project originated from the Injury Data Review, jointly led by the Department of Labour and Statistics New Zealand in 2000–2001. The Injury Data Review proposed a (minimum) set of indicator variables, including the following indicators of cost to address the policy question 'What are the financial costs of injury?':

- The total cost of compensation, treatment and rehabilitation for all injuries
- The average cost of compensation, treatment and rehabilitation per new injury
- The average cost of compensation, treatment and rehabilitation per injury for all other ongoing injuries
- Cost of treatment for all injuries per \$GDP.

These indicators require the following numerator and denominator variables:

- Cost of treatment (associated with the injury event)
- Cost of rehabilitation (associated with the injury event)
- Cost of income compensation (associated with the injury event)
- Number of new injury events
- Number of ongoing injury events
- GDP.

As mentioned earlier, the proposed cost indicators only reflect some of the components of the total cost of injury to society, and do not reflect the array of policy questions that information on costs of injury can be used for. The government requires cost information for a wide range of decisions regarding the allocation of resources to manage the incidence

³ Refer Annex 3.

and severity of injury in New Zealand. The Review identified that further work was required on cost information.⁴

The Department of Labour received funding from the Ministry of Research, Science, and Technology in 2002/03 and 2003/04 to undertake exploratory research to develop a model to estimate the costs of injury.

The Department commissioned Business and Economic Research Limited (BERL) in 2002 to undertake a review of alternative cost methodologies and undertook consultation with agencies to identify the range of information needs. Simultaneous case-study research into the social and economic consequences of workplace injuries, undertaken by the Department and ACC also contributed to the background work.⁵

This background work culminated in a Costs of Injury Symposium in 2002 that identified the need for a strategy to improve costs of injury information over the next 5–10 years. (Box 1, below, outlines some key messages that emerged from the Symposium.)

Box 1: Key messages from the Costs of Injury Symposium, October 2002

- Good information on 'human' costs of injury (ie the intangible costs such as pain and suffering and loss of quality of life) as well as 'resource' costs of injury (ie the direct and indirect costs of injury such as prevention, medical expenses and loss of earnings) is required.
- Unit record data are required where possible (unit and confidentiality issues to be decided) to address a wide range of policy questions, to accommodate a diverse range of information needs and information users, and to facilitate intersectoral and international comparisons.
- Build on or supplement existing administrative information, analytical models, and institutional structures such as the Information Manager.
- Protect and consider enhancing information that already exists (eg via data integration) and ensure that existing and enhanced information can be utilised by stakeholders through improving communication between agencies and accessibility.
- Beware of the limitations of improving information given existing administrative systems, and the diminishing returns from improving information.
- Explore a range of measurement approaches and recognise that different approaches serve different purposes.

The Department subsequently set up an inter-agency working group to produce a Costs of Injury Strategy, setting out a clear vision, purpose statement, scope and evaluation criteria. (Box 2, below, summarises the key elements of the Strategy.)

⁴ In the interim, the Information Manager will endeavor to report against the indicators identified in the Injury Data Review (refer Annex 3).

⁵ Department of Labour and ACC (2002). *Aftermath: The Social and Economic Consequences of Workplace Injury and Illness*. New Zealand.

This report represents work undertaken by the inter-agency working group to define the Framework more clearly and identify the potential for populating it. Significantly, this report clearly documents the state of current information on the costs of injury.

Box 2: Costs of Injury Strategy	
Vision:	To develop and maintain the most comprehensive and integrated injury costs information possible.
Purpose:	To improve estimates of the impact of injuries in New Zealand to assist decision-makers to: <ul style="list-style-type: none"> • Determine and evaluate investment in managing the incidence and/or impact of injuries • Set and evaluate priorities and outcomes across injury prevention, rehabilitation and compensation initiatives (eg the New Zealand Injury Prevention Strategy) • Determine and evaluate who bears the costs of injuries.
Scope:	The costs of injury strategy will cover: <ul style="list-style-type: none"> • Preventive and consequential costs of injury⁶ • Injuries as defined by the Injury Information Manager • 'Resource' and 'human' costs of injury to individuals, family, whanau, community, government, employers, and society • Injuries incurred in New Zealand, including anywhere within New Zealand's Exclusive Economic Zone • Historic and future costs.
Evaluation criteria:	Improved information on costs of injury should: <ul style="list-style-type: none"> • Be relevant (ie reflect purpose statement) • Be flexible and dynamic <ul style="list-style-type: none"> ○ updateable and be updated on an ongoing basis ○ capable of being merged and segregated for easy data retrievals and data update ○ expandable (capable of being added to in the future in multiple directions) • Be efficient and affordable • Be accessible (easy to use and attain) • Be transparent (easy to understand – users should be aware of any qualifications attached to cost estimates) • Cater for a wide range of stakeholders • Supplement rather than duplicate the Information Manager's injury database • Not impose unnecessary compliance costs • Meet the requirements of the Privacy and Human Rights Acts.
Output:	A Costs of Injury Framework that allows agencies—as accurately as possible—to use, improve and supplement existing information on costs of injury in New Zealand in a way that meets their different policy and research needs, as well as the needs of non-government researchers and employer groups.
Timeframe:	5–10 years

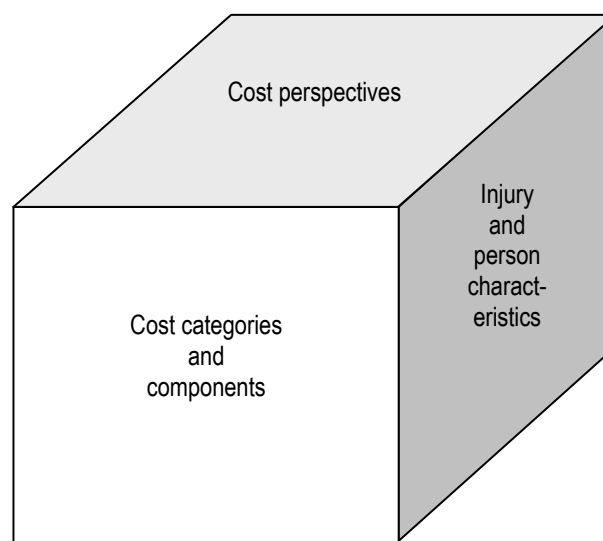
⁶ Preventive costs of injury are widely regarded as difficult to measure because of the difficulty with allocating these costs to specific injuries. For this reason, this report focuses on consequential costs of injury only.

Section 1: Costs of Injury Framework

The Costs of Injury Framework identified in the Costs of Injury Strategy had two dimensions: cost categories and components, and injury and person characteristics.

As a result of work undertaken to produce this report, the Framework has been modified to incorporate cost perspectives as a third dimension. Figure 2 provides a stylised illustration of the new Framework.

Figure 2: Costs of Injury Framework



The Framework can be thought of as comprising a multitude of cells, each representing a separate cost. The type of information about each cost (or group of costs) can in turn be envisaged as quantitative (ie dollar or some other metric, and annual or lifetime) or qualitative. Information sources also vary, and include administrative data, surveys, case studies, estimates from theoretical models, or “guestimates”.

Cost categories

Cost categories include resource costs (ie treatment and rehabilitation costs, and output and productivity costs) and human costs.

Treatment and rehabilitation costs refer to all the (out of pocket) monetary payments made in relation to diagnosis, treatment, and rehabilitation of injuries sustained by the population (of interest). Associated costs include transport, home modifications, and ongoing assistance with impairment. Services are both publicly funded and privately paid for by individuals.

Output and productivity costs result from an individual not being able to work as a result of an injury. Loss of income (earnings to individuals and their friends and family, and loss of profit to employers) is the primary flow-on economic cost that can be measured. (This includes the productivity of those who work voluntarily or who are too young or old to earn taxable income.)

Human costs from an injury or a premature death include psychosocial effects of injury, psychological distress, impaired physical or mental health, pain, and suffering. The ‘costs’ are often non-figurative and difficult to measure.

Total costs are the sum of the treatment and rehabilitation, output and productivity, and human costs.

Costs associated with accident attendance (by the Police and Fire Service, for instance) and property damages (eg damage to vehicles and equipment or machinery during an accident) are not fully explored in this report. These are not technically injury costs, but rather costs of incidents that may result in injury.

Costs, which are not injury specific such as insurance administration and legal costs, are also excluded from analysis in this report.

Injury and person characteristics

Injury and person characteristics include:

- Injury severity
- Injury setting (eg workplace, motor vehicle, sport)
- Types of injuries (ie diagnosis)
- Population sub-groups affected (eg ethnicity, gender, age)
- Geographic location of injury.

Injury and person characteristics, however, are not fully explored in this report. While being able to break cost information down by different characteristics is considered desirable, it is not possible to do so without exploring available data in considerable detail. This is best done once the Information Manager has considered definitions of, and data collection issues with, these characteristics as part of the wider framework of injury data it is developing. The aim of the costs of injury project is to supplement rather than duplicate this work, and to ensure consistency with wider injury data.

Injury and person characteristics potentially provide a more fine-grained alternative basis for identifying priorities, such as those in the New Zealand Injury Prevention Strategy (NZIPS).⁷ NZIPS has identified that the following areas account for 80% of injury deaths and serious injuries in New Zealand:

- Motor vehicle injuries
- Workplace injuries
- Drowning and near drowning
- Falls

⁷ Accident Compensation Authority (June 2003).

- Suicide and deliberate self harm
- Assault.

Cost perspectives

Cost perspectives include individuals and their family, employers, government, and society. They refer to those who bear the costs of injury in the first instance. Individuals and their family are considered together because differentiating between costs to each was likely to present a major difficulty.⁸

Cost perspectives add a useful analytical dimension to the Framework because it is possible, without analysing data in too much detail, to identify the state of information in respect of each of the different cost perspectives.

To assist with reading the report, a variant on the following template is included at the end of each section to summarise what information is available and the potential to improve it.

Figure 3: Template for summarising information on the state of, and potential to improve, information on costs of injury

Cost categories:	Cost perspectives:			
	Individuals and family	Employers	Government	Society
Treatment and rehabilitation costs				
Output and productivity costs				
Human costs				
Total costs				

⁸ Department of Labour and Accident Compensation Corporation (2002). *Aftermath: The Social and Economic Consequences of Workplace Injury and Illness*. New Zealand.

Section 2: Issues with measuring costs

There are a range of issues with measuring costs of injury, discussed below. Where possible, these issues have been taken into account in the report in analysing the suitability of existing and new measurement approaches for each of the high-level injury cost statistics identified. However, these issues are ongoing and will require further consideration if any injury cost statistics are to be produced.

Availability of data: data collection, integration and modelling

Unfortunately, comprehensive base data on the costs of injury do not exist. Base data on injury costs can primarily be sourced from agencies' administrative databases, and to a lesser extent from surveys and case studies.

Integrating data from different sources is also an option, but is complex. Significantly, there are issues with finding a common definition across the data sources—hence, similar types of data should be matched where possible. There are also technical issues with integrating data, including available expertise and computing capacity. Any proposal should allow for a reasonable resource outlay and accommodate a degree of uncertainty about nature and quality of data produced.

Finally, data can also be generated from modelling (including micro-simulation). With any modelling exercise, there will be issues with the underlying analytical approach and assumptions. To some extent these issues can be mitigated if the model is fit for its purpose (ie the purpose for which the model has been developed is clearly identified) and if sensitivity tests are carried out. On the plus side, modelling often presents a considerably cheaper alternative to improved data collection or integration.

Ultimately, the lack of data on some injury costs means that it is necessary to find a proxy for data that does not exist and/or to derive the estimates based on existing data. ACC administrative data on weekly compensation, for example, most accurately represents output and productivity costs from injury to government. However, given a lack of alternative data, it may also be used to derive the similar costs to individuals and employers.

Differentiating between different cost perspectives should encourage the use of appropriate caveats to identify the actual and proxy data and any implications for analysis.

Access to data

In addition to whether sufficient data are available, there are likely to be privacy and confidentiality issues with accessing injury costs data—particularly unit record data.

In most cases these issues can be addressed through appropriate anonymisation or confidentialisation of data, but proper consent from the Privacy Commissioner and/or individuals must first be attained.

Choosing between data

Where there are alternative sources of data, choice may be affected by available detail (ie ability to disaggregate the data). For instance, data are available on aggregate ACC costs met by employers (via employer levies) and the proportion of this is cost that is for ACC weekly compensation. However, confidentialised unit record employer and claims data would need to be explored to get some insight into how these costs are distributed across employers, individuals, and injuries.

Aggregating data

Double counting is a significant issue with aggregating data. For example, the portion of levies paid by employers to cover weekly compensation should not be added to weekly compensation paid out by ACC in calculating costs to society. ACC compensation can be thought of as a transfer payment—payments by the government for which no goods or services are received in return. As transfer payments do not result in a net increase in output, they should not be counted twice.

Lifetime costs and discount rates

Some cost components, particularly those associated with output and productivity costs, for some injuries are ongoing. Without substantial historical data, these future or lifetime costs need to be estimated.

ACC has developed a number of actuarial models to enable the Scheme to become fully funded. NZIER have also undertaken some work to estimate the level of production lost from the New Zealand economy as a result of road traffic accidents.⁹ They produced average productivity losses for fatal, serious, and minor traffic injuries.

Two key statistics that would assist with the estimation of lifetime costs of injury more generally are:

- Loss of life from injury
- Loss of life expectancy from injury.

Loss of life refers to a premature death from injury. The statistic is the number of fatal injuries as a proportion of total injuries. The number of fatalities can be used to determine the rates of death when used with exposure measures such as population, number of

⁹ New Zealand Institute of Economic Research (August 1999). *Lost output: the value of output lost as a result of traffic accidents in New Zealand*. Report to the Land Transport Safety Authority. New Zealand.

vehicles, vehicle kilometres travelled, or number of working hours. Rates of death are useful when making comparisons between industry groups, regions, and across countries.

Loss of life expectancy refers to the reduction in a person's average life expectancy from injury (sometimes referred to as the 'years of life lost from injury').

Both statistics can be thought of as 'volume' measures for calculating total costs of injuries, and were recommended as part of the Injury Data Review.

In using these volume measures, however, care needs to be taken with discount rates. A discount rate is the factor which determines the present worth of a future benefit or cost.

Attributing costs to injury

A range of factors contribute to the consequences and therefore costs of injury. It is not reasonable or realistic to simply attribute a loss of earnings, for instance, to an injury simply because there is a reduction in earnings following the period of injury. Other factors could have contributed to this such as employer receivership, career peak, and personal circumstances.

There are also likely to be offsetting factors. For example, in calculating lifetime costs to employers or society, reduced consumption needs to be taken into account.

A range of additional statistics, therefore, is ideally required for measuring the costs of injury, including but not limited to:

- Propensity to consume
- Age (at time of injury)
- Sex
- Ethnicity
- Occupation
- Hours of work
- Education or skill level
- Number of dependents
- Socio-economic status
- Previous injuries/ medical conditions/ time off work
- Length of time in occupation (tenure)
- Industry
- Region
- Size of employer
- Productivity growth rate
- Discount rate
- Net present value.

Defining injury

There is no universally accepted definition of injury. The Information Manager has adopted the following operational definition of injury for the purposes of developing an injury statistics database: the physical and/or mental effects sustained in one injury event by one person.¹⁰

A clear definition of injury is necessary to properly compare the costs of injury across injury sectors and internationally.

This has not been addressed in this report because the focus has been on identifying base data and measurement approaches, rather than estimating costs of injury. Any work to develop key injury cost statistics, however, will need to address this issue.

¹⁰ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Definitions of Injury*. New Zealand.

Section 3: Treatment and rehabilitation costs

Introduction

This section describes treatment and rehabilitation costs of injury, the information needed to measure these costs, data sources currently available, and the coverage and quality of the available data.

The treatment and rehabilitation costs of injury include all the monetary payments (ie co-payments) made in relation to the treatment and rehabilitation of injuries sustained by the population (of interest). Many individuals, groups and organisations may incur these costs as a result of an individual sustaining an injury. The injured person, their friends and family, employers, government agencies (ACC, Health, Police, for example), and not-for-profit and voluntary organisations may all be involved in the response to an injury.

The treatment and rehabilitation costs of injury are significant. In the financial year to 30 June 2003, ACC expenditure alone totalled approximately \$951 million for the treatment and rehabilitation of injuries.

Types of treatment and rehabilitation costs: who pays, and what information is needed?

The treatment and rehabilitation costs of injury can be categorised in a variety of ways. The following categorisation fits best with terminology used in the health sector in New Zealand and has been used to describe treatment and rehabilitation costs in this report:

- Transport costs (emergency and non-emergency)
- Primary care treatment costs
- Secondary care (hospital) treatment and rehabilitation costs (including institutional long-term care)
- Social rehabilitation (including domiciliary care)
- Vocational rehabilitation.

Who pays?

In most cases, ACC is responsible for paying the majority of treatment and rehabilitation costs of injury. ACC, however, is funded from levies on individuals and employers, and from general taxation.

The Injury Prevention, Rehabilitation, and Compensation Act 2001 (IPRC Act) and its Regulations (IPRC Regulations) set out who is entitled to funding and prescribes the treatment and rehabilitation entitlements that are available under the ACC Scheme. Under the IPRC Act, ACC is required to reimburse the Ministry of Health for the provision of specified entitlements ('public health acute services' (PHAS)), which include services to injury patients (as defined in the IPRC Regulations) who are treated in emergency departments or outpatient clinics as outpatients, or acute inpatient services.

Where injuries are not covered by the Act, or people do not seek treatment for their injuries, or the treatment they seek is not provided by ACC, individuals pay their own costs of treatment and rehabilitation. Residual costs may also be borne by the health sector, potentially under a different category from injury. In some cases, individuals are also required to meet some of the cost of treatment provided by ACC (ie pay a co-payment), particularly with primary care and sometimes for elective surgery.

More accurate detail is provided later in this section about these co-payments and their implications for interpreting available data.

What information is needed about treatment and rehabilitation costs?

Treatment and rehabilitation costs provide a relatively simple, concrete, and transparent way to assess the primary costs of injury to society, and whether there are any notable discrepancies between different injury and population groups.

Treatment and rehabilitation costs also provide the cost savings component for assessing the cost effectiveness of government intervention to reduce the impact of injuries. Information on treatment and rehabilitation costs is therefore necessary for policy and financial accounting and monitoring purposes.

Figure 4, below, identifies some key questions about what information on treatment and rehabilitation costs is required for supporting these purposes.

Figure 4: Treatment and rehabilitation costs – key questions and statistics

Key questions	Statistics
What resources are expended on the treatment and rehabilitation of people with injuries?	Total treatment and rehabilitation costs of injury to society.
What costs are met by ACC?	Total treatment and rehabilitation costs of injury met by ACC.
What costs are met by individuals?	Total treatment and rehabilitation costs of injury met by Individuals.
Does PHAS funding cover the actual costs incurred?	Total treatment and rehabilitation costs of acute treatment and rehabilitation for injury incurred by public hospitals in provision of emergency, acute inpatient, and outpatient injury services covered by PHAS funding.
How is the cost met by ACC distributed across various cost categories, for various population groups, and injury types and settings?	Total and average costs met by ACC by cost component (hospital, medical, transport, etc) for different treatment types, injury types, setting and population groups.
How is the cost met by individuals distributed across various cost categories, for various population groups, and injury types and settings?	Total and average costs met by individuals by cost component (hospital, medical, transport, etc) for different treatment types, injury types, setting and population groups.
How are the costs incurred in PHAS (provided in hospitals) distributed across various cost categories, for various population groups, and injury types and settings?	Total and average costs met by the PHAS payment by cost component (emergency, acute inpatient, outpatient within 6 weeks) for different treatment types, injury types, setting and population groups.

Issues with measuring treatment and rehabilitation costs

Determining the total treatment and rehabilitation costs of injury requires the combination of information from several sources. Some data sources provide the exact expenditure or charge for particular treatment and rehabilitation costs, such as ACC administrative data. However, other data sources provide information for the estimation of average costs only. In several areas there are gaps for which there is no readily available information source.

Many factors will also affect the treatment and rehabilitation costs of an injury and therefore their calculation. These factors include injury type and severity, the age, and health circumstances of the injured person.

Figure 5 outlines the cost components that may need to be considered when calculating the total treatment and rehabilitation costs of injury, using as examples ACC's categorisations of injury severity.¹¹

¹¹ ACC defines minor injuries as those that are associated with 'medical-fees only', and severe injuries as entitlement claims that represent the top 5% in terms of cost.

Figure 5: Cost elements to be considered in determining the total treatment and rehabilitation costs of injury

Treatment and rehabilitation cost component	Minor injury	Severe Injury
Transport costs	✓	✓
Primary care		
• Treatment provider	✓	✓
• Co-payment charges	✓	✓
Secondary care		
• Acute treatment at secondary care facility		✓
• Co-payment charges for elective secondary care (non-contracted)		?
• Pharmaceutical and laboratory costs	?	✓
• Inpatient rehabilitation		?
Social rehabilitation		✓
Vocational rehabilitation		*
Administration		
• ACC	✓	✓

- ✓ Needs to be considered
 ? May apply, but depends on the injury
 * May apply, but depends on whether the person was an earner

In addition, estimates of treatment and rehabilitation costs are dependent on the timeframe under consideration. Many moderate to severe injuries will continue to incur costs over the lifetime of the injured individual.

What information is available on treatment and rehabilitation costs?

The majority of information that is currently or potentially available on the treatment and rehabilitation costs of injury is contained in government agencies' administrative databases. These databases contain information on historical expenditure.

The main sources of information for costs relating to injury treatment and rehabilitation are the ACC administrative database and the National Minimum Dataset (NMDS) of hospital discharge data held by NZHIS. Although these sources potentially hold useful data, they do not provide comprehensive coverage of the treatment and rehabilitation costs of injury treatment and rehabilitation.

Excluded from the ACC administrative database are those people with injuries not covered by the IPRC Act, and those people with injuries who either do not seek treatment for their injury or whose injury is not recorded as an ACC claim in primary care settings (although hospitals can record such injuries as ACC claims).¹² The IPRC Regulations do not cover some types of 'treatment'. Therefore, if an individual seeks treatment from a provider not

¹² If treatment is not sought there is unlikely to be any significant treatment cost associated with the injury borne by the individuals and/or their family.

covered by the Regulations, the expenditure incurred in relation to this treatment will not be recorded on any central database.

For social and vocational rehabilitation, ACC provision is based on assessed need as specified by the IPRC Act and should be recorded in Individual Rehabilitation Plans. Any expenditure incurred by individuals or organisations that is not covered and approved through the assessment process is not paid by ACC, and therefore is not recorded in its administrative database.

Some types of direct expenditure incurred by individuals or organisations may be recorded in other administrative databases. For example, the amount the patient is charged via a co-payment for treatment is likely to be recorded in all treatment provider's databases. Access to and use of this information may be restricted.

NZHS stores detailed information about each inpatient and day-case hospital event provided in New Zealand (public and private) hospitals. Each patient's diagnosis and procedures are recorded along with other information that can be used to identify if the admission was the result of an injury. A costweight (ie cost index) is calculated for each event, and this is the basis on which hospitals are funded. It is also the basis on which the acute inpatient component of PHAS paid by ACC is determined. (Refer Annex 1.)

Although a claim is submitted to ACC for each patient who receives accident and emergency treatment, no cost information for the treatment is supplied. There is no national database of outpatient events or emergency department events. However, in the past, surveys have been undertaken to estimate the costs of providing these services to injured individuals.

Description of sources of treatment and rehabilitation cost information

A summary of the following information is provided at the end of this section in Figure 6.

Transport costs

Transport to and from treatment and rehabilitation and, for the seriously injured, transport in daily living are the main types of transport expenditure incurred as a result of an injury. In addition, individuals may require assistance travelling to or from work while temporarily incapacitated due to a minor or moderate injury.

Emergency transport

Emergency transport is defined by the IPRC (Ancillary Services) Regulations 2002 as transport that starts within 24 hours of a person suffering a personal injury or being found after suffering a personal injury, and is necessary for the purpose of obtaining treatment urgently for the person's personal injury.

ACC is liable for emergency transport by ambulance whether by road, air, or water. ACC purchases emergency and non-emergency ambulance services under contract and user part-charges cannot be applied by the provider. Approximately 90% of ambulance costs paid for by ACC can be attributed to an individual claim.

Individuals or companies will incur the costs of any emergency transport not covered by the IPRC Regulations. These costs are not likely to be recorded and may include attendance at accident and emergency departments, accident and medical clinics, or primary-care practitioners.

Non-emergency transport

Non-emergency transport is funded by a variety of groups and individuals. Depending on the reason for the transport, a group or individual may contribute part, or all, of the non-emergency transport costs.

For ACC claimants, ACC directly pays for a range of non-emergency transport for rehabilitation purposes.¹³

ACC only pays for non-emergency transport to or from treatment and rehabilitation services if certain eligibility criteria are met, including minimum distance and cost thresholds and, in some instances, that the person receives prior approval from ACC. Non-emergency transport entitlements include transport to or from work. These decisions are made on a case-by-case basis and are available in relation to a claim. ACC supports transport for daily living for people eligible for long-term social rehabilitation assistance.

Outside of these provisions, individuals and possibly organisations will incur non-emergency transport costs. No information is available on these costs.

Primary care treatment costs

Primary care costs include treatment provider charges, pharmaceutical costs, and laboratory costs. The main sources of information are administrative databases such as ACC's and treatment provider organisations.

The IPRC Regulations list the 'treatment providers' who can receive payment from ACC and the types of treatment, procedures, or materials that can be charged to ACC. The amount a treatment provider will receive in relation to a particular treatment service is also defined either in the Regulations or by contract.

Primary care treatment providers are also able to charge the patient for the treatment service in addition to the charge to ACC. The treatment provider determines the level of this co-payment unless they have entered into a contractual agreement with ACC that restricts the level of the co-payment.

¹³ Injury Prevention, Rehabilitation, and Compensation (Ancillary Services) Regulations 2002. New Zealand.

Treatment provider charges

Treatment providers invoice ACC directly and therefore information is held in the ACC database on the dollar amount per claim. There is variation, however, in the level of detail that is held for the different treatment provider categories due to historical payment arrangements. The following treatment providers are covered either by IPRC Regulations or by ACC contracts: general practitioners, nurses, physiotherapists, accident and medical clinics¹⁴, radiologists, counsellors, psychiatrists, dentists, acupuncturists, audiologists, chiropractors, occupational therapists, optometrists, osteopaths, podiatrists, and speech therapists. Cost information is also held for assessments and specialist consultations.

The amount that a patient pays for treatment services is likely to be recorded on treatment provider administrative databases.

ACC surveys of treatment providers also provide estimates of co-payments charged by treatment provider groups for a limited range of specific types of assessments, consultations, or procedures.

Pharmaceutical costs

ACC covers the cost of pharmaceuticals for injury treatment. ACC pays Pharmac (\$8.6 million in 2002/03) directly for the cost of primary care related pharmaceuticals.

The individual receiving the pharmaceuticals may be faced with a charge for them: either a co-payment, a part-charge, or a full charge (if the pharmaceutical is not covered by Pharmac schedules). These charges can be claimed back from ACC (approximately \$5 million per annum). As such, the treatment and rehabilitation costs of pharmaceuticals are fully covered by ACC for ACC claimants. If an ACC claimant requests reimbursement for those costs they will be available in the ACC system at a claim level.

Primary health sector laboratory costs

Medical laboratory costs requested from the primary health sector are funded by District Health Boards through the Healthpac claiming system. Vote Health is refunded by ACC annually as part of the PHAS payment. This is about \$0.5 million per year.

Secondary care (hospital) treatment and rehabilitation costs

A range of injury treatment and rehabilitation services is provided in secondary care facilities (hospitals) including acute treatment (emergency non-admissions and hospital inpatient), elective procedures, non-acute inpatient treatment and rehabilitation services, day-patient services, outpatient services, and specialist services.

¹⁴ Accident and emergency clinics are part of hospitals and therefore funded through the PHAS funding. Accident and medical clinics are funded either under contract or regulations by ACC.

Acute care provided in hospitals for patients with injuries is funded separately from other types of hospital treatment. ACC funds PHAS, as detailed in the IPRC Act and the IPRC (Public Health Acute Services) Regulations 2002. However, the Minister of Health is responsible for their purchase from District Health Boards. An annual service agreement between Ministers of ACC and Health provides the basis for the funding and purchasing of PHAS. The Crown recovers its costs from ACC through bulk payments made under the annual service agreement.

A full description of the coverage of PHAS is provided in Annex 1. In brief, PHAS cover the following secondary care services for injury:

- Services provided as part of an acute admission and outpatient services provided within 6 weeks of discharge
- Emergency department presentations, subsequent services within 7 days of presentation, and outpatient services within 6 weeks of treatment
- Services provided within 7 days of referral
- Ancillary services (excluding emergency transport)
- Services relating to the provision of treatment.

The process for estimating the bulk payment for PHAS is also detailed in Annex 1. A two-stage process is used: the first stage identifies the injury cases that meet the PHAS definition and the second stage identifies the costs associated with those cases. Different data sources are required for cost calculations, including the NMDS inpatient and day-patient records, and survey data for outpatients and emergency department volumes.

Acute care emergency non-admission

As described above, acute care at emergency departments is funded through the bulk payment for PHAS.

Currently administrative data sources for emergency departments are only held at each hospital. The number of triaged admissions is reported but injuries cannot be separated from non-injury cases. Surveys have been conducted in the past to estimate the costs associated with emergency department injury presentations.

Acute care hospital inpatient

Acute care for people admitted to hospital is funded through the PHAS bulk payment. The NMDS records all inpatient and day-case discharges including information about the diagnosis and procedures undertaken. Diagnostic Related Groups (DRGs) are calculated for each discharge. The DRG along with the patients' length of stay in hospital determines the costweight that is allocated to each hospital event.¹⁵

¹⁵ Annex 2 provides more detail on how costweights are calculated.

Acute treatment costs are funded through the bulk payment up to a maximum of 6 weeks. Ongoing inpatient rehabilitation costs are direct billed to ACC.

Elective procedures, non-acute inpatient treatment and rehabilitation services, and day-patient services

ACC has contracts with 47 hospitals for provision of elective procedures. Detailed claim data are held for the procedures undertaken within the contracts. These are fully funded for treatment costs (with a standard contract price for the procedure), but there are limits on volume. However, there is provision for additional procedures if needed.

ACC also funds elective procedures that are negotiated individually outside of the contracts. ACC funds 60% of the standard contract price for these non-contract procedures. The ACC data base records various payment type categories (eg surgery, anaesthesia, general hospital charges) for one procedure.

If the claimant makes a choice to use a non-contracted provider then they will be charged for non-contracted elective procedures that are conducted. The treatment providers determine that charge and the amounts the providers charge for different procedures are unknown. In some instances there might be three payers for the secondary care elective procedure: ACC, an insurance company, and the patient. NZHIS also receives discharge records for elective events and a costweight is calculated.

Ancillary costs associated with these elective procedures such as transport, escort, and accommodation costs may be funded by ACC if eligibility criteria are met.

Outpatient services

There are two mechanisms for funding outpatient treatment: direct billing to ACC and the PHAS bulk payment. The mechanism used depends on the timing of the outpatient treatment, as defined in the IPRC (Public Health Acute Services) Regulations 2002. Where ACC is billed directly, the costs appear in the ACC database.

Hospital outpatient databases are being developed but at the moment are currently not sufficiently robust to identify costs. Once developed, it is anticipated that these databases will provide detailed information on treatment and rehabilitation costs. However, both the volume of services used by injury patients and unit costs of these services are required to generate good total cost information, and it is not necessarily the case that both types of data will become available at the same time.

In the past, the Ministry of Health has conducted surveys to estimate outpatient costs.

Specialist services

Where an inpatient at a public hospital receives care from a specialist, within the acute phase of their care, the costs are included in the PHAS bulk payment. Where specialists' services are required for a patient's rehabilitation (eg services delivered in an outpatient setting after 6 weeks post discharge or 6 weeks of treatment) they are included in

outpatient payments made by ACC. If the patient remains an inpatient for longer than 6 weeks and receives specialist services, these are funded directly by ACC.

Pharmaceuticals, laboratory, and radiology costs

The PHAS bulk payment includes provision for pharmaceuticals, medical laboratory tests, and radiology costs. Costs associated with non-emergency outpatient treatment and inpatient rehabilitation are direct billed to ACC.

Social rehabilitation

Under the IPRC Act the purpose of social rehabilitation is to assist in restoring a claimant's independence to the maximum extent possible. Key aspects of social rehabilitation referred to in the Act are aids and appliances, attendant care, child care, education support, home help, modifications to the home, training for independence, and transport for independence. ACC may provide other social rehabilitation if the claimant is assessed as having a need for the rehabilitation.

As noted above, receipt of social rehabilitation equipment and services through ACC is dependent on an assessor determining there is a 'need' for the rehabilitation. If a claimant incurs expenditure outside of the assessed need then the claimant (or others) will bear that cost.

Vocational rehabilitation

Under the IPRC Act the purpose of vocational rehabilitation is to help a claimant to maintain employment, obtain employment, or regain or acquire vocational independence.

ACC assisted vocational rehabilitation is limited to those people who are entitled to weekly compensation or on parental leave. Under legislation, employers must take all practicable steps to assist an ACC claimant with their vocational rehabilitation as agreed in his or her individual rehabilitation plan. The employer may incur costs in assisting the claimant through, for example, providing or modifying equipment. There is no known data on these costs.

Definition of terms in Figure 6, below

ACC claim data	Data maintained by ACC about payments for treatment and rehabilitation.
Treatment provider administrative data sources	A treatment provider's own databases, eg General Practitioner practice records.
ACC provider surveys	ACC's surveys of primary-care treatment providers. Information is collected on patient co-payment charges for specific consultations and procedures.
Hospital databases (in the future may be sourced from ACC)	This information is currently available only from hospital databases but in the future ACC will record these claims once hospital systems have developed sufficiently.

Figure 6: Summary of sources of treatment and rehabilitation cost information

Broad cost category	Cost category		Who pays?	Primary administrative data source	Data source for costs to individuals	Other data sources
	level 1	level 2				
Transport	Emergency transport		ACC, individual	ACC claim data	No known data source	Unknown
	Non-emergency transport		ACC, individual	ACC claim data	No known data source	Unknown
Primary care treatment costs	General practitioners		ACC, individual	ACC claim data	ACC provider surveys - average costs	Treatment provider administrative databases
	Practice nurses		ACC, individual	ACC claim data	ACC provider surveys - average costs	Treatment provider administrative databases
	Physiotherapists		ACC, individual	ACC claim data	ACC provider surveys - average costs	Treatment provider administrative databases
	Physiotherapists – contracts		ACC	ACC claim data	Not applicable	Treatment provider administrative databases
	Accident and medical clinics		ACC, individual	ACC claim data	ACC provider surveys - average costs	Treatment provider administrative databases
	Radiologists		ACC, individual	ACC claim data	ACC provider surveys - average costs	Treatment provider administrative databases
	Counsellors, psychiatrists, psychologists		ACC, individual	ACC claim data	ACC provider surveys - average costs	Unknown
	Dentists		ACC, individual	ACC claim data	ACC provider surveys - average costs	Treatment provider administrative databases
	Acupuncturists		ACC, individual	ACC claim data	ACC provider surveys - average costs	Unknown
	Audiologists		ACC, individual	ACC claim data	No data	Unknown
	Chiropractors		ACC, individual	ACC claim data	ACC provider surveys - average costs	Unknown
	Occupational therapists		ACC, individual	ACC claim data	No data	Unknown
Optometrists		ACC, individual	ACC claim data	No data	Unknown	

	Osteopaths	ACC, individual	ACC claim data	ACC provider surveys - average costs	Unknown
	Podiatrists	ACC, individual	ACC claim data	No data	Unknown
	Speech therapists	ACC, individual	ACC claim data	No data	Unknown
	Assessments	ACC	ACC claim data	No data	Unknown
	Specialist consultations	ACC	ACC claim data	No data	Unknown
	Laboratory services	ACC, bulk-fund	No data	No data	Healthpac?
	Pharmaceuticals	ACC, bulk-fund ACC, claim	No data	No data	Healthpac?
Secondary care (hospital) treatment and rehabilitation costs	Accident and emergency (non-admission)	ACC, bulk-fund	Hospital databases	Not applicable	
	Outpatient follow-up accident and emergency (non-admission)	< 7 days after treatment	ACC, bulk-fund	Hospital databases	Not applicable
		> 7 days after treatment	ACC, claim	Hospital databases (in the future may be sourced from ACC data)	Not applicable
	* Acute admission (includes pharmaceuticals and laboratory tests provided during the acute admission)	Inpatient treatment < 6 weeks	ACC, bulk-fund	NZHIS	Not applicable
		Inpatient treatment > 6 weeks	ACC, claim	ACC claim data NZHIS	Not applicable
	Outpatient follow-up (acute admission)	< 6 weeks after discharge	ACC, bulk-fund	Hospital databases	Not applicable
		> 6 weeks after discharge	ACC, claim	Hospital databases (in the future may be sourced from ACC data)	Not applicable
	Non-acute inpatient	ACC, claim	ACC claim data	Not applicable	

	rehabilitation				
	Pharmaceutical > 6 weeks	?		No known data source	
	Laboratory > 6 weeks	?		No known data source	
	Acute referral (ie emergency department costs)	< 7 days after referral	ACC, bulk-fund	Hospital databases	Not applicable
	Elective surgery (non-acute)	Contracted hospital care	ACC, claim	ACC claim data	Not applicable
		Direct purchased hospital care	ACC, individual	ACC claim data	No known data source
Social rehabilitation	Assessments		ACC	ACC claim data	Not applicable
	Equipment		ACC, individual	ACC claim data	No known data source
	Home modifications		ACC, individual	ACC claim data	No known data source
	Inpatient rehabilitation		ACC, individual	ACC claim data	No known data source
	Motor vehicle modification		ACC, individual	ACC claim data	No known data source
	Personal support		ACC, individual	ACC claim data	No known data source
	Other		ACC, individual	ACC claim data	No known data source
Vocational rehabilitation	Assessments		ACC	ACC claim data	Not applicable
	Service provision and equipment		ACC, individual, employer	ACC claim data	No known data source

* Information used by the Injury Prevention Research Unit in their paper for Department of labour: “Obtaining routine estimates of the lifetime costs of hospitalised injury: description of a method to estimate the cost of inpatient hospital care”, August 2003.

Quality of information on treatment and rehabilitation costs

What unit record treatment and rehabilitation cost data are available or potentially available?

ACC data

ACC claim data are available at the unit record level, and includes all treatment and rehabilitation costs met by ACC, other than those covered by the PHAS payment. The PHAS funding accounts for approximately 30% (\$268 million in 2002/03) of treatment costs met by ACC and covers all acute services associated with emergency departments, subsequent inpatient services (within 6 weeks of admission), outpatient services (within 6 weeks of discharge), and acute referrals, pharmaceuticals, and laboratory costs.

The level of additional (that is non-cost) information varies. Comprehensive ACC claim data are available for all entitlement claims (approximately 103,000 in 2002/03). These data include information on the claimant (age, gender, ethnicity, region, etc), the claim (type of injury), and injury setting (work, non-work, motor vehicle, etc). Other than basic injury type and demographic data, very little information is captured in the ACC database systems for 'medical-fee only' claims which are not motor vehicle or work-place injuries. However, with increased electronic lodgement of claims by doctors, more information about patient details will be captured on ACC claims.

Total and average treatment costs are therefore calculable by various individual characteristics, settings, and injury categories. Treatment costs recorded in the ACC claim data are categorised across 32 primary cost categories.

NZHIS Data

Unit record level data are available for all inpatient and day-case discharges (both acute and non-acute). Injury events can be identified within these (117, 660 public hospital discharges for injuries and poisonings in the year 99/00) using the diagnosis code, external cause code (e-code) or injury flag, ACC45 flag, or a mixture of these. One of the issues with the data is how to identify which records correspond to an injury.¹⁶

NZHIS data includes information on the patient (age, gender, ethnicity, region, etc) diagnosis and types of treatments received. The data also include an estimated treatment cost (known as a 'costweight'). This costweight is an average cost based on the patient's diagnosis, treatment, and length of stay in hospital. Unit record cost information provided by public hospitals to NZHIS is used to calculate these average costs. These costweights reflect inpatient and day-case costs, they do not include costs associated with emergency department or outpatient services.

¹⁶ This work is being undertaken by the Information Manager in terms of looking at which discharges relate to the same injury. While there is no universal definition of injury, the Information Manager has adopted the following definition for this purpose, "the physical and/or mental effects sustained in one injury event by one person".

Costweights, by definition, represent average hospital resource usage. Each hospital inpatient (injured or not) is assigned to one of about 661 DRG codes, which effectively signal common resource usage.¹⁷ There are 26 DRG codes associated with injury diagnoses. Cost and length of stay profiles are determined for each DRG code. The costweight for each unit record is then determined by the DRG code (ie case complexity) and the patient's length of stay. There is a fixed price for each costweight (ie 1 costweight = \$X).¹⁸ Costweights are also calculated for ACC funded private hospital cases.

Linked ACC and NZHIS data

Linked ACC and NZHIS unit record data would provide the most complete picture on treatment and rehabilitation costs. NZHIS data would essentially supplement ACC data by the addition of information on the hospital treatment costweights for acute inpatient services. Note that these costweights are the basis for determining the amount that ACC pay for the acute inpatient component of the PHAS payment. The other costs covered by the PHAS payment (emergency departments and outpatient services within 6 weeks) would not be included in the NZHIS data. These costs account for approximately 22% of the PHAS payment.

Linked NZHIS and ACC data would ensure injury events are able to be identified within the NZHIS dataset. It is also required to distinguish acute from elective injury admissions. (Note that there are cases not covered by ACC, eg seasickness, which are coded as injuries by NZHIS.)

Quality of data

The cost information that is available from ACC and NZHIS is collected for claim and payment purposes and internal hospital management purposes (ie budgeting and benchmarking performance), respectively. Data quality needs to be investigated fully to ensure that the appropriateness, consistency, and completeness of the data for cost calculations.

Statistics New Zealand has recently completed a pilot study for the Injury Statistics Project they are undertaking in their role as Information Manager under the IPRC Act 2001.¹⁹ The study found that ACC and NZHIS data can be integrated or linked to a suitable level of quality and confidentiality.

¹⁷ The version of the Diagnostic Related Group (DRG) classification used in New Zealand has changed over the years. In version 3.1 there are 26 DRG codes relating to discharges with a principal diagnosis from the Injuries, Poisonings and Toxic effects of Drugs chapter. In the current version (4.2) there are 24 DRG codes. These DRG codes do not directly relate to the definition of injury in the Injury Prevention, Rehabilitation, and Compensation Act. Version 3.1 had 667 DRG codes in the total classification. Version 4.2 has 661 codes.

¹⁸ Annex 2 provides more detail about how costweights are calculated.

¹⁹ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Feasibility Report*. New Zealand.

Data accessibility

Release and distribution of health data is regulated by the Privacy Act and the Health Information Privacy Code (HIPC). The HIPC provides greater detail to the Privacy Act and defines how it applies to health data. NZHIS has an 'Information Release Policy' which is based on the requirements of the HIPC. The Information Release Policy describes the circumstances when identifiable or unit record data will be made available to researchers. These requests are dealt with on a case-by-case basis. Summary data are routinely published and are more readily available.

Requests for data specifically provided to the Information Manager for integration will be re-directed to the original providers of that data. Access to integrated data will be governed by Statistic New Zealand's statutory framework, in accordance with data integration and microdata access protocols.²⁰ The development and implementation of a detailed dissemination strategy is also planned for the next stages of the injury development project, and access will be focussed on meeting diverse user needs.

Cost data collected by private health service organisations may be deemed commercially sensitive by those organisations and not necessarily accessible for analysis.

Gaps in coverage

Figure 6 highlights the gaps in the current availability of treatment and rehabilitation cost information. There are considerable gaps in the information available on those injury costs met by individuals, families, and employers. Good information exists on the treatment and rehabilitation costs met by ACC, including unit record level information on PHAS costs which Statistics New Zealand has recently confirmed can be achieved with linked ACC and NZHIS data.²¹ NZHIS data contains information on the cost of inpatient services, but not emergency or outpatient services which are still held only by hospitals.

Individuals and their family

There is considerable variation in the costs incurred by individuals across primary care treatment services within and between different regions. The proportion of primary treatment costs met by individuals is thought to vary and to depend on the type of treatment. The costs to those who choose to receive elective procedures outside ACC contract agreements are unknown.

There is currently no specific information on treatment and rehabilitation costs of injuries to families. However these are expected to be a relatively small part of total treatment and rehabilitation costs to society.

²⁰ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Privacy Impact Assessment*. New Zealand.

²¹ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Output Report*. New Zealand.

Employers

The cost to employers is generally considered to be the cost of levies paid by them, and any co-payments they meet. However there will be additional treatment and rehabilitation costs not met by ACC that employers meet directly. These are expected to be modest. In addition, ACC may not hold complete information on treatment costs met by accredited employers.²²

Government

The total amount paid by ACC is known, as is the amount ACC pays for specific ACC entitlements. The amount paid by hospitals for injuries not covered by ACC is also known. There is no disaggregated information on costs of acute care for injury at emergency departments and outpatient services at secondary care facilities.

Quantum of treatment and rehabilitation costs

The total cost of treatment and rehabilitation covered by ACC in 2001/02 was approximately \$865 million and \$951 million in 2002/03.²³ The PHAS funding in the same years was \$251 million and \$268 million respectively. (In 2001/2002 acute inpatients accounted for \$183 million (76%), outpatients \$12 million (5%), and emergency departments \$41 million (17%).)

In contrast, other hospital (ie ACC elective surgery) costs made up \$90 million and \$115 million, and treatment (ie ACC medical and dental) costs made up \$255 million and \$265 million in 2001/02 and 2002/03 respectively. The latter includes the costs associated with around 1.3 million claims accepted each year by ACC which are classified as minor or 'medical-fee only' claims (approximate total cost of \$77 million in 2001/02). Vocational and social rehabilitation costs made up \$216 million and \$246 million in 2001/02 and 2002/03 respectively, while the remaining treatment and rehabilitation costs covered by ACC included conveyance for treatment, backdated attendant care, and miscellaneous costs of \$53 million and \$57 million in 2001/02 and 2002/03 respectively.

²² Accredited employers are employers who have been assessed as able to partially or fully manage their employees' workplace injury claims for a specified period of time.

²³ Accident Compensation Corporation. *Annual Report 2003*. New Zealand.

Measurement of treatment and rehabilitation costs, further work, and priorities

Figure 7, below, outlines the measurement approaches and issues, further work, and priorities for each of the treatment and rehabilitation cost statistics identified earlier in this section. Areas of further work are discussed in more detail after Figure 7.

Priorities (high, medium, low) have been assessed against the following criteria:

- Current state of information (quality, completeness, timeliness and availability of information)
- Technical feasibility of improving information ('potential')
- Cost of improving information
- Usefulness of improving information (policy relevance and quantum of costs).

Figure 7: Treatment and rehabilitation cost statistics – measurement, further work, and priority level

Indicator	Measurement and quality	Further work and priority level
Total treatment and rehabilitation costs of injury to society.	<ul style="list-style-type: none"> • Not realistic at this stage. 	<ul style="list-style-type: none"> • Develop a data quality framework for treatment and rehabilitation costs of injury. • High priority
Total treatment and rehabilitation costs of injury met by ACC.	<ul style="list-style-type: none"> • Two measures are currently available – costs to date and lifetime costs. 	<ul style="list-style-type: none"> • Production of cost statistics. • High priority (costs to date) • Medium priority (lifetime costs)
Total and average costs met by ACC by cost component (primary and secondary care, transport, etc) for different treatment types, injury types, setting and population groups.	<ul style="list-style-type: none"> • ACC data enables most cost components to be determined for all entitlement claims (as opposed to minor claims). Includes primary care, rehabilitation and elective surgery costs. Excludes all PHAS funded costs, including pharmaceutical, and laboratory costs. 	<ul style="list-style-type: none"> • Production of cost statistics from confidentialised ACC unit record data (ie extend current reporting). • High priority (costs to date) • Medium priority (lifetime costs)
Total treatment and rehabilitation costs of acute treatment and rehabilitation for injury met by public hospitals (emergency, acute inpatient, outpatient).	<ul style="list-style-type: none"> • NZHIS data provide information on costs of secondary (hospital) care. Inpatient costs only – excludes emergency and outpatient costs. Average costs only, based on 26 diagnosis groups (IPRU analysis). Issues of comparability with ACC reporting and definition of injury cases. 	<ul style="list-style-type: none"> • Expand and implement method recommended by IPRU. • High priority
Total and average costs met by the PHAS payment by cost component (emergency, acute inpatient, outpatient within 6 weeks) for different treatment types, injury types, setting	<ul style="list-style-type: none"> • Linked ACC and NZHIS data is required to get unit record cost estimates for the acute inpatient component of PHAS. Statistics New Zealand have confirmed 	<ul style="list-style-type: none"> • Production of cost statistics. • Linked ACC and NZHIS (confidentialised) unit record data on treatment and rehabilitation costs, should be

and population groups.	that this is feasible. <ul style="list-style-type: none"> Unit record information on the costs of emergency departments and outpatient services. Surveys have been used previously to determine levy amounts. 	made available for research purposes as part of Statistics New Zealand's injury database. <ul style="list-style-type: none"> High priority (both) Development of administration systems required to get estimates of bulk funded costs for emergency department and outpatient services, by injury type, etc. High priority
Total treatment and rehabilitation costs of injury met by Individuals. Total and average costs met by individuals by cost component (primary and secondary care, transport, etc) for different treatment types, injury types, setting and population groups.	<ul style="list-style-type: none"> ACC surveys will provide average cost information for most primary care patient co-payments. But not by injury type, setting, and other characteristics, and demographics. 	<ul style="list-style-type: none"> <i>EITHER</i> extend existing provider surveys to identify levels of co-payments. <i>OR</i> develop new survey/s of individuals to collect information on costs met by individuals – including outpatient and emergency department costs, transport, social rehabilitation, and vocational rehabilitation. Medium priority (both)

Develop a data quality framework for treatment and rehabilitation costs (high priority)

Develop a data quality evaluation framework to evaluate the quality of cost data for the two main sources of treatment and rehabilitation cost data—ACC and NMDS health collections. Any work would need to complement work currently being done by the Information Manager on the injury database and by the Ministry of Health. The suggested model is based on the Canadian Institute of Health (CIHI) Data Quality Framework.

The deliverable would be a report that accurately and systematically records the quality of all currently available data, across a range of quality measures. The framework would include the following high-level dimensions:

- Coverage, for example what cost information is included in available cost information
- Completeness of available cost information
- Accuracy of available cost information
- Timeliness, for example the difference between the planned and actual release dates for data
- Comparability, for example the inclusion of ACC claim numbers and consistent use of injury codes (ICD or Read)
- Usability, for example the ability to produce custom reports to meet requests
- Relevance, for example, can the data be used to inform cost of injury policy issues?

Current documentation on the cost information contained in these two data collections is dispersed. Some progress has been made on aspects of coverage and availability as part of this report, but further work is required. This work is feasible and would require modest resources. A data quality framework would enable the quality of the two main data collections to be assessed and changes to be monitored over time.

Production of cost statistics: total and average treatment and rehabilitation costs met by ACC for different treatments, and injury and population groups (high priority – costs to date; medium priority – lifetime costs)

ACC's claim level data include a substantial amount of cost information. Information is available on all treatment costs met by ACC other than those included in the PHAS payment (approximately 30% of total treatment and rehabilitation costs met by ACC). ACC's data include the cost to ACC of elective surgery conducted in the public and private hospitals. These data allow average costs met by ACC to be calculated, for different injury and person characteristics.

It needs to be investigated whether key cost statistics could be produced relatively easily by expanding current reporting by ACC and Statistics New Zealand. This work is considered to be a high priority.

In addition, ACC estimates the future treatment and rehabilitation costs for injuries to enable the Scheme to be fully funded. ACC has developed robust actuarial methods to estimate the expected profile of injury costs over time. These estimates contribute to the determination of levy amounts across ACC accounts, but tend to provide more accurate determinations at the aggregate rather than individual injury level. Total 'lifetime' treatment and rehabilitation costs to ACC could therefore be produced as a key cost statistic. This is considered to be a medium priority.

Expand and implement method recommended by IPRU (high priority)

NZHIS' NMDS data contain unit record information for all inpatient discharges (both acute and non-acute). These data include unit record level cost information based on average treatment costs (costweights).

The Injury Prevention Research Unit (IPRU) completed an investigation in 2003 using these data to determine the treatment and rehabilitation costs of public hospital inpatient care for specific kinds of injury events. The method they proposed was relatively simple and involved two key steps:

- 1 Identification of injury events using the diagnosis, external cause codes and diagnostic related groups (DRG codes) reported in the NZHIS NMDS for inpatient discharge data
- 2 Summing the costweights that NZHIS assigns to each injury discharge.

With the first step, IPRU have undertaken work to 'clean' NZHIS' NMDS data to identify injury events, including isolating and removing readmissions and day patients. The later was done to derive a nationally consistent dataset of the acute injuries, partly due to a time-

series issue.²⁴ As a result, however, a substantial number of minor injuries are potentially ignored.²⁵

With the second step, IPRU relied on costweights routinely calculated and published by NZHIS for the purposes of hospital funding. Costweights are also calculated for discharge records of ACC funded patients treated at private hospitals. Total and average inpatient hospital treatment costs are calculable by various patient and injury categories. Matching with ACC data is required to distinguish acute from elective admissions.

Continuing this work is considered to be a high priority, however matching NZHIS and ACC data is required to get the most complete picture of treatment and rehabilitation costs. (See below.)

An alternative to this 'average' cost or 'costweight' approach could be to ask hospitals for unit cost information directly. Only public hospitals with clinical costing systems, however, are currently able to provide costing information for each inpatient and day-case event. Unfortunately, not all hospitals in New Zealand have these systems. These costs are used in an annual or biannual review of costweights (ie the costs in 02/03 are the basis for costweights in 04/05). Costweights essentially show an index of relativity of resources consumed between discharges. The dollar value of the costweight is also adjusted regularly for inflation, etc. The costing information is not held centrally and it is a significant piece of work for hospitals to provide it. Past studies have been able to identify the costs of about 60% of discharges nationally.

Considerable further work would be required to identify how useful this approach would be because of the information gaps and the costs and timeliness of providing the data.

Given these uncertainties, this work is not recommended. The IPRU approach is reasonable and can be improved, and there are other processes in the health sector that ensure costweights are an overall reflection of reality.

Linked ACC and NZHIS data: production of cost statistics and availability for research purposes (high priority)

Linked NZHIS unit record level data to the ACC data will provide additional unit information on the hospital costs for the acute inpatient component of PHAS. While both the ACC and NZHIS data are very useful sources of cost information in their own right, linkage is required to get the most complete picture of treatment and rehabilitation costs.

Statistics New Zealand has recently confirmed the feasibility of linking NZHIS and ACC data as part of Stage 1 of the Injury Statistics Project to a suitable level of quality and confidentiality, with the necessary cost data included.²⁶ This means that unit record level cost information could be made available that reflects the vast majority of treatment costs

²⁴ Some injuries are now treated as day cases whereas in the past the patient would have been admitted. An opposite situation is happening for traffic injuries in some hospitals since 2000.

²⁵ The Information Manager has also looked at which discharges relate to the same injury for the purposes of linking NZHIS and ACC data as part of their pilot study for the Injury Statistics Project. Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Use of NZHIS Hospital Discharge Data*.

²⁶ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Output Report*. New Zealand.

met by ACC (approximately 93% in 2002/03). The only costs, met by ACC, not included would be the emergency and outpatient components of the PHAS payment. (Note that costs for those whose claims were declined, plus those not claimed by the provider or the individual, plus those injuries that fall outside the PHAS definition of injury are not met by ACC. However, some of these costs can be obtained from hospital data.²⁷)

Ideally, this integrated data would be made available for research purposes as part of Statistics New Zealand's injury database, and be used to produce more comprehensive treatment and rehabilitation cost statistics. This work is considered to be high priority because it is both feasible and adds significantly to current base data on injury costs.

Development of new national data collections for outpatients and emergency departments (high priority)

Linkage of ACC and NZHIS data will provide (confidentialised) unit record level information on acute and non-acute inpatient costs (including day-case admissions). These costs are the major component (78%) of the costs funded by ACC via their PHAS bulk funding arrangements with the Ministry of Health. However, additional work would be required to estimate costs at the unit record level for outpatient and emergency department costs covered by the PHAS payment.

The information available would automatically improve if ACC directly purchased these services. (Note that this would require a change in legislation.) Another option, which has been undertaken on an occasional basis, include conducting projects to define the emergency department and outpatient services that fall under the definition of PHAS and investigating how to cost these services. Service contracts and surveys have been used in the past to do this work, although a modest sample survey every 3–5 years could suffice in future.

A more desirable option, however, is the development of new national data collections for outpatients and emergency departments.

This work has already been scoped by the Ministry of Health and has the potential to produce real operational benefits. It is anticipated that establishing national data sets will require defining standards and considerable resourcing of district health boards (DHBs). This is an ongoing issue for the health sector. However, the technical feasibility of undertaking this work has improved considerably in recent years, and a reasonably compelling business case could be made.

The development of national data collections for outpatients and emergency departments is therefore considered a high priority.

²⁷ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Output Report*. New Zealand.

Survey of individuals and/or other treatment providers (medium priority)

ACC are currently surveying the main primary care treatment provider groups to determine co-payment charges paid by individuals for consultations and particular procedures. This information will be collected on an annual basis to allow monitoring over time. However, there is currently no information on:

- The costs to individuals of transport, social rehabilitation, and vocational rehabilitation that are not covered by ACC
- The levels of co-payments charged by treatment providers who are not currently covered by ACC surveys (refer to Figure 6).

Additional provider surveys would be required to estimate the average costs to individuals. Depending on the purpose of the cost estimate, the existing ACC surveys may need to be modified.

To establish all treatment and rehabilitation costs to individuals, for particular injuries, a survey of individuals rather than providers is required. It might be possible with the permission of respondents to link survey information with administrative data to develop profiles of costs for a range of demographic groups, and injury settings and types.

Such surveys would take time to develop and cost a reasonable amount to undertake. The work proposed is an investigation into the feasibility of surveying individuals, and extending existing ACC surveys of treatment providers. This work is considered a medium priority.

Populating the Costs of Injury Framework

Figure 8, below, summarises the current state of and potential to improve information on treatment and rehabilitation costs from injury in terms of the Costs of Injury Framework presented in Section 1 of this report.

Figure 8: Summary of state of (and potential to improve) information on the treatment and rehabilitation costs of injury

Treatment and rehabilitation costs	Individuals and family	Employers	Government	Society
Current state of information (Potential)	Poor (Medium)	Poor (Low)	Good (Medium)	Poor (Medium)
Statistics	<p>A. Total cost met by individuals and their family</p> <p>B. Total and average cost met by individuals and their family, for different treatment types, injury types and settings, and demographic groups, etc</p>	<p>C. Total cost met by employers</p> <p>D. Total and average cost met by employers</p>	<p>E. Total cost met by government (ACC, ACC's PHAS, NZHIS)</p> <p>F. Total and average cost met by government (ACC, ACC's PHAS, NZHIS)</p>	<p>G. Total cost met by society</p> <p>H. Total and average cost met by society</p>
Data sources	<ul style="list-style-type: none"> ACC provider surveys 	<ul style="list-style-type: none"> ACC data on employer premiums ACC provider surveys 	<ul style="list-style-type: none"> ACC unit record data* NZHIS unit record data* Linked NZHIS/ ACC unit record data* 	<ul style="list-style-type: none"> Aggregation of statistics 'A'-'H' – conditional on good measures of each indicator
Further work (Priority)	<ul style="list-style-type: none"> Feasibility of new survey of individuals and households (Medium) Feasibility of extending existing surveys of treatment providers (Medium) 		<ul style="list-style-type: none"> Production of key cost statistics – based on ACC and NZHIS cost data (High) Production of key cost statistics – based on linked ACC and NZHIS cost data (High) Availability of unlinked and linked ACC and NZHIS cost data as part of the Information Manager's injury database for research purposes (High) Development of national collections for outpatients and emergency departments (High) 	<ul style="list-style-type: none"> Establishment of data quality framework (High)

* The availability of any unit record data would be subject to confidentiality and privacy constraints.

Conclusion

To improve the information base on treatment and rehabilitation costs of injury, the following areas of further work have been identified in order of priority:

High priority

- Production of the following cost statistics:
 - Total treatment and rehabilitation costs (excluding PHAS) met by ACC for all injuries and for different injury types, treatment types, and population groups (source is ACC's claim data)
 - Average treatment and rehabilitation costs met by ACC (excluding PHAS), by major cost categories (hospital treatment, medical treatment, vocational rehabilitation, transport, etc), for all injuries and for different injury types, treatment type, and population groups (source is ACC's claim data)
 - Total treatment and rehabilitation costs for inpatient and day-case acute patients for all injuries and for different injury types, treatment types, and population groups (source is NZHIS' NMDS data)
 - Average treatment and rehabilitation costs for inpatient and day-case acute patients, by major cost categories (treatment types), for all injuries and for different injury types, treatment types, and population groups (source is NZHIS' NMDS data)
 - Total treatment and rehabilitation costs (excluding emergency department and outpatients components of the PHAS) for all injuries and for different injury types, treatment types, and population groups (source is linked NZHIS' NMDS data and ACC data)
 - Average treatment and rehabilitation costs (excluding emergency department and outpatients components of the PHAS) by major cost categories (hospital treatment, medical treatment, vocational rehabilitation, transport, etc), for all injuries and for different injury types, treatment type, and population groups (source is linked NZHIS' NMDS data and ACC data).
- Confidentialised ACC unit record level claim data on treatment and rehabilitation costs (including separate cost components) to be made available for research purposes if the Privacy Act, Health Information Privacy Code, and public concerns are able to be met.
- Confidentialised NZHIS unit record level discharge data on average costs (with costweights attached) to be made available for research purposes (via IPRU approach).
- Linked and confidentialised NZHIS and ACC unit record level data on costs to be made available as part of Statistics New Zealand's injury database for research purposes.
- Develop a data quality framework which will identify the accuracy and completeness of data available for the calculation of total treatment and rehabilitation costs of injury met by society.

- There is little national information on the costs incurred at emergency and outpatient departments at secondary care facilities covered by the PHAS payment. Further work on development of new national data collections for outpatients and emergency departments needs to be considered in the first instance.

Medium priority

- Production of the following cost statistic:
 - Total lifetime treatment and rehabilitation costs to ACC for all injuries and for different injury types, treatment types and population groups using existing actuarial models developed by ACC.
- Develop options for extending the range of information available on the costs met by individuals.

Section 4: Output and productivity costs

Introduction

Injuries can result in the loss of output and productivity by those injured and those indirectly affected by injury, such as family and friends. The terms are not mutually exclusive, but loss of output can be thought of as the absolute loss of production of physical goods and services while a person is required to take time off work. Loss of productivity, on the other hand, can be thought of as the marginal loss of production where a person continues or returns to work at partial strength, either on a temporary or permanent basis. Loss of output and productivity could result from a minor interruption that lasts 1–2 hours through to a few weeks, or from a significant interruption that lasts several years or results from a person's death.

Loss of income is the primary cost associated with the loss of output and productivity. Income includes earnings (wages or salary) to individuals and their families and revenue to employers. (Interest and rent are also forms of income but are considered secondary costs of injury and are not explored in this section.)

Loss of value from household and community production (ie unpaid work) is also incurred by individuals and their families as a result of injury; while 'friction costs' are also incurred by employers in the process of replacing human resources (including voluntary workers), such as the costs associated with hiring and training temporary or permanent staff replacements.

Loss of earnings and value of unpaid work: who pays and what information is needed?

A difficulty with measuring loss of earnings is attributing the loss to injury rather than to other factors such as labour market dynamics (eg job creation and destruction, retirement) and an individual's pre-existing conditions, psycho-social make-up, or financial circumstances.

Two components of loss of earnings are considered in this section:

- actual earnings (both *before* and *after* return to work (RTW) or independence)
- potential earnings in the absence of injury.

Loss of earnings to the person injured as well as those immediately affected by injury is relevant. In some cases, family, close friends and colleagues can play important care giving and support roles that affect their own output and productivity.

Similarly, the effect of loss of value of unpaid work is widespread. The primary difficulty with measuring household and community production losses is that they are non-monetised losses. However, these losses can be imputed and assigned to injury.

Who pays?

The ACC Scheme is a compulsory insurance Scheme that covers, amongst other things, significant economic loss from injury. Individuals contribute to this Scheme (for non-workplace injuries) through levies on their earnings and motor vehicle registration, and through general taxation. Employers are responsible for costs associated with workplace injuries. (Individuals and employers thus also suffer indirectly from forgone levies and tax revenue from injuries.)

The Ministry of Social Development (MSD), also offers financial support for injury if people are unable to access ACC and are in financial hardship. Individuals contribute to this support through general taxation.

Individuals (as well as their families, friends, employers and community) directly pick up earning losses that are not covered by the ACC Scheme or MSD, as well as the value of any household or voluntary production losses. These losses may be small, but are not necessarily inconsequential.²⁸

What information is needed about earnings losses and the value of unpaid work?

ACC and the Department of Labour provide advice to the Minister for ACC on the appropriateness and adequacy of individual entitlements under the IPRC Act. For instance, where the level of an existing entitlement does not represent the actual loss, or where specific population groups are unfairly disadvantaged in accessing entitlements because of the nature of their employment or the area where they live.

There are also cost-sharing and interface issues with MSD. Once a person has been assessed as fully rehabilitated by ACC, and have been exited from the Scheme, they may seek further financial support from MSD. Further, where social assistance is already being provided, due to financial hardship or other reasons, ACC is required to reimburse MSD once an affirmative cover and/or entitlement decision has been made.

Figure 9 presents some key questions and some potential statistics to help identify the specific information that is required on loss of earnings to individuals.

²⁸ Department of Labour and Accident Compensation Corporation (2002). *Aftermath: The Social and Economic Consequences of Workplace Injury and Illness*. New Zealand.

Figure 9: Loss of earnings and value of unpaid work – key questions and statistics

Key questions	Statistics	Definitions
What amount of <i>pre-injury</i> earnings do people lose from injury?	Count of injuries where there is a drop in earnings after injury	Including for injured and caregivers (eg spouses)
	Count of injuries where ACC weekly compensation is paid	
	Count of injuries where MSD benefits are paid	
	Total loss of pre-injury earnings	Including for injured and caregivers (eg spouse)
	Total cost of ACC weekly compensation (or 'ACC-compensated earnings loss')	
	Total cost of MSD benefits (or 'MSD-compensated earnings loss')	Total costs of income-replacement benefits for injured person and/or their family or household
<ul style="list-style-type: none"> What amount is compensated by ACC and/or MSD? 	Proportion of total loss of pre-injury earnings compensated by ACC weekly compensation	Numerator: Total cost of ACC weekly compensation Denominator: Total loss of pre-injury earnings
	Proportion of total loss of pre-injury earnings compensated by MSD benefits	Numerator: Total cost of MSD benefits Denominator: Total loss of pre-injury earnings
<ul style="list-style-type: none"> Is this compensation appropriate and equitable? (Equal access, uptake, etc.) 	Proportions of ACC and MSD compensated loss for different injury and person characteristics (eg type of injury, injury setting, injury severity, occupation, industry, region, sex, age, and ethnicity)	
<ul style="list-style-type: none"> Are there any disparities between population groups that cannot reasonably be explained by injury and person characteristics? 	Average loss of pre-injury earnings for different injury and person characteristics (as above)	
	Average cost of ACC weekly compensation for different injuries and person characteristics (as above)	
What amount of <i>potential</i> earnings do people lose from injury?	Total loss of potential earnings	For injured and caregivers (eg spouse)
<ul style="list-style-type: none"> Are there distinctive characteristics of those who suffer loss of earning potential? 	Average loss of potential earnings for different injuries and person characteristics (as above)	
What value of unpaid work is lost from injury?	Total value of unpaid work lost from injury	

Loss of revenue and friction costs: who pays and what information is needed?

The loss of revenue to employers arises from the loss of output and productivity from injured workers and their colleagues, either through work absenteeism or lighter/modified duties. This loss includes compensation for employees' earnings losses, potentially on an ongoing basis.

Friction costs of injuries include all costs associated with the replacement of a worker, such as:

- Hiring temporary/permanent staff (uncertainty about duration)
- Training temporary/permanent staff
- Pay differentials between what the employee would have been paid to do the work and what replacement labour is paid. This could involve an overtime pay differential for a temporary absence, a savings in hourly pay with a new or temporary hire—off-set by extra expense to train/monitor the temporary hire until he or she is up to speed
- Investigating injury incidents and correcting safety defects
- Loss of special skills or knowledge
- Distraction of co-workers
- Production delays
- Prosecution and fines
- Loss of reputation.

These costs faced by employers are described in the literature as 'friction costs' as they are not permanent or lifetime costs. Employers, unlike individuals, are assumed to adapt and accommodate the financial impact of an injury.

Costs vary depending on such factors as the type of business, processes and equipment, and availability of replacement labour.

Who pays?

As mentioned above, the ACC Scheme compensates individuals for earnings losses from loss of output and productivity from all injuries covered by the IPRC Act. As the ACC Scheme is a fully-funded scheme, the total ACC levies collected from all employers (including self-employed) are required to meet the full cost (ie current and expected future cost) of all ACC entitlements paid out for *workplace* injuries.

Levies are derived from a formula based on employers' total liable earnings and their industry or risk class. ACC's Employer Programmes offer discounts and periods of claim management (whereby employers can directly meet the cost of ACC entitlements) if employers can demonstrate adequate health and safety management practices. Due to the lack of clarity around what is and is not a workplace injury, and the complexity of the structure of the ACC Accounts, there is likely to be residual cross-subsidisation between individual employers.

Employers directly meet the revenue loss and all other friction costs from injury.

Finally, the government also directly suffers revenue loss and friction costs from injury as a large employer. The government employs approximately 15% of the fulltime equivalent New Zealand labour force.

What information is needed about revenue losses and friction costs?

ACC and OSH need information on the revenue loss and friction costs from workplace injuries to convince employers of the value (or benefit-cost ratio) of investing time and effort, or purchasing safety equipment to prevent injuries.

Injury prevention is a key objective of the IPRC Act. Under the Act ACC is able to enter accreditation agreements with employers to promote injury prevention in respect of work-related personal injuries. ACC has designed and actively promotes two employer programmes: the Workplace Safety Management Practices Programme and the Partnership Programme.

OSH also works with employers (either via prosecution or training) to ensure they meet the primary obligation under the Health and Safety in Employment (HSE) Act to take “all practicable steps” to avoid serious workplace injuries.

Further, DoL and ACC provide advice to the Minister for ACC on:

- Employers and Self-Employers (‘work’) Accounts, including levy rates, levy stability, cross-subsidisation, and risk-rating
- Entitlement and return to work issues, including the role of employers in post-placement support for both workplace and non-workplace injuries.

Employers also have an interest in revenue loss and friction costs from injury and approaches they can take to actively manage them.

Figure 10 presents some key questions and some potential statistics to help identify the specific information required on productivity losses to employers from injury.

Figure 10: Revenue loss and friction costs – key questions and statistics

Policy Questions	Indicator	Definition
What is the productivity loss to employers from injury?	<ul style="list-style-type: none"> Total annual loss of revenue from injury Average annual loss of revenue from injuries for different employer characteristics (industries, employer size, region, etc) 	Revenue is the total money received by a firm. Estimated loss of revenue from injury due to loss of injured employees' time and time replacing employees. (Subscripts refer to years.)
	<ul style="list-style-type: none"> Total annual 'friction' cost of injury Average annual friction cost of injuries for different employer characteristics (as above) 	Expenditure on compensation, hiring, training, investigation, damaged equipment and safety procedures directly resulting from the incident. (Subscripts refer to years.)
<ul style="list-style-type: none"> What factors affect this productivity loss? <ul style="list-style-type: none"> Type and severity of injury Labour supply issues Rehabilitation effort 	The following for employer characteristics (as above): <ul style="list-style-type: none"> Average number of days off work from injuries Average number of non-replaced days off work from injuries Average number of partial work days from injuries 	
Do employers fully compensate individuals for earnings losses from workplace injuries?	The following for different employer characteristics (as above):	
<ul style="list-style-type: none"> Indirectly via ACC levies? (Employers and Self-employed Levies) 	<ul style="list-style-type: none"> Average cost of weekly compensation for workplace injuries Proportion of annual revenue loss that is weekly compensation for workplace injuries 	
<ul style="list-style-type: none"> Directly via sick leave entitlements? 	<ul style="list-style-type: none"> Average cost of sick-leave entitlements 	

Description of information sources and quantum of output and productivity costs

The following information sources are explored below:

- ACC administrative data
- ACC survey data
- Inland Revenue Department (IRD) administrative data
- MSD administrative data
- Other data sources.

ACC administrative data

ACC administrative data are information collected by ACC solely for the purpose of assessing and administering people's entitlements as set out in the IPRC Act.

For the purposes of measuring output and productivity losses from injury, information ACC collects on both (entitlement and non-entitlement) claims and employers is relevant.

Of particular relevance in terms of entitlement claims is ACC weekly compensation. There are no other entitlements specifically designated to compensate individuals for loss of pre-injury earnings. However, it is possible that people may choose to regard and use their ACC independence allowance or lump sum compensation for this purpose.

Weekly compensation

ACC provides weekly compensation for 80% of individuals' pre-injury earnings up to a statutory maximum of \$87,185.15 (gross per annum).²⁹ Weekly compensation is available for work and non-worked related injuries if a person was earning immediately prior to their injury and can establish an ongoing stream of earnings. (Both these requirements can be difficult to establish for precarious work such as seasonal or part-time work.)

There are some important limitations:

- Eligibility requirements for *both* cover *and* entitlements under the ACC Scheme that must be met
- Weekly compensation is only paid after 7 days (for workplace injuries, employers are required to meet the cost of 1st week compensation)
- An ongoing incapacity to work (as opposed to *earn*) less than 30 hours per week must be demonstrated. Provided this can be demonstrated an individual can continue to receive their original weekly compensation, adjusted for inflation, until they are

²⁹ Section 100 and Clause 46, Schedule 1 of the Injury Prevention, Rehabilitation, and Compensation Act 2001. New Zealand.

entitled to New Zealand superannuation.³⁰ (There is no distinction made in the ACC Scheme between temporary and permanent incapacity.)

Once a person can demonstrate a capacity to work 30 hours or more per week, their entitlement to weekly compensation ceases after 3 months. This is the case irrespective of whether the person is able to return to their pre-injury level of earnings or any earnings.

- Weekly compensation is abated at the rate of 24 cents for every \$1 of earnings derived during the period of incapacity up to \$56.67, and at the rate of 56 cents for every \$1 over \$90.62.

Despite these limitations, ACC data provides the primary source of information on individuals' *compensated* loss of *pre-injury* earnings. ACC data also provides a rough proxy for individuals' loss of pre-earnings before return to work or independence, provided an additional 25% is added to the cost.

ACC does not provide any real compensation for loss of *potential* earnings.

The minimum amount of weekly compensation, however, is available to young people such as students, subject to conditions, who are injured before they have had the opportunity to earn a living.

Independence allowances and lump sums

Independence allowances and lump sums are provided to people who suffer permanent impairment as a result of their injury.³¹ They are intended to compensate individuals for non-economic loss as a result of their injuries, and so are arguably partial measures of intangible costs of injuries (discussed later in this section).

Even though independence allowances and lump sums are used for economic purposes, they do not provide a useful measure of economic loss. The amount of independence allowances and lump sums set in legislation is independent of any assessment of individuals' actual non-economic loss—really a token recognition of non-economic loss.

While an independence allowance or lump sum is not a good measure of loss, receiving an independence allowance or lump sum could provide a crude signal of the severity of injury. This is only a crude measure because impairment is only one element of severity—disability is another, more subjective element.

The severity of the injury, or degree of permanent impairment, can either be worked out from the American Medical Association percentage awarded, or backwards from the

³⁰ Clause 52, Schedule 1 of the Injury Prevention, Rehabilitation, and Compensation Act 2001. New Zealand.

³¹ Lump sums replaced independence allowances in the Injury Prevention, Rehabilitation, and Compensation Act 2001 for permanent impairment that results from injuries sustained after 1 April 2001.

amount received as ACC does not record the impairment percentage in their main system.³²

ACC Levies

ACC's levy data are relevant for working out who pays for output and productivity costs. Unfortunately, this can only be worked out at a fairly aggregate level (eg industry-based risk groups) because of the insurance nature of the Scheme and the structure of ACC's accounts.

A. Claimant data

It is possible to work out individuals' contribution to weekly compensation at an aggregate level, as the total weekly compensation paid out from the Earners and Non-Earners' Accounts.

B. Employer data

ACC claims data are only systematically linked, to a reasonably high standard to 'standard'³³ employers for weekly compensation entitlement claims that result from workplace injuries.³⁴ ACC is looking to establish this link for all (entitlement and 'med-fee only') claims resulting from workplace injuries.³⁵ It is possible, therefore, to work out which employers are incurring the most costs.

It is possible to work out individual employers' contribution to weekly compensation at the aggregate level, as the total weekly compensation paid out of the Employers' Account (or Self-Employed Account.)

Quantum

It is not possible to tell from ACC data alone what proportion of individuals' loss of pre-injury earnings before they return to work or independence is covered by ACC, let alone individuals' potential earning losses from injury.

In the fiscal year to 30 June 2003, ACC accepted 1,520,023 claims. Of these, 103,127 were entitlement claims and 61,623 received weekly compensation.³⁶ There were also 27,115 ongoing claims that received weekly compensation. Of the 88,738 new or ongoing weekly compensation claims, 38,313 were work-related claims.

The total cost of weekly compensation in the year to 30 June 2003 was \$629 million—\$190 million associated with new claims, and \$439 million with on-going claims.

³² ACC uses the *American Medical Association Guides to Measuring Permanent Impairment*.

³³ 'Partnership Programme' employers are required to report all claims information.

³⁴ Employers are only responsible for workplace injuries.

³⁵ Priority will be given to claims costing more than \$1000.00.

³⁶ Accident Compensation Corporation. *Injury Statistics 2003 (Final Edition)*. New Zealand.

ACC data are a lower bound indicator of individuals' loss of pre-injury earnings *before* return to work or independence for individuals that are in established employment and suffer a relatively *serious* injury (ie one that requires more than 7 days off work.)

To estimate the additional loss of pre-injury earnings before ACC entitlements began, assume that the 62,000 weekly compensation claimants had 5 days off prior to receiving weekly compensation and the remaining 41,000 entitlement claimants had an average of 2 days off work, and 20% of *minor* injury claimants had an average of 1 day off work. If the average hourly rate were \$20.00, this would amount to another \$108 million that individuals or employers bear directly.

Loss of pre-injury earnings after return to work or independence and potential earnings, as opposed to that compensated by ACC, will be significant for some individuals. Currently no information exists on this. An additional 5% loss on top of the compensated loss would equate to \$31 million. The 20% of wages and salary not compensated by ACC equates to an additional \$157 million.

ACC survey data

In 2002, ACC commissioned a small survey of *exited* weekly compensation claimants to gauge whether they returned to their pre-injury level of earnings.

The survey found that 59% of those surveyed returned to a lower level of earnings. Some additional questions were asked about claimants' post-injury expenses.

In terms of the data generated by this survey, some insight is provided into the level of *actual* post-injury income. Unfortunately corresponding pre-injury earnings information was not obtained, and it is difficult to isolate out the different sources of post-injury income (social assistance, earnings, etc).

ACC and the Department of Labour are considering the possibility of a regular, multi-purpose survey to pick up this and other information about injured workers that is not readily available from ACC's administrative data.

An important issue will be the ability or potential to link survey information with administrative information. In terms of the 2002 survey, results can only be linked for the purposes of establishing population characteristics. Survey participants' approval would be needed to link at a unit record level.

IRD administrative data

IRD administrative data will be a key source of information on individuals' loss of pre-injury and potential earnings.

IRD collects information on employers and employees for the purpose of collecting tax-revenue for the government. IRD also holds information on earnings from self-employment. These data can provide information on individuals' actual pre- and post-injury earnings.

IRD's IR348³⁷ or Employer Monthly Schedule (EMS) consists of employers' monthly schedule of payments to employees and others whose income is taxed at source, and includes gross earnings and PAYE for each employer/employee combination, for each month. Importantly, ACC is deemed an 'employer' of ACC weekly compensation recipients, and ACC weekly compensation recipients are deemed to be 'employees' (distinguishable from real employees) as weekly compensation is not a tax exempt entitlement. In the same way, individuals receiving government benefit assistance can be identified.

Used alone, tax data will provide insights into loss of earnings as a result of injury. This information would only be available for those injured workers who received weekly compensation from ACC (approximately 62,000 new claims in 2002/03). Information on individuals' earnings prior and post injury, ACC compensation received and government benefits received would be available for July 1999 onwards. Person-specific information on workers' ages and genders, their employers' industries and approximate firm size (payroll and number of employees) would also be available. There would be no information about their claims or the nature of their injuries (ie occupation, type of injury, setting, treatments, other costs, etc).

The period over which claimants receive weekly compensation is typically short—with approximately 70% of claimants away from work for less than 1 month, and 95% for less than 1 year. Thus for injuries where weekly compensation was received during 2002, at least 18 months of earnings information would be available prior and post injury. This dataset will provide very limited information on the income loss of injured workers who receive weekly compensation for a relatively long period of time (ie for some years).

IRD tax data alone would also provide information on the social assistance received by injured individuals who received weekly compensation from ACC, rather than all entitlement claimants. No information would be available on benefit type.

IRD administrative data would not provide a good source of information on employers' revenue losses from injury.

³⁷ IR348: April 1999 onwards. IR 66: April 93 – March 1999.

Employers and self-employed are required to provide information on revenue, expenses and profit to IRD. However, this information could not be used to properly investigate the impact of injury on these. These impacts (if any) are currently unknown, but there are too many intervening unmeasured variables such as poor management that could affect causal analysis between firms' profit and revenue and injury rates.

Linked IRD and ACC data

Linking IRD data with ACC data would provide additional information on the injury or claim and entitlement (including occupation, type of injury, setting, types of treatment received and treatment costs).

Linked ACC and IRD data would provide information on the impact of injury on earnings for a wider group of injuries—in particular, for entitlement claims where weekly compensation was not paid—approximately 41,000 claims in 2002/03. This will include those not eligible for weekly compensation (eg non-earners, those in some casual or precarious employment) and those who were eligible but were away from work for less than a week. (This would require data to be matched on the basis of individuals' name and date of birth information—individuals' IRD numbers are only collected by ACC for claims where weekly compensation is paid out.)

To determine loss of potential earnings, individual's actual earnings post-injury need to be compared with what they would have received if they had not been injured. This is not directly observable and needs to be estimated.

In the first instance workers' actual earnings pre- and post-injury could be compared. However, any observed differences can only be attributed to combined effects of the injury and any other factors that could influence earnings.

The post-injury earnings of injured workers could also be compared to that of similar workers (with respect to age, gender, prior earnings and firm size) who did not receive weekly compensation. This would provide an estimate of loss of potential earnings for injured workers (over a subsequent 18–24 month period.) Other aspects like cessation of employment, and change of employer can also be identified from these data. While this would provide a useful estimate of loss of potential earnings, it cannot control for a large number of unobserved variables that could potentially impact on earnings (eg occupation and hours worked among others).

There are a large number of 'minor' claims accepted each year (approximately 1,417,000 in 2002/03) for which name and date of birth information is not captured in the ACC system. These claims are referred to as 'medical-fee only' claims and typically cost less than \$50 each. (The exception to this is workplace and motor vehicle injuries where 'medical-fee only' claims are captured in the ACC system.) The impact of these injuries will not be able to be investigated using the linked data. Similarly, the impact of injuries not covered by ACC will not be able to be investigated using these data.

Linked ACC and IRD administrative data would also provide additional insight into the loss of earnings compensated by social assistance.

Linked ACC and IRD data would provide additional information on the social assistance received by those that had an entitlement claim accepted by ACC, including those where weekly compensation was paid and those where it was not, all work-place and motor vehicle claims, (rather than an all registered claims). Again no information would be available on benefit type. These data are an alternative to obtaining linked MSD/ACC data (discussed below).

Linked IRD, ACC and NZHIS data

Linking IRD data with ACC and NZHIS data would provide additional information on the hospital treatment received by the injured person, and additional information on the cost of inpatient treatment. Statistics New Zealand has recently confirmed the feasibility of linking ACC and NZHIS data as part of their injury database development.³⁸ These data would also pick up people hospitalised for injuries that do not have an ACC claim associated with them.

Linked ACC and MSD administrative data

MSD provides income assistance to people who meet their income and cash asset tests.

Core assistance includes the unemployment, invalids and sickness benefits.³⁹ These benefits provide a level of assistance required for maintaining a basic standard of living that is adjusted to a person's household and financial circumstances.

People who are not receiving ACC weekly compensation, (and possibly some people who are receiving ACC weekly compensation,) who have suffered a loss of pre-injury earnings may be eligible for this assistance. This depends on their family circumstances and cash assets (eg those with a partner in paid work may not be eligible).

Social assistance paid to injured individuals could be seen as compensation for loss of earnings due to injury or compensation for labour market or social disadvantage, or in some cases a mixture of both.

It is not possible to tell from MSD data alone the number of injured people who are receiving core benefits to assist with any loss of pre-injury earnings. Current or previous injury status is not a requirement for a benefit, and therefore is not recorded by MSD.

To identify the component that is a consequence of injury the counterfactual needs to be estimated—that is, the social assistance that the injured person would have received had they not suffered an injury. Linked longitudinal MSD and ACC data would provide an

³⁸ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Feasibility Report*. New Zealand.

³⁹ Hardship assistance is also available in the form of one-off payments.

estimate of this. The linking of these data would be based on name and date of birth information (and IRD number in cases where ACC weekly compensation was paid.)

Linked ACC and MSD administrative data would provide some insight into the *compensated* cost of injury. But unlike ACC data, social assistance is determined independently of individuals' actual earnings loss.

Linked ACC and MSD data may shed some light on some familial impacts.

Linked ACC and MSD data would identify where a benefit is provided to an injured individual, (or is provided at an abated rate,) the benefit type and amount, and the people covered by the benefit (ie partners and dependant children). This would provide good information on the level of compensation for injury met by social assistance. These data would capture those who have had an entitlement claim accepted by ACC, including those where weekly compensation was paid and those where it was not, and all workplace and motor vehicle claims, (rather than all registered claims).

Linked ACC, IRD and MSD data

Linked ACC, IRD and MSD data would provide the most comprehensive information on the social assistance received by injured individuals. However, this would be a significant data-integration exercise.

Quantum

A recent data link of 'exited' weekly compensation recipients by ACC and MSD showed that around 11.5% moved onto a benefit after 6 months.

Other data sources

There is a range of other data sources that provide some insights into the loss of output and productivity from injury including OSH administrative data, the Household Economic Survey, Human Capital Statistics, the Disability Survey, Demographic Trends data, the Census, the Annual Enterprise Survey, and the System of National Accounts.

Two that are worth exploring briefly are OSH data and Statistic New Zealand's Household Satellite Account.

OSH data

The amount employers are prosecuted for non-compliance with the Health and Safety in Employment (HSE) Act 1993 could be considered an indirect cost of injury to the employer. Fines (notionally) represent a friction cost of doing business that those employers should have incurred by taking "all practicable steps" to avoid the injury before

the injury occurred. They are not part of the social cost of injury as they represent transfer payments.

OSH electronically records fines and court costs, but not on their primary database 'HAZARD'. Linking these case records with HAZARD and then with ACC data to link with individual employers and/or industries is likely to be tenuous.

OSH does not systematically record other costs to employers of complying with the HSE Act.

Household Satellite Account

The Household Satellite Account is an extension to the core National Accounts produced by Statistics New Zealand, which captures the value of household production. This information source may provide an important basis for imputing the value of unpaid household work lost from injury.

The Account derives unpaid work values by combining information from the 1999 Time-Use Survey on the number of hours per week spent on unpaid productive household activities with a medium housekeeper wage rate.⁴⁰

⁴⁰ Statistics New Zealand (May 2001). *Measuring Unpaid Work in New Zealand 1999*. New Zealand.

Quality of information on output and productivity losses

Gaps in coverage

Earnings and value of unpaid work losses

Good information is available from ACC on compensation for loss of earnings paid by the Scheme (approximately \$629 million in 2002/03). This is intended to reflect 80% of lost earnings for those covered by the scheme, but caps and exclusions reduce that replacement rate.

One significant gap identified is that ACC weekly compensation does not reflect loss of earning resulting from minor injuries (ie requiring less than 7 days off work), or for those not eligible for weekly compensation (which includes those with casual or precarious employment). Another significant gap is information on the loss of potential earnings. IRD information and linked ACC/IRD information offers considerable potential to address gaps in these areas.

In terms of valuing the loss of unpaid work, the Household Satellite Account offers potential, but does not provide any insight into the voluntary sector outside the household.

There are gaps in the information on earnings losses and value of unpaid work losses sustained by family, friends and colleagues of the injured person.

Revenue losses and friction costs

No specific information currently exists on employers' revenue losses or friction costs from injuries.

While IRD information is collected on employers' revenue, profits, and expenses, this information is unlikely to provide reliable insights into the impact of injury on these.

Quality of data

Generally, ACC's administrative claims data are good. There are, however, some general issues with the quality of ACC's administrative data, including accurate return to work dates, the number of days off work, etc.

The quality of IRD data is still being investigated. However, initial indications are that it will provide useful data on the earnings of injured workers.

Measurement of output and productivity losses, further work and priorities

Figure 11 outlines measurement approaches and issues, further work, and priorities for each of the statistics identified earlier in this section. Substantive areas of further work are then expanded upon.

Priorities (high, low, medium) have been assessed against the following criteria:

- Current state of information (quality, completeness, timeliness and availability of information)
- Technical feasibility of improving information ('potential')
- Cost of improving information
- Usefulness of improving information (policy relevance and quantum of costs).

Figure 11: Output and productivity cost statistics – measurement, further work, and priority level

Cost statistics	Measurement and quality	Further work and priority level
Earnings losses		
<i>Actual loss of pre-injury earnings</i>		
A. Count of injuries where there is a drop in earnings after injury B. Total loss of pre-injury earnings from injury C. Average loss of pre-injury earnings for different injury and person characteristics	IRD data will provide a good measure for ACC weekly compensation recipients only, and for limited individual and employment characteristics. Adjustment for non-injury events and future losses is required. Count and anonymised unit loss data should be routinely available; 'B', 'C' should be produced as cost statistics.	For 'B' and 'C', likely to be issues with accuracy and attributing earnings loss to injury. Exploratory regression analysis with the data is desirable. LEED research provides a short-term opportunity to undertake this work. High priority
	Linked ACC and IRD data will provide similar measure as above, but for wider individual and employment characteristics. Data integration is required, which raises privacy issues.	Feasibility study required for integration of ACC and IRD data. High priority
	Currently no information is available on family and friends. IRD data may shed light on earnings and employment dynamics of those living at same address.	Case studies or surveys would be required. Low priority
<i>Loss of pre-injury earnings compensated by ACC</i>		
D. Count of injuries where ACC weekly compensation is paid E. Total cost of ACC weekly compensation F. Average cost of ACC weekly compensation for different injury and person characteristics	Measures are readily produced from ACC data – only basic identification and aggregation would be required. Count and anonymised unit loss data should be routinely available; 'E', 'F' should be produced as cost statistics.	Relatively straightforward. ('E' recommended as part of Injury Data Review.) High priority
	'E / B' should be produced as cost statistic.	Straightforward if can measure 'B'. Medium priority
G. Proportion of total loss of pre-injury earnings, 'B' above, that is compensated by ACC weekly compensation		

H. Proportion, 'G' above, for different injury and person characteristics	'F / C' should be produced as cost statistic.	Straightforward if can measure 'C'. Medium priority
<i>Loss of pre-injury earnings compensated by MSD</i>		
I. Count of injuries where MSD benefits are paid J. Total cost of MSD benefits for injuries K. Average cost of MSD benefits for different injury and person characteristics	Linked ACC and MSD data would provide moderate measures for injured and possibly their spouses residing at the same address. 'K', particularly, is likely to be limited to key demographics – possible that ACC does not record injury details for non-entitlement claims. All count and anonymised unit cost data should be available.	Expect loss of pre-injury earnings compensated by MSD to be relatively small, and information is primarily useful for policy – unlikely to be of wider public interest. Accuracy for all statistics likely to be an issue. Medium priority
	IRD data alone would also provide moderate measures for ACC weekly compensation recipients, but for limited injury and person characteristics. No information on benefit type would be available.	
	Linked ACC, IRD and MSD data would provide the most comprehensive information on the social assistance received by injured individuals.	
	No information on family and friends <i>not</i> residing at same address.	No
L. Proportion of total loss of (pre-injury) earnings that is compensated by MSD benefits	= 'J / B'.	Straightforward if can measure 'B'. Medium priority
M. Proportions, 'L' above, for different injury and person characteristics	= 'L / C'.	Straightforward if can measure 'C'. Medium priority
<i>Loss of potential earnings</i>		
N. Total loss of potential earnings O. Average loss of potential earnings for different injury and person characteristics	IRD data could provide a moderate measure for ACC weekly compensation Recipients, provided a comparison group of similar workers (with respect to age, gender, prior earnings and firm size) who did not receive weekly compensation could be created. Non-injury events would also need to be controlled for. Potential for cost statistics to be produced.	Conditional on work for 'A' and 'B', above. High priority
<i>Value of unpaid work losses</i>		
P. Total value of unpaid work lost from injury	Statistics' Household Satellite Account could provide a sound methodological basis for valuing unpaid household work, but hours lost from injury would need to be estimated.	Case studies or surveys would be required. Low priority

Revenue losses		
Q. Total annual loss of revenue from injury	IRD data collects some information on employers' profit, revenue and expenses, but likely to be considerable issues with accuracy of any measures produced.	No
R. Average annual loss of revenue from injury for different employer characteristics (including government)		
S. Average number of days off work from injuries for different employer characteristics	ACC data would provide a poor measure of these statistics (ie only days where weekly compensation is paid). Should be available as cost statistics.	Feasibility study for employer/ workplace survey Medium priority
T. Average number of partial work days from injuries for different employer characteristics		
U. Average number of non-replaced days off work from injuries for different employer characteristics	No information is available.	
Friction costs		
V. Total annual 'friction' cost of injury	Apart from ACC levy data, no other information is available.	Feasibility study for employer/ workplace survey. Medium priority
W. Average annual friction cost injury for different employer characteristics		
X. Average cost of weekly compensation for different employer characteristics	ACC data would provide a good measure as weekly compensation claims are now routinely allocated to employers.	Reasonably straightforward. High priority
Y. Weekly compensation as a proportion of annual loss of revenue from injuries for different employer characteristics?	= 'Y / Q'.	Conditional on being able to measure 'Q'. Low priority
Z. Average cost of sick-leave entitlements	No information is available.	Feasibility study for employer/ workplace survey. Medium priority

Exploring IRD data, and linked ACC and IRD data—earnings losses (high priority)

IRD tax data are a potential source of information on earnings losses for individuals who receive weekly compensation from the ACC. First, actual earnings of these individuals could be compared prior and post injury. Next, the post-injury earnings could also be compared to that of similar workers (with respect to age, gender, prior earnings and firm size) who did not receive weekly compensation. This would provide both an estimate of loss of actual pre-injury earnings once individuals return to work or independence and of loss of potential earnings from wages and salary (and possibly self-employment) for injured workers. Some information on social assistance receipt would also be available.

An initial feasibility assessment would be required to establish whether a reasonable number of ACC weekly compensation recipients can accurately be identified. Statistical and econometric analysis would then be required to establish a comparison group and control for non-injury related factors. Some strong assumptions would have to be made

about the homogeneity in injury propensities among different workers, given the limited injury characteristics available in IRD data.

Linking ACC and IRD data would provide additional information on injury and person characteristics. It would also allow the investigation of earning losses for a broader class of injuries—all entitlement, workplace and motor vehicle claims—not just those where weekly compensation was paid. This would be more complex than exploring IRD data alone because of inherent privacy issues with linking data. Approval and feasibility assessment would be required.

This series of work is considered a *high priority* for a number of reasons. First, there is no comprehensive information that is readily available on *actual* or *potential* earning losses. Some survey information is available, but this information is costly, incomplete, not timely, and suffers from sample size and selection issues.

Second, there is real potential to improve this information with IRD data, as outlined above. The opportunity currently exists to analyse a 4-year set of IRD data as part of the Linked Employer-Employee Database (LEED) research. The LEED research involves integrating existing employer and employee administrative data from the IRD PAYE and income tax systems, together with business data from Statistics New Zealand's business frame. The information produced will provide insights into the operation of the labour market and business performance. Using the LEED to investigate earnings and employment dynamics of injured workers (who received ACC weekly compensation) will help illustrate the potential of these data to develop official statistics and support policy relevant statistical research.

Finally, the information that would be produced is highly relevant for a current policy programme by DoL, ACC and MSD to improve the sustainable earnings and other labour market outcomes for injured workers.

Case studies or survey of individuals and their family and friends (low priority)

Case studies or a survey would provide additional information on the earnings losses and unpaid work losses of individuals who do not receive weekly compensation and, more generally, of family and friends who provide essential support and care-giving roles. A survey could also reveal information about changes in individuals' expenditure and consumption patterns, which provides another way to assess financial hardship from injury.

This work is considered a low priority primarily because of the time and expense associated with developing good quality, comprehensive questionnaires, administering the survey, and analysing the data. The nature of the information being sought may also be difficult to standardise and may raise issues of accuracy. The case studies and surveys would rely heavily on individuals' recall of past events and their interpretation of how they allocated their time.

There would still be a gap with respect to information on actual earnings losses of those who have minor injuries. (That is those who do not have an entitlement, workplace or motor vehicle claim accepted by ACC, which includes most 'medical-fee' only claims.)

ACC does not have sufficient information about these claims to allow them to be matched to IRD data. However, there is not a strong policy need for better information on minor injuries as they are not considered to be a significant proportion of societal costs of injury.

Costs to family and friends are also not expected to be a significant proportion of societal costs of injury.

Exploring linked ACC and MSD data, and linked ACC, MSD and IRD data (medium priority)

Linked ACC and MSD administrative data would shed light on additional costs of injury borne by the government, but not on the actual costs of injury. Unlike ACC entitlements, rates of social assistance are determined independently of an individuals' prior earning status.

ACC and MSD data would need to be linked to identify injured people who become beneficiaries because of their injuries. The rate of benefit uptake, the type and number of benefits received, the duration and periods on those benefits, and the total amount received over a period of time could then be determined. Some data linkage and analysis has been undertaken for specific policy purposes, but this has been limited to weekly compensation recipients. A feasibility study would be required to determine whether all entitlement claims could also be linked.

The other option is to investigate this using IRD data and linked ACC/IRD data. The IRD data identify those who received social assistance, as well as those who received ACC weekly compensation payments. This is considered to be a more expedient way of investigating social assistance received by injured individuals.

There is reasonable policy interest in the interface between ACC and MSD in terms of achieving positive labour market outcomes for injured workers. However, while linking MSD and ACC data is expected to be technically feasible and relevant for policy, the work would be reasonably resource intensive, and would not shed a great deal more light on societal injury costs, than that provided by the linked IRD/ACC data. As such, the work is considered a medium priority.

Survey of employers and/or workplaces (medium priority)

Specific information on friction costs to employers would require a regular survey of employers and/or workplaces. Ideally, the survey would cover employers that have had or have injured workers (both workplace and non-workplace injuries, and minor and serious injuries) and employers that have had no injured workers. The survey would also need to cover a range of employers or workplaces in different industries and regions in New Zealand.

An investigation into the feasibility and potential benefits of such a survey is required. This investigation is considered a medium priority. There is real paucity of information in

this area, which DoL and ACC require to motivate employers to take a more active role in injury prevention and the rehabilitation of injured workers.

However, undertaking the survey is likely to be restricted by cost. A more generic survey of employers is currently being considered by DoL to gather information for a range of other policy purposes. The precise nature of this survey has not been determined, but there may be an opportunity to add some questions to this survey.

Populating the Costs of Injury Framework

Figure 12 summarises the current state of, and potential to improve, information on costs relating to the loss of output and productivity from injury in terms of the Costs of Injury Framework presented in Section 1 of this report.

Figure 12: Summary of state of (and potential to improve) information on the output and productivity costs of injury

Costs relating to loss of output and productivity	Individuals and family	Employers	Government	Society
Current state of info (Potential)	Poor (High)	Poor (Medium)	Good (Low)	Poor (Medium)
Statistics	A. Loss of pre-injury earnings, not compensated B. Loss of potential earnings C. Value of unpaid work losses	D. Actual loss of revenue E. Friction costs	F. Pre-injury earnings compensated by ACC G. Pre-injury earnings compensated by MSD H. ACC weekly compensation administrative costs	I. Loss of output and productivity to society
Data sources	<ul style="list-style-type: none"> • IRD data • Linked IRD and ACC data • Linked IRD and ACC and MSD data 	<ul style="list-style-type: none"> • ACC data for 'E' – only for workplace injuries, does not include first week compensation, sick leave entitlements, replacement costs 	<ul style="list-style-type: none"> • ACC data • Linked MSD and ACC data 	<ul style="list-style-type: none"> • Sum of statistics 'A' to 'G', conditional on good measures for each indicators
Further work (Priority)	<ul style="list-style-type: none"> • Feasibility studies to link data (High) • Exploratory analysis of data to attribute earnings loss to injury and produce cost statistics(High) • Feasibility of case studies or surveys to fill gaps, eg unpaid work (Low) 	<ul style="list-style-type: none"> • Feasibility of employer/ workplace survey (Medium) 	<ul style="list-style-type: none"> • Expand ACC reporting of 'F' and 'G' (High) • Investigate feasibility of producing and reporting 'G' (Medium) 	

Conclusion

To improve the information on costs relating to loss of output and productivity from injury, the following areas of further work have been identified:

High priority

- Extend the current reporting of ACC data to produce the following statistic:
 - Average cost of ACC weekly compensation for different injury and person characteristics and different employer characteristics.
- Use IRD tax data from employers and individuals—available via the Linked Employer-Employee Database (LEED) research project—to estimate loss of pre-injury earnings, loss of earnings potential and MSD benefit receipt for individuals who received weekly compensation from ACC. (No information would be available on the nature of the injury.)
- Investigate the feasibility of linking of ACC claim data with IRD tax data from employers and individuals to estimate loss of pre-injury earnings and potential earnings for individuals who had entitlement claims accepted by ACC. (Information would be available for a much broader group of injuries [ie all entitlement, workplace and motor vehicle claims] and on the nature and setting of the injury.)
- Produce the following statistics (conditional on the work above):
 - Proportion of total loss of pre-injury earnings that is compensated by ACC weekly compensation (including proportions for different injury and person characteristics)
 - Proportion of total potential loss of earnings that is compensated by ACC weekly compensation (including proportions for different injury and person characteristics)
 - Proportion of total loss of (pre-injury) earnings that is compensated by MSD (including proportions for different injury and person characteristics)
 - Proportion of total potential loss of (pre-injury) earnings that is compensated by MSD (including proportions for different injury and person characteristics).

Medium priority

- Investigate the feasibility and benefits of undertaking a survey of employers and/or workplaces to estimate the friction costs of injuries to employers and produce the following statistics:
 - Average number of days off work from injuries for different employer characteristics
 - Average number of partial work days from injuries for different employer characteristics

- Average number of non-replaced days off work from injuries for different employer characteristics
 - Total and average annual friction cost injury for different employer characteristics
 - Average cost of sick-leave entitlements (due to injury) for different employer characteristics.
- Investigate the feasibility of linking of ACC claim data with MSD benefit data to produce the following statistics:
 - Count of injuries where MSD benefits are paid/not paid for different injury and person characteristics
 - Total and average cost of MSD benefits for different injury and person characteristics
 - Total and average cost of MSD benefits received as a *result of injury*, for different injury and person characteristics.
- Investigate the feasibility and benefits of undertaking a survey of individuals to identify loss of earnings and unpaid work of those who have minor injuries and do not receive weekly compensation, and of their caregivers.

Section 5: Human costs

Introduction

Human costs from an injury or from a premature death include psychological distress, impaired physical or mental health, pain and suffering, and loss of enjoyment and quality of life.

For the purposes of this research project, these are regarded as ‘costs’ as they affect how government agencies choose to allocate resources, and could provide agencies with a more comprehensive basis for evaluating whether programmes to manage the incidence and severity of injury have been successful. They are also necessary to gain a human perspective.

Human costs are not costs to the injured person alone, but also to their family, friends, and communities. Recent case-study research by the Department of Labour and ACC (‘Aftermath’) examined these costs in detail.⁴¹ The study found that, for the victims of injury and their families, it was these costs that were the greatest burden. Further, consequences of injury and illness are multiple, complex, ripple out, and are ongoing.

They are often subjective costs that are very difficult to define because different people place different values on them. As a consequence, many human costs are unable to be measured directly, such as a loss of intimacy between spouses, or the breakdown of a family unit due to an unexpected death. People may become isolated, estranged from their community, and depressed. Boden et al noted this impact, commenting that:

*... injured workers’ ability to continue to perform their social, family, and work roles is compromised by their diminished earnings, long-term physical limitations, depression, fear and anger. As a result, family relationships suffer and family members frequently sustain significant economic and psychological hardships.*⁴²

Who pays and what information is needed?

Human costs are not fully compensated or managed by government agencies or employers.⁴³ Individuals, family, friends and the wider community directly bear these costs.

⁴¹ Department of Labour and Accident Compensation Corporation (2002). *Aftermath: The Social and Economic Consequences of Workplace Injury and Illness*. New Zealand.

⁴² L. Boden et al (1999). ‘Economic Consequences of Workplace Injuries and Illnesses: Lost Earnings and Benefit Adequacy’. *American Journal of Industrial Medicine*. 36: 487-503, p. 187.

⁴³ Independence allowances and lump sum compensation for permanent impairment is available under the Injury Prevention, Rehabilitation, and Compensation Act 2001, and is intended to compensation for non-economic loss. However, as discussed in Section 4, this compensation is capped.

The ‘Aftermath’ case-study research, however, also found that injuries could have significant impact on employers and government employees—psychological costs for OSH inspectors dealing with fatalities, and guilt and ongoing trauma for employers and their workers who had witnessed or were responsible for an accident, for instance.

Information required for different policy purposes is essentially the same, but for different injury and population groups, as Figure 13 illustrates.

Figure 13: Human costs – key questions

What are the human costs of injury to:	<i>for different settings:</i>	<i>for different severity:</i>	<i>for various population groups:</i>	<i>for miscellaneous factors:</i>
<ul style="list-style-type: none"> • Society? • Individuals, family and friends? 	<ul style="list-style-type: none"> • Motor vehicle • Aviation • Maritime • Workplace • Sport 	<ul style="list-style-type: none"> • Fatal • Serious • Minor 	<ul style="list-style-type: none"> • Age • Gender • Ethnicity • Region 	<ul style="list-style-type: none"> • Suicide • Crime

Good information on micro costs to individuals and their family and friends is required for designing policy interventions, as they reveal much more about what matters to individuals than simply resource costs.

By way of contrast, good information on macro costs to society is required for:

- Ex-ante evaluation – to provide a more comprehensive picture of the cost of injuries and therefore the effectiveness or benefit of injury prevention programmes to reduce injury risk. Benefit-cost or cost-effectiveness ratios would potentially be distorted if human costs (or savings in those costs) are not taken into account. Inclusion of these costs in estimating the cost of injuries effectively enables comparison of projects with asymmetric effectiveness on different levels of injury severity and other characteristics in a consistent scale.
- Ex-post evaluation – to provide an additional element to measure the success or failure of a programme in terms of benefits to the nation as a whole.

An important consideration for any policy purpose, given the implicit issue with measuring human costs, is whether a quantitative measure is required, and if so, whether that measure needs to be in dollars. The primary advantage of a dollar measure is the ability to generate a measure of total costs and therefore a scale of costs that is readily understandable—this is discussed further in Section 6: Total costs. The main disadvantage relates to the imprecise estimation of people’s preferences and the risk of over or underestimating actual costs.

Qualitative data are recognised as an option for some policy decisions where a better understanding of human costs is necessary, even if not sufficient. One example might be how to design a system to administer compensation entitlements in a manner that is sensitive to individuals’ dignity and need for financial independence.

Issues with measuring human costs

Measuring human costs is not an exact science. These costs are not fully compensated by government agencies so there is no readily available source of data. Even if these costs were fully compensated, however, it is unlikely that they would reflect the true costs as perceived by those individuals, and their friends and family, who are affected.

Figure 14 outlines a range of concepts and indicators used in international literature and research to describe human costs.

Figure 14: Different concepts and indicators used to describe human costs

Concept or 'cost'	Indicator
<ul style="list-style-type: none"> Pain and suffering 	<ul style="list-style-type: none"> Value of statistical life (eg Willingness to Pay) ACC, Insurance, or Court compensation
<ul style="list-style-type: none"> Disability 	<ul style="list-style-type: none"> Health outcome measures (Disability Adjusted Life Years)
<ul style="list-style-type: none"> Physical or mental impairment 	<ul style="list-style-type: none"> Level of permanent impairment (eg American Medical Association Guides) ACC, Insurance, or Court compensation Change in accommodation or area of living Health outcome measures (Life years Lost to Injury)
<ul style="list-style-type: none"> Loss of life quality or enjoyment 	<ul style="list-style-type: none"> Value of statistical life (eg Willingness to Pay) Health outcome measures (Disability and Quality Adjusted Life Years) Happiness Rate of divorce Qualitative description of experiences following injury

These concepts and indicators are not mutually exclusive, and this report does not attempt to define them as such. In some cases, there are also multiple measurement approaches for the same indicator. However, the variety of measurement approaches is diverse and offers potential for different policy purposes. For instance, measures associated with the value of statistical life are usually expressed in dollar terms, whereas health outcome measures are generally expressed as relative indices or weightings.

The indicators and the different measurement approaches are discussed below. However, discretion will be required when it comes selecting approaches for further work.

As the variations in injury impacts for different individuals with comparable cause and injury severity can be significant, the primary interests for most policy uses are usually the total and average costs (by cost component, injury severity, injury setting, injury location, etc) to society.

Primarily qualitative analyses (such as 'Aftermath') are useful to do occasionally to gain an understanding of various possible injury outcomes. However, these studies tend to focus on 'identified' individuals, whose outcomes are not necessarily typical.

Measurement approaches

Despite the lack of actual market data, a range of innovative measurement approaches can provide some insight into the cost indicators identified in the previous section—mostly at a macro level.

Figure 15 sets out the measurement approaches according to whether they provide a monetary, numeric, or a qualitative cost measure. Where possible, New Zealand data are identified to support measures of those indicators. Key approaches are then discussed in detail. Further work identified as worth pursuing is also explained and evaluated.

Figure 15: Human cost indicators – definitions, measurement approaches, and viability

Indicator	Definition and relevance	Measurement and quality	Worth pursuing? • Work required
Monetary cost indicators			
<ul style="list-style-type: none"> • Value of statistical life (VOSL) 	<p>The value to society of preventing a premature death from injury– theoretically can be different for different groups of people, but unlikely to be tolerated. ‘Statistical’ (ie not identified) because value is implicit in people’s valuation of risk changes and not of an explicit avoidance of death as such.</p>		
<ul style="list-style-type: none"> ○ Willingness to pay (WTP) 	<p>The maximum amount of money society would be prepared to pay for the avoidance of one premature statistical death. Or, what risk reduction is worth to individuals.</p> <p>Cost to family (including the concerned individual).</p> <p>Cost to society.</p>	<p>Contingent valuation – generates average value for each individual, sensitive to individuals’ circumstances (eg wealth).</p>	<p>Yes</p> <ul style="list-style-type: none"> • Extend the NZ VOSL and similar values for serious and minor injuries to non-motor vehicle injuries. • Extend to other injury severity definitions.
		<p>Revealed preference theory.</p> <p>An example is the utility maximisation model, which typically looks at the standardised net benefit function from use of safety equipment or at wages paid to get workers to take job risks to derive a VOSL. Robustness of estimates depends on the accuracy of the utility function in describing individuals’ preferences and any confounding effects from compulsory use of the equipment.</p>	<p>Possible</p> <ul style="list-style-type: none"> • Investigate adequacy of data in NZ to support wage-risk study.
<ul style="list-style-type: none"> ○ Willingness to accept (WTA) 	<p>Amount of money the public would be required to receive or save in exchange for an increase in risk.</p> <p>WTA-based VOSL can be</p>	<p>Contingent valuation, as above.</p> <p>LTSA estimated the WTA-based VOSL should be around 3 to 5 times the NZ WTP-based VOSL value.</p>	<p>No further work is required if applying the relativity found in the NZ VOSL study.</p>

	expressed as a function of the WTP-based value, and is useful for assessing interventions that might result in an increase in risk. Cost to family (including the concerned individual). Cost to society.	Revealed preference theory, as above.	
<ul style="list-style-type: none"> • Health outcome measures 	Measure the relative quality of life in different health states (ie the level of pain and suffering and disability). Discussed below. Cost to individuals.	Generating dollar values would require anchoring health outcome measures to a comparable monetary measure, such as a VOSL.	Yes <ul style="list-style-type: none"> • Monetising health outcome measures.
<ul style="list-style-type: none"> • Government, Insurance or Court Compensation for pain and suffering 	The dollar value ACC, Courts, or Private Insurance companies award individuals for their pain and suffering. Court awards are affected by factors such as ability to sue, finding malfeasors to sue, financial means of liable party, bargaining power, use of compensation as a deterrent, etc. Government awards tend to be capped. None are reflective of 'true' value for pain and suffering.	In NZ, ACC Scheme removes an individual's right to sue. Lump sums for pain and suffering only available until 1992, also capped and not inflation adjusted. In US, good court data available, but comparability questionable. Australian court awards might be more comparable, but capped.	No
<ul style="list-style-type: none"> • Government, Insurance or Court Compensation for physical and mental impairment 	As above, but impairment is not really comparable to pain and suffering – questionable proxy.	In NZ, ACC Scheme awards a regulated amount for impairment.	No
Non-monetary, but numeric cost indicators			
<ul style="list-style-type: none"> • Health status measures 	Measure the relative quality of life in different health states (ie the level of pain and suffering and disability).		
<ul style="list-style-type: none"> ○ Quality Adjusted Life Years (QALYs) 	Loss of life expectancy (or years of life lost from injury, YLL) is adjusted to reflect individuals' quality of life (or value of years of life <i>remaining</i>). Cost to individuals.	Arithmetic product of the life expectancy and the quality of the remaining years. Time in different health states weighted, ranging from 0 for death and 1 for a year of perfect health.	Yes <ul style="list-style-type: none"> • Applicability of overseas estimates of QALYs and 'New Zealand estimates' of DALYs to injury.
<ul style="list-style-type: none"> ○ Disability Adjusted Life Years (DALYs) 	YLL is adjusted to reflect individuals' disability. DALYs are effectively inverses of QALYs in that they represent the value of healthy years <i>lost</i> . Cost to individuals.	Time in different health states weighted, ranging from 0 for perfect health and 1 for death.	

○ Life years Lost to Injury (LLI)			
• Happiness⁴⁴	Unhappiness, or pain and misery, refers to feeling bad and wishing things were different. Richard Layard ⁴⁵ argues that this is on the same dimension as happiness. Cost to individuals.	Happiness is measured subjectively, but can be validated objectively with psychometric and neurological testing, which monitors brain activity in response to positive and negative stimuli. Depending on the quality of the data source, there may be issues with the level of imprecision and potential bias with any estimates.	Yes <ul style="list-style-type: none"> • Review of literature and potential NZ data sources.
• Level of permanent impairment	Average functionality lost from injury. Not adjusted for individuals' circumstances (ie does not capture disability), so not a good measure per se. However, could provide a useful 'volume' measure. Cost to individual.	ACC data, potential to break down for different injury and population groups. ACC awards compensation for permanent impairment using the American Medical Association's Guides to Permanent Impairment.	Yes <ul style="list-style-type: none"> • Produce statistic on level of impairment percentage using ACC data.
• Rate of divorce	Rate of divorce following injury. Tenuous link between divorce and human costs, but relationship strain was identified in 'Aftermath' case-study research. Cost to family. Cost to government.	Births, deaths and marriages. Real issue is credibly attributing divorce rates to injury; causality could run in opposite direction.	Possible <ul style="list-style-type: none"> • Linking ACC data with internal affairs data. • Alternatively, survey required.
• Change in accommodation, area of living	The link between change in accommodation status and injury is likely to be stronger than that for divorce because it is directly related to the level of impairment after an injury. Cost to family.	Census data	Possible <ul style="list-style-type: none"> • Feasibility of linking ACC data with Census data. • Survey may be required.
Qualitative cost indicators			
• Descriptive consequences of injury	Extending 'Aftermath' case-study research to non-workplace related injuries.		

⁴⁴ Richard Layard (March 2003). 'Happiness: Has Social Science a Clue?' *Lionel Robbins Memorial Lectures 2002/0*. London School of Economics.

⁴⁵ Richard Layard (March 2003). *Ibid*.

Willingness to pay-based value of statistical life (WTP-based VOSL)

The WTP-based VOSL represents the total amount of money that the population *collectively* would be willing to pay for safety improvements that are expected to prevent one premature *death*.

For WTP-based VOSL, literature shows a wide range of VOSL estimates from different studies. However, most of the variations found were due to the variations in the quality and variation of measurement approaches rather than any inherent problem with the WTP methodology itself.

There are two approaches to estimate the WTP-based VOSL, outlined in Figure 15 above: contingent valuation and revealed preference theory. These are discussed in turn.

WTP-based VOSL – contingent valuation approach

Literature on the contingent valuation approach to estimate the WTP-based VOSL is relatively well developed, and has been used to generate VOSL estimates in the transport sector in New Zealand.

With contingent valuation, a dollar value for reductions in the risk of fatal injuries is derived by asking a representative sample of the population a series of detailed questions to discover just how much people actually value their safety.

The major limitation with this approach is that there may be a difference between what people say they would be willing to pay and what they would actually pay if they faced the situation in real life. However, studies have found that answers obtained from realistic questions are very close to what people do in real life. If the question is not realistic, the results are not reliable.

A well constructed survey with different budget constraint scenarios also effectively allows individuals to delineate between different cost components—that is, what they are willing to pay to avoid pain and suffering as opposed to financial hardship more generally. This is relevant when it comes to using WTP-based VOSL estimates in a measure of total costs of injury (discussed in Section 6).

New Zealand WTP-based VOSL estimates derived from contingent valuation

The WTP-based VOSL has been properly estimated twice in New Zealand for road transport related risk, from surveys conducted during 1989–90 and 1997–98 (discussed below). As the majority of the population uses the roading network, road transport related risk provides a comprehensible risk, with easily understandable scenarios for carrying out a VOSL study.

The VOSL based on road risk is used in all safety evaluations across all three transport modes (road, maritime and aviation) in New Zealand, as decided by the Government in 1991 (New Zealand Gazette, 16 May 1991, No. 72, p.1602).

Importantly, the New Zealand VOSL has been used to value the human cost (and specifically pain and suffering) component of the Social Cost of Road Crashes and Injuries.

A. Estimate based on 1989–90 survey findings

Based on the results from the first survey, the New Zealand VOSL was established at \$2 million in April 1991. To express the value in current dollars, the Government decided in 1991 that this value should be indexed to the average (ordinary time) hourly earnings. The current VOSL is \$2.61 million (at June 2002 prices).

The value has also been adjusted for serious and minor injuries. The average loss of life quality for a serious injury is estimated to be 10% of the VOSL (or \$261,100 at June 2002 prices), based on the findings in the United States and the United Kingdom. This 10% estimate is also supported by the New Zealand 1997–98 VOSL survey. The loss of life quality due to a minor injury is estimated at 0.4% of the VOSL (or \$10,400 at June 2002 prices).

B. Estimate based on 1997–98 survey findings

The second VOSL survey addresses two major issues with using the current WTP-based VOSL. First, there may have been significant social and economic changes over time, affecting the WTP value the population attaches to road transport related risk. Second, the WTP value might not be linearly related to income or the relationship might have shifted over time due to improved understanding and awareness of safety. In addition, the study included questions regarding an increase in risk.

The second survey report recommends a range between \$3 million and \$5 million, with a midpoint estimate of \$4 million for the WTP-based VOSL for road risks in New Zealand.⁴⁶

Despite rigorous internal and international review of the survey and the resulting VOSL estimate, a decision has yet to be made as to whether or not to adopt a new VOSL.

The official New Zealand VOSL is \$2.61 million (at June 2002 prices).

WTP-based VOSL – revealed preference theory approach

Revealed preference theory is based on the idea that there is a linkage between the implicit value placed by an individual on the risks he or she actually faces, that this implicit value can be ‘observed’. Wage-risk trade-offs provide a good example.

Studies on wage-risk trade-off attempt to find the relationship between wage and risk

⁴⁶ J. C. Guria, W. Jones, M. W. Jones-Lee, M. Keall, J. Leung, and G. Loomes (2003). *The New Zealand Values of Statistical Life and of the Prevention of Injuries*. Draft report. Land Transport Safety Authority. New Zealand.

associated with the job for comparable activities.

The main problem with implementing this theory is that there are many factors affecting wage rate and unless all relevant factors are appropriately accounted for in the analysis, the estimated value can be biased.

Another potential problem is that the concerned individuals may not have the correct assessment of the risks, or the opportunity to choose between jobs with differential risks. The choice in many cases could be due to reasons other than risk, such as geographical location (eg mining township) and level of unemployment. Further, the skills required between jobs with differential risks are hardly identical, and what appear to be similar jobs except with difference in risks are not necessarily comparable in reality.

A recent cross-method meta-analysis addresses the question of variation in the VOSL by nature of risk finds that motor vehicle and occupational risk reduction values are virtually indistinguishable.⁴⁷

The same analysis finds that consumer-behaviour studies, which provide an alternative way to analyse revealed preference theory outside the labour market, tend to underestimate VOSLs.

New Zealand WTP-based VOSL estimates derived from revealed preference theory

Revealed preference theory has been extensively investigated overseas, but equivalent studies do not appear to have been undertaken in New Zealand.

There is some current debate, however, as to whether New Zealand data would adequately support a wage-risk study.

Willingness to accept-based value of statistical life (WTA-based VOSL)

Some policies or interventions might entail marginal increases in risk in return for resource savings. Therefore, it is necessary to have some indication of individuals' willingness to tolerate risk increases in return for reductions in the costs currently incurred by them. The WTA-based VOSL represents the amount of money the public would be willing to receive or save in exchange for an increase in risk of one premature statistical death. This assists the assessment of policies or interventions that might result in an increase in risk.

Similar to the WTP-based VOSL, the WTA-based VOSL can be derived from contingent valuation or revealed preference theory. In the case of contingent valuation, the survey questionnaire would be focusing on an increase in risk. With revealed preference theory, such as wage-risk analysis, the focus would be on willingness to accept higher pay for a high risk job, rather than sacrifice higher pay in favour of a lower risk job.

⁴⁷ Ted Miller (2000). 'Variations Between Countries in Values of Statistical Life'. *Journal of Transport Economics and Policy*. 34:2, 169–188, p12.

As WTA is not constrained by income, the WTA-based VOSL it is often found to be higher than the WTP counterpart. Theoretical explanations of disparity between WTP- and WTA-based VOSLs can be found in a number of international studies.⁴⁸ Typical explanations are that preferences can be affected by degree of substitutability of the goods in question and that preferences can be asymmetric between gains and losses.

New Zealand WTA-based VOSL estimates

Using the results from the second VOSL survey in New Zealand, the WTA-based VOSL should be around three to five times the WTP-based value in New Zealand. This range is within those found in overseas studies.

Health outcome measures

A number of measures are available for assigning relative values (usually between 0 and 1) to health outcomes. The most commonly used measures of change in health outcomes that combine mortality (ie quantity of life) and morbidity (ie quality of life) from health interventions are the Quality and Disability Adjusted Life Years (QALYs and DALYs).⁴⁹ An additional health outcome measure that has recently been developed specifically for injury is Life years Lost to Injury (LLI).⁵⁰ These measures are discussed separately below.

The measures are all arithmetic products of life expectancy and preference weights. Preference weights are used for the ‘quality’, ‘disability’, or ‘function’ adjustment in QALYs, DALYs, and LLIs respectively.

A range of ‘health status indices’ are used to derive these preference weights, including the EuroQol, General Health Rating Index, Quality of Wellbeing Scale, and Functional Capacity Index.

These indices assist with the validation of measures across different population groups. They can also be one- or multi-dimensional depending on their underlying methodology. QALYs and DALYs typically use one-dimensional methods, whereas the LLI uses a multi-dimensional method.

The four extant methods used for deriving indices are standard gamble, person trade-off, time trade-off, and visual analogue scaling. These methods are controversial as they yield inconsistent results, and it is unclear which method and results are appropriate.

⁴⁸ For example: (1) R. Sugden (1999). ‘Public Goods and Contingent Valuation’ and ‘Alternatives to the Neo-classical Theory of Choices’. Chapters 5 and 6 in *Valuing Environmental Preferences*. Eds. I. Bateman and K. Willis. Oxford University Press. (2) J. C. Guria, M. Jones-Lee, J. Leung, and G. Loomes (1999). ‘The Willingness to Accept Value of Statistical Life Relative to the Willingness to Pay Value.’ Paper presented at the 23rd Australasian Transport Research Forum. Perth, Australia.

⁴⁹ Pharmac (1999). ‘A prescription for Pharmacoeconomic analysis.’ *Pharmaceutical Management Agency Ltd, Version 1*.

⁵⁰ NHTSA, U.S. Department of Transportation (2000). ‘Appendix C: Functional Losses Resulting from Motor Vehicle Crashes’ in ‘The Economic Impact of Motor Vehicle Crashes 2000.’ Available at www.nhtsa.dot.gov/people/economic/econimpact2000/appendix_c.html.

International research has also revealed that health outcome measures based on these different underlying methods can lead to different priority settings.⁵¹

Comparison with VOSL measures

VOSL measures are typically used in environmental and safety intervention analysis, whereas health outcome measures are primarily used for evaluating health interventions.

Health outcome measures do not indicate what society is willing to pay to prevent an injury (or a range of specific health outcomes caused by injury), and therefore do not give an indication of the intrinsic value of being alive. More simply, health outcome measures are not denominated in dollars like VOSLs, but instead denominated in years of life or risk to life. Monetisation is possible, but controversial.

To varying degrees, (depending on the underlying health status index to assign preference weights,) health outcome measures also constrain individual preferences over health outcomes and combine preferences across people on a relatively egalitarian basis.⁵²

Another difference is that health outcome measures specifically measure the impact on the individual, whereas WTP-based VOSLs can measure the impact on both the family and individual.

New Zealand health outcome measures

No health outcome measures have been properly estimated in New Zealand. The New Zealand Ministry of Health (MoH) encountered significant data deficiencies when estimating DALYs for their 2001 study to estimate the burden of disease and injury in New Zealand. These deficiencies included the lack of any New Zealand-specific disability weights and suitable epidemiological data to estimate years lost to disability.⁵³

Estimates for QALYs and LLIs could also be estimated in New Zealand, using overseas data or epidemiological modelling but would face similar issues with the precision of estimates.

The methodology for DALYs was adopted because it provided the potential to generate population-based health outcomes, readily decomposable by cause (disease and injury), which could also be directly applied to cost-utility analysis for specific health interventions.

By way of contrast, QALYs only provide a method for measuring cost utility. Pharmac currently uses QALYs for drug cost analysis.

⁵¹ Wendy Watson, Joane Ozanne-Smith, and Jeff Richardson (2002). 'A Comparison of Three Methods Used to Measure Population Based Injury Morbidity.' Paper presented at the 4th *International Conference Measuring the Burden of Injury*. Montreal, Canada.

⁵² J. K. Hammitt (2002). 'QALYs versus WTP.' *Risk Analysis*. 22 (5), 985–1001.

⁵³ Ministry of Health (2001). 'The Burden of Disease and Injury in New Zealand.' *Public Health Intelligence Occasional Bulletin No. 1*.

MoH is reluctant to undertake the exercise again without improvements in the DALY methodology.⁵⁴

QALYs

A quality adjusted life year (QALY) is an arithmetic product of the life expectancy and the quality of the remaining years.⁵⁵ The methodology is based on the assumption that preferences over health risks depend on the probabilities of each health outcome. A weight is placed on time in different health states, ranging from 0 for death and 1 for a year of perfect health. In other words, it measures the years of healthy lifespan remaining.

The main issue with using QALYs in the Costs of Injury Framework is that permanent disability, where quality of life is a major issue and survival less of an issue, is difficult to quantify because the importance attached to each of the health dimensions is highly dependent on age, life context and life responsibilities.⁵⁶

QALYs are generally used in conjunction with intervention costs to generate the average or the incremental programme cost per QALY saved (ie the incremental cost-utility ratio or ICUR); the smaller the ICUR, the more cost effective the intervention. However, such application does not provide any estimates of net benefit or benefit to cost ratio of a health intervention.⁵⁷

By monetising QALYs, one estimates the benefits of saving life years. Researchers usually estimate the value of a QALY based on the VOSL such that the discounted present value of QALYs lost in a fatality equalled the VOSL.⁵⁸ However, this approach suggests the implicit VOSL for children would be significantly higher than that for older people. This effect—which may reflect society valuations—will arise as long as the value of a QALY is the same at all ages. A problem with this approach is that it assumes the same life years lost for each age group, while in reality this varies.

DALYs

Disability adjusted life years (DALYs) are essentially inverses of QALYs with disability-weights and age-weights incorporated.⁵⁹ However, the application of age-weights in the calculation of DALYs is not compulsory. For example, age weightings have not been adopted for the estimation of DALYs in the burden of disease and injury studies conducted in Australia and New Zealand.⁶⁰

⁵⁴ Ministry of Health (2001). *Ibid.*

⁵⁵ M. Malek (2000). 'Implementing QALYs? *Hayward Medical Communications.*

⁵⁶ C. Phillips and G. Thompson (2000). 'What is a QALY? *Hayward Medical Communications.*

⁵⁷ J. C. Guria and J. Leung (2003). 'Is Society Willing to Pay More for Children's Safety?' Paper presented at the 26th Australasian Transport Research Forum 2003. Wellington, New Zealand.

⁵⁸ For example: (1) T. Miller (2000). *Op.cit.* (2) Des O'Dea (2002). 'Measuring the Social Cost of Serious Injury.' Report to the Accident Compensation Authority. New Zealand.

⁵⁹ (1) T. Arnesen and E. Nord (1999). 'The Value of DALY Life: Problems with Ethics and Validity of Disability Adjusted Life Years.' *BMJ.* 319, 1423-1425. (2) Hammitt 2002. *Op.cit.*

⁶⁰ Cited in Ministry of Health (2001). *Op.cit.*

DALYs measure the years of healthy life lost while QALYs measure the years of healthy life remaining. DALYs assign disability weightings, ranging from 0 for perfect health (and thus a relatively high quality of life) and 1 for death, to each state of health.

When DALYs were first developed, the intended uses were (1) to assist prioritisation of health services, (2) to assist identification of disadvantaged groups and targeting of health interventions, and (3) to assist the provision of a comparable measure of output for intervention, program and sector evaluation and planning. However, DALYs have mostly been used as a measure of the burden of disease.⁶¹ A major criticism of this use is that DALYs do not measure the actual 'burden' of disease, rather they only measure aggregate ill-health.⁶²

Further limitations with DALYs relevant to the Cost of Injury Framework are:

- When age weightings are applied to the DALY calculation, it implicitly assumes the value of health states depend on the age of onset of the disability or fatality.⁶³ The age weighting used in the DALY calculation also disfavours children and old people.⁶⁴
- DALYs are directly measured for only a modest number of health states, then judgementally and somewhat arbitrarily interpolated for others.

Despite these limitations, DALYs have been widely used as a health outcome measure for systematic comparison of aggregate ill-health across different populations or countries.

LLI

Life years Lost to Injury (LLI) is an arithmetic product of a person's life expectancy and their Functional Capacity Index (FCI) value, which provides a utility weight ranging from 0 to 1 of the functional status among injured persons and populations. LLI thus measures the life-long effect of injury.⁶⁵

The FCI has recently been developed by the United States Department of Transportation.

⁶¹ N. Homedes (2000). 'The disability-adjusted life year (DALY) definition, measurement and potential use.' *Human Capital development and Operations Policy Working Papers*. World Bank.

⁶² S. Anand and K. Hanson (1997). 'Disability-adjusted life years: a critical review.' *Journal of Health Economics*. 16(6), 703–730.

⁶³ World Bank. 'A derivation of the DALY equation.'

<http://www.worldbank.org/html/extdr/hnp/hddflash/workp/wp_00068add.doc> last downloaded April 2004.

⁶⁴ T. Arnesen and E. Nord (1999). *Op.cit.*

⁶⁵ NHTSA (2000). *Op.cit.*

Happiness

There has been a recent resurgence in measuring ‘happiness’ or ‘utility’, particularly its correlation with income—the traditional mainstay of economic policy—notably led by Richard Layard of the London School of Economics⁶⁶.

Subjective wellbeing data are relatively unexplored by economists, despite the existence of substantial panel datasets in the US and Europe. Data are generated in response to basic survey questions about happiness with life, satisfaction with life, satisfaction with job/work, and mental distress (usually a weighting of responses to 12 or so questions).

While the data are subjective, Andrew Oswald argues that with a large enough random sample, reliable (or unbiased) statistical results can be generated. He also argues that common patterns in subjective wellbeing surveys have been observed across countries (marriage status, income, sex, employment status, etc) and across data sources. Further, there is a strong correlation with observed phenomena (ie psychometric and neurological testing).⁶⁷

Using statistical regression, Oswald argues that it is possible to use these data to:

- Determine what external factors influence happiness
- Calculate the monetary value needed to compensate individuals for unhappiness—that is the amount required to leave a person as happy as they were before the external event occurred (ie compensating differential)
- Control for personal characteristics (marriage status, income, sex, employment status, etc) that have been found to be consistent across periods of time, countries and different data sources.⁶⁸

Layard has found that at a high level of income, above \$15,000 (US), there is not a strong correlation between income and happiness.⁶⁹

Layard’s other key findings are that people adapt to conditions over time (variously referred to in the literature as ‘adaption’, ‘habituation’ or ‘hedonic treadmill’) and that people want things and experiences simply because other people have them – relative rather than absolute income matters (referred to as ‘rivalry’, ‘contrast’, ‘envy’ or ‘social comparison’).⁷⁰

⁶⁶ Richard Layard (March 2003). *Op.cit.*

⁶⁷ Andrew J. Oswald (April 1997). ‘Happiness and Economic Performance.’ *Department of Economics, University of Warwick*. (Forthcoming: Economic Journal.)

⁶⁸ Andrew J. Oswald (August 2002). ‘How much do External Factors Affect Wellbeing? A Way to Use ‘Happiness Economics’ to Decide.’ *The Psychologist*.

⁶⁹ Richard Layard (March 2003). *Op.cit.*

⁷⁰ Richard Layard (March 2003). *Op.cit.*

Richard Easterlin has taken this further.⁷¹ According to Easterlin, adaptation and social comparison affect utility less in non-pecuniary than pecuniary domains:

Life events in the non-pecuniary domain, such as marriage, divorce and serious disability have a lasting effect on happiness, and do not simply deflect the average person temporarily above or below a setpoint given by genetics and personality.

Further, individuals allocate a disproportionate amount of time to achieving their aspirations in the pecuniary field because they do not properly account for adaptation or hedonic effects. Reallocation of time to family life and health would result in an increase in happiness. (Could this be a case for more injury prevention?)

Measures of happiness could provide a measure of loss of life quality of life or enjoyment from injury from another perspective.

A potential issue with measuring happiness is causality: does injury cause unhappiness, or does unhappiness cause injuries? Easterlin suggests that direction depends on whether the domain being explored is uni- or multi-dimensional. In addition, there may be issues with recall bias if trying to calculate happiness prior to injury. These would need to be explored further.

New Zealand measures of happiness

A range of existing and proposed surveys ask questions relating to happiness:

- Mental health survey
- MSD living standard surveys 2000, 2004
- MSD social wellbeing survey 2004
- MSD/Big Cities quality of life survey 2004.

These surveys would need to be investigated further to establish whether they would provide a sound basis for measuring happiness in New Zealand, and specifically whether the injured population could be separately identified.

ACC, Insurance, and Court compensation for pain and suffering

In theory, a 'perfect market' would attach an appropriate dollar value to individuals' pain and suffering from injury. In practice, there are constraints that prevent the market operating perfectly. While a judicial system can be considered as a response to these constraints, it has its own constraints including ability to sue, finding a person to sue, the financial means of the person being sued, etc.

In New Zealand, the introduction of the ACC Scheme in 1974 attempted to address these issues by removing individuals' right to sue. The result is a more equitable and potentially

⁷¹ Richard A. Easterlin (September 2003). 'Explaining happiness.' *PNAS*. Vol. 100, no. 19.

more generous system.⁷² Lump sum compensation for pain and suffering was available until 1992, but was tightly capped and was not price-inflation adjusted. The result was that all ACC claimants who were entitled to this compensation ended up being awarded the maximum compensation available—a result that was not equitable or financially sustainable.

The government considered reintroducing compensation for pain and suffering in 2000, but even with adjustment for price-inflation, there was no certainty that without an objective and therefore defensible tool for measuring pain and suffering, a similar pattern of ‘compensation-inflation’ would not occur.

Aside from whether this compensation is available, it is questionable whether it provides a suitable measure of human costs. Compensation represents an amount that the government is prepared to pay to recognise loss, not the loss itself. In the case of pain and suffering, it is clear that any compensation is simply a token gesture (albeit with some rationale to support the level of payment).

In the United States, however, individuals’ right to sue for pain and suffering has not been removed. Data on court awards for pain and suffering have been analysed to generate a measure of human costs. While this measure could be ‘imported’, there are real issues of comparability, particularly in terms of the implicit social values in these awards.⁷³

Australian data would be more comparable, but awards for pain and suffering tend to be capped, and data are unlikely to be as abundant because Australia can be considered less litigious.

Level of permanent impairment

ACC provides compensation for permanent physical and mental impairment: independence allowances and/or lump sum compensation depending on when the injury that led to the impairment occurred.

Impairment, as defined under the ACC Scheme, means a loss, loss of use, or derangement of any body part, organ system, or organ function. Disability, by contrast, is the alteration of a person’s capacity to meet personal, social, or occupational demands or statutory or regulatory requirements, because of impairment.

While disability is potentially a closer approximation of pain and suffering, there is likely to be a reasonable correlation between those who suffer impairment and those who experience pain and suffering—particularly for high degrees of impairment. Impairment measurement is also based on objective, verifiable and measurable findings using the American Medical Association Guides to Permanent Impairment. The level of permanent impairment could therefore provide a useful ‘volume’ measure of pain and suffering.

⁷² For example: theoretical and empirical work by the New Zealand Institute for Economic Research in relation to medical misadventure payouts.

⁷³ Mark Cohen and Ted Miller (2003). ‘Willingness to Award Non-Monetary Damages and the Implied value of Life from Jury Awards.’ *International Review of Law and Economics*. 23, 165–181.

Rate of divorce, change in accommodation or area of living

Divorce (dissolution of marriage) or separation, or break-up in relationships (both physical and emotional) is one of the most considerable costs observed for family and friends of injured people.⁷⁴ In addition, major lifestyle changes, including changes in careers, beginning and stopping education, and having to give up hobbies either because of being physically or emotionally unable to do so or to care for an injured family member, have been seen to take place as a result of injury.

Theoretically, it would be possible to aggregate the numbers of divorces (or relationship break-ups) taking place within a given period of time in order to correlate them with injuries occurring to one of the partners. However, this calculation would be constrained by the fact that it would be difficult to attribute accurately the numbers or rate of divorce or separation to the actual injury. The same would also hold true for indicators of changes in lifestyle.

Descriptive consequences of injury

The 'Aftermath' case-study research attempted to obtain a deeper understanding of the consequences of workplace injury and illness. However, as mentioned, it looked at these costs and consequences only for the injuries and illnesses that were work-related. In a wider context, it would be possible to carry out a similar study for a selection of non-workplace related injuries. This would provide not only a wider range of experiences individuals go through because of injury or illness, but also provide a basis for comparison with those that are only work related. Research could also potentially be undertaken for specific injuries that are non-work related and the costs and consequences associated with these.

Psychosocial analysis

In the 'Aftermath' study, the visibility and invisibility of injury or illness were major factors in many of the cases, with influences acting from all areas. With an obvious, demonstrable link to the workplace, it was found that the injured participants received more support. Diagnosis and treatment were accurate and prompt when medical providers dealt with an injury associated with a specific event. There was (largely) more support provided by the workplace.

There is potential for future research to delve deeper into issues related to factors that cause the differences in observed consequences between visible and invisible injuries and illnesses. Ensuing results could help provide more information to agencies for decision-making with respect to resource allocation and could provide them a more accurate basis for programme evaluation.

⁷⁴ Department of Labour and Accident Compensation Corporation (2002). *Aftermath: The Social and Economic Consequences of Workplace Injury and Illness*. New Zealand.

Quantum

Using the New Zealand VOSL, the human costs of fatal and hospitalised injury in New Zealand in 1991 can be (very) crudely estimated as \$12.6 billion (\$3.5 billion for fatal injuries and \$9.1 billion for non-fatal (hospitalised) injuries). The total would be even higher if the human costs of non-hospitalised injuries were included.

This estimate is based on the number of fatal and non-fatal (hospitalised) injuries being 1,772 and 45,247 respectively (using IPRU's online data for 1991⁷⁵); and a VOSL of \$2 million for fatal injuries and \$200,000 for non-fatal (hospitalised) injuries (at April 1991 prices).

Further work and priorities

This part explores areas for further work, identified in Figure 15 above, and evaluates their relative priorities using the following criteria:

- Current state of information (quality, completeness, timeliness and availability of information)
- Technical feasibility of improving information ('potential')
- Cost of improving information
- Usefulness of improving information (policy relevance and quantum of costs).

VOSL for other sectors (high priority)

The WTP-based VOSL used in New Zealand was estimated using road transport risks. A key question is whether one could apply this value to other sectors (eg occupational or sport injuries, etc). Though there could be substantial differences (eg in terms of age distribution and income distribution of the injured) in the rates of fatal or non-fatal injuries between road and non-road injuries, the VOSL is unlikely to be significantly different between different accident settings.

However, two issues could affect the VOSL for other sectors:

- Literature shows that, all other things being equal, WTP values (thus VOSL) vary with income measures (usually household income per person for a household survey). This is not surprising because income level affects the ability to pay. However, this raises a question as to whether different occupations should have the same VOSL.
- Findings in various VOSL studies regarding variation by age are mixed. Some studies found VOSL to exhibit an inverted U-shaped relationship with age, that is the VOSLs for children and older people are lower than that for other adults.⁷⁶ However, some

⁷⁵ Injury Prevention Research Unit's Online National Injury Query System: <http://www.otago.ac.nz/ipru/Statistics/NIQS.html>

⁷⁶ For the case in Canada: (1) M. W. Jones-Lee, M. Hammerton, and P.R. Philips (1985). 'The Value of Safety: Results of a National Sample Survey.' *The Economic Journal*. 95, 49-72. (2) A. Alberini, M. Cropper, A. Krupnick and N. Simon (2002). 'Does the Value of a Statistical Life Vary with Age and Health Status? Evidence from the United States and Canada.' *Resources for the Future*. Discussion Paper 02-19.

studies found VOSL for children to be higher and some studies found the VOSL to be the same irrespective of age.⁷⁷ The relationship between WTP and age could have implications for injury types that predominantly occur within particular age groups.

The proposed work would involve a literature review of international practice and a feasibility study regarding the extension of the VOSL to other sectors in New Zealand.

This work is regarded as a high priority because it would enhance estimation of the pain and suffering component of the social cost of non-road injuries, using an existing measure that is currently used in the transport sector, and which government has already invested considerable money developing.

The primary advantage is that it provides a dollar measure that can be used for benefit-cost analysis.

The main disadvantages are likely to be the expense of running the feasibility study, as it would require international peer review and there are potential ethical and political issues if WTP values were to vary for different population groups.

Value of loss of life quality for injuries (high priority)

In the transport sector, the values of the loss of life quality for serious and minor injuries are currently estimated at 10% and 0.4% of the New Zealand VOSL respectively.

However, the average severity of serious injuries may differ between road and non-road injuries and between accident settings (eg sport injuries versus machinery injuries). According to the injury definitions adopted in the transport sector, fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock necessitating medical treatment, and any other injury involving removal to and detention in hospital are classified as serious injuries.⁷⁸ This means that a serious injury could result in temporary to permanent disability.

To apply the New Zealand VOSL to non-road injuries, the value of loss of life quality associated with injuries would need to be established at a more disaggregated injury severity level.

The proposed work is a literature review of international practice and a feasibility study of how such work can be done with New Zealand data would be useful in quantifying the human cost of injury for different injury severities.

This work is regarded as a high priority because it is supplementary to the work discussed above.

⁷⁷ For the case in the United States: (1) G. Blomquist, T. Miller, and D. Levy (1996). 'Values of Risk Reduction Implied by Motorist Use of Protection Equipment: New Evidence from Different Populations.' *Journal of Transport Economics and Policy*. 30, 55-66. (2) Alberini et.al. (2002). *Op.cit.*

⁷⁸ Land Transport Safety Authority (2001). 'Motor Accidents in New Zealand 2001'. New Zealand.

Investigating adequacy of New Zealand data to support wage-risk analysis (high priority)

While there are issues with the reliability of revealed preference theory, there are also some concerns with extending the existing New Zealand VOSL, which is based on contingent valuation studies, outside the transport sector.

The proposed work is simply a review of available data and international methods to support a wage-risk study in New Zealand. This review is considered a high priority.

This study could provide a less costly alternative to valuing (and maintaining a value of) human costs outside the transport sector, as it would use available data on observed behaviour. Given that international evidence is that results in wage-risk studies tend to be similar to those found in results of studies, a wage-risk study could provide a useful benchmark for the existing VOSL.

Monetising health outcome measures (high priority)

An alternative to VOSL that could be used to determine the value of human cost in non-road safety areas is to estimate monetary values of QALYs, DALYs, or LLIs. Monetisation is a necessary prerequisite for health outcome measures to be used in the Costs of Injury Framework.

A two-stage programme of work is proposed. The first stage would involve a proper investigation of how each of the health outcome measures are determined, their applicability or potential to be developed further for injury. Of particular interest, is whether MoH's DALYs can be used for assessing the relative effectiveness of different injury prevention or rehabilitation programmes for given types of injuries.

This stage of work has the potential to demonstrate how existing (primarily international) information can be used better, without considerable expense. The work would not involve any estimation (or re-estimation) of health outcome measures, but would rely exclusively on estimates derived overseas. (A potential by-product, however, could be a recommendation that estimation be undertaken with New Zealand data, or be enabled with the development of New Zealand-specific preference weights (eg BERL's NZQOL⁷⁹) or improvements in epidemiological data.

The second stage of work would investigate monetisation, and build on work already undertaken by Des O'Dea.⁸⁰

Because the application of health outcome measures does not typically involve conversion of these measures into monetary terms, very little is available in the literature on the methodology of doing so, particularly with DALYs and LLIs.

⁷⁹ Business and Economic Research Limited (September 2002). 'Measuring the Total Cost of Injury in New Zealand: A Review of Alternative Cost Methodologies.' Report to the Department of Labour. New Zealand.

⁸⁰ Des O'Dea (2002). 'Measuring the Social Cost of Serious Injury.' Report to the Accident Compensation Authority. New Zealand.

This work is regarded as a high priority as it is primarily investigatory, and ‘free-rides’ on work being done internationally. This would be an inexpensive piece of work.

The work would also counterbalance the work proposed for extending the New Zealand VOSL to non-transport sectors. Similarly with that work, consideration would need to be given to the feasibility of keeping any proposed measures updated and relevant.

Investigating literature on Happiness (low priority)

The work proposed is a literature review of the recent international work on measuring happiness and related concepts such as satisfaction. Of particular interest is whether injured populations have been assessed using international data, and whether there is any basis or intention for similar studies to be undertaken in New Zealand. The potential limitations and robustness of any dollar estimates should also be investigated further.

The literature review would explore the following relationships in more detail:

- Links between happiness and *quality of life*
 - Oswald suggests that this relationship has yet to be forged.⁸¹
- Links between happiness and *WTP*
 - WTP is often referred to in the literature as a measure of happiness
 - Because both are survey approaches—is WTP subject to same issues of habituation and rivalry?

This work is regarded as a low priority. Happiness potentially provides a relevant and innovative way to measure the *ex post* costs associated with the human costs from injury. However, while the review is considered a very preliminary piece of work that would require limited resourcing, it is extremely difficult to justify any expenditure into an area where two well-established measures already exist (ie the New Zealand VOSL and QALYs and DALYs).

Level of impairment (medium priority)

The level of impairment provides an indicator of human costs, rather than a measure of the costs themselves. Nonetheless, this information is available from ACC’s administrative database and should be produced as an injury statistic. This is considered a medium priority.

Investigate proxies such as rate of divorce, relocation (low priority)

Apart from the indicator identified immediately above (ie level of impairment), the areas of work that have been identified all relate to the measurement of costs to society. There is little information in the way of *mirco* costs to individuals and their friends and family.

⁸¹ Andrew J. Oswald (April 1997). *Op.cit.* Background notes p.18.

Proxies, such as the rates of divorce and relocation after injury, offer some insight into these costs. While they do not provide rigorous information for economic analysis, they could provide useful information for policy development. The main disadvantage is that considerable work would be required to generate proxies, and the reliability of these proxies is likely to be questioned. This work is therefore considered a low priority.

Further qualitative case-study research (low priority)

Further case-study research into the consequences of non-workplace injuries would offer more insight into the *mirco* costs to individuals and their friends and family.

The case-study research undertaken by DoL and ACC into the consequences of workplace injuries was very successful and provided valuable insight into these costs. While the information generated is qualitative, the raw impact of such information on those who make decisions cannot be underestimated. A real understanding of what individuals and their family and friends go through as a result of injury can arguably have a considerable impact on what decisions are made.

This work is considered a low priority primarily because of the resource commitment required, and because it is unlikely to assist directly with the aim of the study to quantify the costs of injury.

Populating the Costs of Injury Framework

The following table summarises the current state of and potential to improve information on human costs in terms of the Costs of Injury Framework presented in Section 1 of this report.

Figure 16: Summary of state of (and potential to improve) information on the human costs of injury

Human costs	Individuals and family	Employers/ Government	Society
Current state of information (Potential)	Moderate (Medium)	Poor (Low/High)	Moderate (Medium)
Indicators \$ = dollar # = non-dollar numeric Q = qualitative	A. Level of permanent impairment (#) B. Description of experiences (Q) C. QALYs, DALYs, LLIs (\$, #) D. Happiness (\$, #) E. Rate of divorce (#) F. Change in accommodation or area of living (#) G. WTP-based VOSL (\$)	H. Description of experiences (Q)	I. WTP-based VOSL (\$)
Further work (Priority)	A. Produce statistic from ACC administrative data (Medium) B. Further qualitative research into consequences of non-workplace injuries (Medium) C. Investigating potential to monetise (High) D. Literature review on measures of happiness (Low) E. Feasibility study (Low) F. Feasibility study (Low) G. Feasibility study to extend NZ WTP-based VOSL to non-transport sectors (High) AND Investigate adequacy of NZ data to support wage-risk analysis (High)	H. As for 'B'	I. As for 'G'

Conclusion

To account for all costs and benefits associated with an injury, inclusion of the human cost following injury is important because it is a major part of the macro or societal cost of injury.

A range of cost indicators and measures of these has been discussed. The potential to develop a generic WTP-based VOSL for all injury sectors in New Zealand seems immediately appealing because the contingent-valuation derived value: (1) has been established using international best practice, (2) has been adopted and used by the transport sector over the past decade, and (3) provides a monetary measure of human costs.

However, there are also merits in investigating other approaches for non-transport sectors. Health outcome measures are another set of indicators with the potential to ‘graft’ monetary values for injuries on to. A revealed-preference derived WTP-based VOSL may also provide a less costly alternative.

Non-monetary estimates should also not be ruled out. They provide valuable insights into the micro costs to individuals and their family and friends, which are important for policy development.

The following areas of work have been identified as necessary for populating the Cost of Injury Framework with human costs. A range of work has been identified as a high priority because it represents an investigation into the merits of different, competing measurement approaches rather than measurement itself. With all these measurement approaches, it will be necessary to consider the feasibility of regularly maintaining and/or updating any estimates that may be produced.

High priority

- | | |
|----------|---|
| Monetary | <ul style="list-style-type: none"> • Investigate whether the WTP-based VOSL established for road transport safety can be applied to other sectors. • Value of loss of life quality for injuries. • Investigate potential to monetise QALYs, DALYs, and LLIs. • Investigate adequacy of NZ data to support wage-risk analysis. |
|----------|---|

Medium priority

- | | |
|-------------|--|
| Numeric | <ul style="list-style-type: none"> • Produce statistic on the level of impairment from injury with ACC administrative data. |
| Qualitative | <ul style="list-style-type: none"> • Further qualitative research into the consequences of non-workplace injuries. |

Low priority

- | | |
|----------|--|
| Monetary | • Literature review on measures of happiness and applicability to measuring human costs. |
| Numeric | • Investigate potential proxies, such as divorce and relocation rates. |

Section 6: Total costs of injury

Introduction

It is impossible to eliminate all injuries, not only because of physical constraints but also because of financial constraints. Some injury risks are inherent to certain activities and are almost impossible to remove completely unless such activities are prohibited (eg sport injuries). Resources are limited so investing in those injury management areas (such as prevention and rehabilitation) with the highest return possible is always preferable.

There is a range of ways to measure highest return: the greatest number of injuries avoided, the greatest reduction in severity of injuries, and the fastest rate of return to pre-injury status. These measures, however, measure *incidence*—assumptions still have to be made about how much people value these returns. *Cost* implicitly provides a measure of impact and, where cost is measured in dollars, provides a standard and commonly understood unit of value.

A measure of *total cost* will ensure that all the potential benefits of (or savings from) a programme are accounted for. However, a measure of total costs for investment decisions is only strictly necessary where some types of injuries are disproportionately associated with some types of costs. Basing investment decisions on partial accounting would potentially bias investment towards or away from these injuries.

A measure of total costs is also relevant for decisions affecting the extent to which the government and employers should bear the costs of injury. The proposition that the government should bear most of the cost of injury goes to the heart of its distributive equity role; while the proposition that employers should bear the full costs of workplace injuries goes to the heart of perfect competition.

Perhaps most importantly, a measure of total costs provides an indicator of social and economic welfare. For example, if total cost per capita increases over time, it is reasonable to conclude that New Zealanders are becoming worse off. A measure of total costs could also be used to compare the burden of injury with other conditions and how New Zealand is faring against other countries.

Measurement

Total costs can notionally be thought of as the sum of treatment and rehabilitation, output and productivity, and human costs, as discussed in the previous sections. However, care should be taken when aggregating various cost components to avoid double counting (eg transfer payments). A common unit of measurement is needed to calculate total costs. Given that monetary measures of costs associated with treatment and rehabilitation and loss of output and productivity are potentially available, only monetary measures of human costs are explored in this section.

Figure 17 outlines some key policy questions, key statistics or indicators, monetary measurement approaches discussed in previous sections, and quality issues—including consistency of measurement approach and duplication—and potential output.

Figure 17: Total costs of injury – key questions, indicators, and measurement

Key questions ⁸²	Cost statistics or indicators ⁸³	Measurement	Quality and output
<p>How much does it cost the government (departments) to manage the impact of injuries?</p> <p>Are there any discrepancies across injury and population groups?</p>	<p>A. Total costs of injury to government (ACC, MoH, etc)</p> <p>B. Proportion of total cost to government met by ACC, MoH, etc</p> <p>C. Average investment for different injury and population groups</p>	<p><i>Treatment and rehabilitation costs:</i> ACC and NZHIS data</p> <p><i>Output and productivity costs:</i> ACC weekly compensation and MSD benefit data</p> <p><i>Human costs:</i> ACC independence allowance data</p> <p>Both cost-to-date and lifetime costs using ACC's forecasting are available – with latter, need to take account of any offsetting consumption effects</p>	<p>Adequate</p> <p>The approach is basically an accounting approach so there are no real issues with consistency of measurement. Potentially some issue with duplication, particularly with treatment and rehabilitation costs because of ACC's bulk billing arrangement with MoH.</p>
<p>How does NZ compare internationally in terms of injury costs?</p> <p>How should government (departments) select which injury risks to eliminate or prioritise?</p> <p>How should government (departments) select which injury programmes or policies to implement?</p>	<p>D. Total costs of injury to society</p> <p>E. Distribution of total costs to society across society:</p> <p>1) Average total cost of injury to society for different injury and population characteristics</p> <p>2) Marginal total cost of additional injury</p>	<p><i>Treatment and rehabilitation costs:</i> ACC, NZHIS, and survey data (plus co-payments and 'unfunded' treatment)</p> <p><i>Output and productivity costs:</i> ACC, MSD, and IRD data</p> <p><i>Human costs:</i> NZ VOSL (on its own or used to monetise health outcome measures, eg QALYs)</p>	<p>Questionable</p> <p>Reasonable to assume that measure underestimates societal costs of injury.</p> <p>This is also an accounting approach, but there are potentially some methodological issues aggregating actual costs with any of the estimated human costs, particularly willingness to pay (ie care needs to be taken to ensure that the approach only captures human costs).</p>
<p>Are employers fully covering the costs of workplace injuries?</p>	<p>F. Total cost of <i>workplace</i> injury to society</p> <p>G. Total cost of <i>workplace</i> injury to employers</p>	<p>As for 'E(1)', above</p> <p><i>Treatment and rehabilitation, and output and productivity costs:</i> ACC levies and survey data</p> <p><i>Human costs:</i> survey data</p>	
<p>What proportion of injury costs are individuals bearing?</p>	<p>H. Total cost of injury to individuals</p>	<p>Survey data</p>	

⁸² Note that cost components can also help address these questions.

⁸³ These indicators *assist* decision making.

Quantum

The total ACC Scheme costs (ie treatment, rehabilitation, and compensation) in the year to 30 June 2003 were \$1.7 billion. (Treatment and rehabilitation accounted for around \$950 million and compensation accounted for around \$750 million. Weekly compensation was the single most expensive expenditure item at approximately \$612 million.)

Further work and priorities

The following text briefly picks up on the measures identified in Figure 17, above, and suggests some priorities given the expected quality and achievability of the output.

Total cost to government (high priority)

There are two levels of total costs to government:

1. At a disaggregated level (eg by injury setting, injury severity, regional locations, government agency)
2. At a global level (ie for New Zealand as a whole).

Calculating the total cost to government should be relatively straightforward because it basically requires aggregating available administrative data. Therefore, this work is considered a high priority. Some consideration will need to be given to issues of double counting and future costs.

Total cost to society (medium priority)

Total costs to society can also be calculated at a disaggregated level or at a global level. As human cost measures for non-transport related injuries are currently not available and depend on the outcomes of further work identified in preceding sections, this work is considered to be a medium priority.

It should be noted, however, that the total social cost of injury is an important cost, and is considered to be the ultimate goal of the costs of injury project. It affects all benefit-cost analyses, in which *all* benefits and *all* costs need to be considered.

Total cost to employers (medium priority)

Requires additional survey information that is not currently available.

Total cost to individuals (low priority)

Requires additional survey information that is not currently available.

Section 7: Recommendations

Introduction

This section sets out overall recommendations based on findings in the report and a weighted assessment of the specific areas of further work and priorities that have been identified.

Generally, it is considered that a sound information base exists for measuring costs of injury across a range of cost categories and perspectives and that this should be built on rather than replaced with a consistent data source. A large-scale, robust survey of injury costs, for instance, would be very expensive and time consuming to develop. The approach recommended for populating the Costs of Injury Framework, therefore, is an ad hoc or ‘modular’ approach.

The main limitation with this approach is that a *comprehensive* database of injury costs (as part of the wider injury database Statistics New Zealand is developing) would not be produced. As a result, there would not be much scope to manipulate available data and information to meet specific information needs, without careful qualifications.

The main advantage of a ‘modular’ approach, however, is that responsibility for producing and/or reporting the statistics or indicators identified in the report to support the Framework could be assigned to a specific agency or interagency group. This would provide flexibility for agencies to cater the cost statistics or indicators to their specific information needs (ie costs for particular injury and population groups, which were not fully explored in this report, and selection of appropriate measurement approaches where alternatives exist).

Figure 18 summarises the cost statistics and indicators identified in the report. Note that the shaded sections in Figure 18 indicate that there is no data available, an estimate cannot reliably be produced, or that no real need for the information has been identified.

Figure 19 summarises the further work and priorities in respect of each of the statistics and indicators in the Framework, also identified in the report (note that the letters correspond to those used in Figure 18). Following Figure 19, each group of priorities is evaluated against the following criteria:

- Potential for integrating work into the Information Manager’s injury statistics project
- Available resourcing
 - Whether agencies’ baseline funding is an option or additional funding sources would need to be sought
 - Opportunities to ‘free-ride’ on related projects
- Coverage in terms of the statistics and indicators identified to support the Costs of Injury Framework
 - A real policy demand for cost information exists
 - How any omission would affect the integrity of the data or Framework
- Wide stakeholder interest—usability and acceptability of any indicators produced
- Ability to regularly update any indicators produced.

Figure 18: Summary of costs of injury statistics and indicators

Costs of injury statistics and indicators	Individuals and family	Employers	Government	Society
Treatment and rehabilitation costs	A. Total and average costs to individuals and their family for different treatments and injury and population groups	B. Total and average costs to employers for different treatments and injury and population groups	C. Total, average and lifetime costs to government agencies for different treatments and injury and population groups	D. Total and average costs to society for different treatments and injury and population groups
Output and productivity costs	E. Loss of pre-injury earnings, not compensated F. Loss of potential earnings G. Value of unpaid work losses	H. Actual loss of revenue I. Friction costs	J. Pre-injury earnings compensated by ACC K. Pre-injury earnings compensated by MSD L. ACC weekly compensation administrative costs	M. Loss of output and productivity to society
Human costs \$ = dollar # = numeric Q = qualitative	N. Level of permanent impairment (#) O. Description of experiences (Q) P. QALYs, DALYs, LLIs (\$, #) Q. Happiness (\$, #) R. Rate of divorce (#) S. Change in accommodation or area of living (#) T. WTP-based VOSL (\$)	U. Description of experiences (Q)		V. WTP-based VOSL (\$)
Total costs		W. Total costs of (workplace) injuries to employers	X. Total costs of injury to government agencies	Y. Total costs of injury to society

Figure 19: Summary of further work and priorities

	Treatment and rehabilitation costs	Output and productivity costs	Human costs	Total costs
High priority	<ol style="list-style-type: none"> 1. Use ACC data, NZHIS data and linked ACC and NZHIS data to produce statistics total and average costs to ACC, NZHIS, and both for different treatments, major cost categories, and population and injury groups (C) 2. Maximise the availability of ACC, NZHIS, and linked NZHIS data for research purposes, subject to confidentiality and privacy constraints (C) 3. Develop a data quality framework, in conjunction with ACC, MoH and SNZ, to enable accurate and complete identification and calculation of total direct costs of injury to society (D) 4. Investigate potential to develop two new national data collections to improve information on the costs incurred at emergency and outpatient departments at secondary care facilities covered by PHAS funding (C) 	<ol style="list-style-type: none"> 5. Use ACC data to produce statistics on the cost of ACC weekly compensation (J, K) 6. Use LEED data to produce statistics on actual loss of pre-injury earnings and earnings potential for ACC weekly compensation recipients (E, F) 7. Investigate linking ACC and LEED data to extend above estimate to all ACC entitlement claims (E, F) 	<ol style="list-style-type: none"> 8. Investigate application of the WTP-based VOSL to non-transport sectors (T, V) 9. Value of loss of life quality for injuries (T, V) 10. Investigate the potential to monetise health status measures (QALYs, DALYs, LLIs) (P) 11. Investigate adequacy of NZ data to support wage-risk analysis to derive a WTP-based VOSL (T, V) 	<ol style="list-style-type: none"> 12. Use available administrative data to produce a statistic on the total cost of injury to government (X)
Medium priority	<ol style="list-style-type: none"> 13. Use existing ACC actuarial models to produce statistic of the total 'lifetime' direct costs to ACC (C) 14. Investigate a survey of individuals and/or providers and DHB's to identify cost to individuals not identifiable or covered or by ACC, including: <ul style="list-style-type: none"> - outpatients and emergency department costs, transport, and social and vocational rehabilitation costs - all co-payments (A) 	<ol style="list-style-type: none"> 15. Investigate a survey of employers and/or workplaces to estimate and produce statistics on friction costs to employers (I) 16. Investigate linking ACC and MSD data to produce statistics on the cost of social assistance for injuries (K) 17. Use above work to produce statistics on the proportion of loss compensated by ACC and MSD (I, J) 	<ol style="list-style-type: none"> 18. Use ACC data to produce a statistic on individuals' level of impairment from injury (N) 19. Further qualitative research into the consequences of non-workplace injuries (O, U) 	<ol style="list-style-type: none"> 20. Use available administrative data and the NZ VOSL to produce an amalgamated statistic on the total cost of injury to society (Y)

Low priority		21. Investigate case-studies or surveys of individuals and their family and friends to identify loss of earnings for minor injuries and loss of value for unpaid work (E, F, G)	22. Literature review on happiness measures and application to injury (Q) 23. Investigate potential proxies, such as divorce and relocation rates (R, S)	24. Investigate a survey to identify total costs to employers (W)
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Evaluating 'high priority' work

Using ACC and NZHIS data to produce statistics on treatment and rehabilitation, compensation, and total costs to government from injury fits well with the injury statistics project the Information Manager is currently undertaking, and could be undertaken within current baselines. The work (items 1, 2, 5 and 12 in Figure 19) would produce useable and uncontroversial cost estimates that are required for policy and could regularly be updated. These estimates are central to the costs of injury framework both because they are interest to a range of agencies, and because they represent a substantial proportion of the observable costs of injury for which the government is accountable.

The LEED research project provides a short-term opportunity, within current baseline funding, to investigate the production of statistics on the actual and potential loss of earnings to individuals from injury. This work (items 6 and 7 in Figure 19) could eventually be handed over to the Information Manager. The work would represent a significant breakthrough in currently unobservable costs of injury, which could have major policy implications. The work could be expected to produce good, uncontroversial cost estimates that can be updated.

Developing a data quality framework and developing two new national data collections would enable complete identification and calculation of total direct costs of injury to society, but could not be afforded within current baselines. This work (items 3 and 4 in Figure 19) would need to be a joint programme of work between ACC and MoH, and require considerable financial support and commitment from senior officials and possibly Ministers. It is also likely that the Information Manager would want to be involved. The work would not result in immediate cost estimates, but if it is collected it could be added to Statistic's integrated injury database and produce immediate cost estimates.

A range of work (items 8–11, and arguably item 22, in Figure 19) is proposed to investigate the merits of and potential to implement a range of methods to estimate human costs from injury in New Zealand. There is wide stakeholder interest in this work because it addresses a significant gap in the Costs of Injury Framework. However, this interest is not limited to injury. The methods could be applied to a range of other adverse events, such as disability and crime. To manage potential controversy between agencies, and practical constraints with being able to repeat the work on a regular basis, this work should to be undertaken as a single project by an independent group or task-force, which can draw on a reasonable amount of expertise in this area (possibly internationally). This would also

provide some scope to explore other approaches that have not been identified. This exercise would be a significant piece of work that would require careful scoping and separate funding.

Evaluating 'medium priority' work

Some work (item 14 in Figure 19) has been identified to improve non-administrative information sources on costs to individuals from injuries, including co-payments and costs for outpatient and emergency services, transport, and social and vocational rehabilitation. This work could sit well with the data quality framework, discussed above, as it would also need to be a joint programme of work between ACC and NZHIS. The work is necessary because it would address some significant gaps in administrative data on treatment and rehabilitation costs from injury, but would require additional funding commitments and would not produce immediate cost estimates.

A range of ad hoc work has been identified as a medium priority that involves producing or reporting cost statistics from existing administrative data (items 13, 16, 17, 18, and 23 in Figure 19). This work could be funded within current baselines and could potentially be handed over to the Information Manager. This work is contingent on some of the work discussed above.

A survey of employers and/or workplaces is proposed to identify friction costs to employers (item 15 in Figure 19). This could be an expensive undertaking that would impose additional compliance costs on employers. To manage this, opportunities to link in with similar work in other policy areas should be identified in the first instance. With survey data there are quality issues and real limitations with regularly updating results that need to be taken into account.

Further qualitative research along the lines of the 'Aftermath' case-study research is also proposed to identify consequences of non-workplace injuries. This work (item 19 in Figure 19) could shed light on costs associated with loss of life and life expectancy in the medium term. However, qualitative research is expensive and additional funding would need to be sought.

Evaluating 'low priority' work

A range of 'low priority' work has been identified to address remaining gaps in the costs of injury framework (items 24–27 in Figure 19). Additional funding would be required to undertake most of this work, and the expected output is likely to be contentious and not easily updatable. This work would only warrant being undertaken if it could be tacked onto the work-streams identified above, or related work in other policy areas.

Conclusion

A ‘modular’ approach is recommended to populate the Costs of Injury Framework. This means that the set of ‘stand-alone’ statistics or indicators—based on those identified in the report to support the Framework—would be produced from existing data, where available, and regularly reported by one or more agencies.

The following statistics are currently (or could potentially be) produced from ACC administrative data, or from linked ACC and NZHIS administrative data. As such, a case could be made for the Information Manager to take responsibility for their production and reporting:

- Individuals’ loss of pre-injury earnings from injuries that are compensated by ACC
- Actual treatment and rehabilitation costs to government agencies from injuries.

The following statistics and indicators could also be produced from available administrative data, but require some further work before the Information Manager could take responsibility for their production and reporting. This work could possibly be undertaken within agencies’ base-lines:

- Individuals’ actual pre-injury loss of earnings from injuries
- Individuals’ loss of potential earnings from injuries
- Individuals’ pre-injury and potential earnings from injuries that are compensated by MSD
- Employers’ actual loss of revenue and/or profit from injuries
- Lifetime treatment and rehabilitation costs to government agencies from injuries
- Individuals’ level of permanent impairment from injuries
- Total costs of injuries to government
- Total costs of injuries to society (an amalgamated estimate from available administrative data and the New Zealand VOSL).

The following statistics and indicators require substantial work, (and in some cases an independent working group or task-force,) and it is recommended that they are scoped properly by interested agencies and additional funding sought:

- Human costs to society from injuries for non-transport sectors—including, but not limited to, investigation of the following methods:
 - WTP-based VOSL (dollar measure)
 - QALYs, DALYs, and LLIs (monetised measures)
- Treatment and rehabilitation costs to individuals from injuries
- Friction costs to employers from injuries
- Total costs of workplace injuries to employers.

The following indicator is unlikely to be reliably or efficiently measured, therefore a 'go slow' approach is recommended:

- Human costs to society from injuries—
 - Development of proxies such as the rate of divorce and change in accommodation or area of living
 - Description of individuals' experiences of injuries, and their family and friends' associated experiences
 - Investigation of happiness measures.

Annexes

Annex 1: Funding of public health acute services – how is it calculated?

Note: This annex provides an overview of the *previous* process to calculate the cost of public health acute services. This process is currently under review.

Public health acute services (PHAS) are defined by the IPRC Act and Regulations. PHAS for people who have been injured are provided by public hospitals. The cost of these services is initially paid for by DHBs and annually reimbursed by ACC. This Annex describes the process that was previously agreed by ACC and the Ministry of Health to calculate the cost of public health acute services.

There are two specific areas of interest for calculating the costs of these services. Firstly, which hospital patients are covered? Secondly, which parts of their hospital care are being paid for? The estimated or actual costs for these services are the basis for the ACC reimbursement.

A joint working group has been set up between ACC and the Ministry of Health to apply the definitions from the IPRC Act to the information available from hospitals and ACC. This calculation exercise is complex and resource intensive, and therefore it is not undertaken every year. The last time it was calculated was 2000. Since then the 2000 results have formed the basis for subsequent payments.

Which hospital services are included in PHAS?

PHAS include some of the services provided in public hospitals, including:

- Emergency departments
- Outpatient clinics (within specified time frames)
- Inpatient services (within specified timeframes).

For each of these service areas the working group uses hospital and ACC information that is available and agrees:

- How to define those patients who are included within PHAS
- How to define the services that have been provided to those patients
- The price for those services.

This forms that basis for estimating the costs of PHAS.

Overview of the calculation process

This section looks at each of the hospital service areas that provide PHAS (emergency department, outpatient, and inpatient services) and comments on how the three components of the cost calculation (which patients, which services, and price) are determined.

Inpatient services

- How to define those patients who are included within PHAS

The National Minimum Dataset (NMDS) includes every inpatient hospital event and is therefore the ‘universe’ from which PHAS events are selected.

The agreed process uses several fields with the inpatient event record, and also includes matching with ACC records to exclude elective cases.

- Which services are included?

The definition of public health acute services from the IPRC Act and Regulations are translated into codes collected in the NMDS to identify which services are included in the PHAS.

- What is the price?

The price agreed by ACC and the Ministry of Health is the WIES costweight (see Annex 2) for each included event, multiplied by the unit costweight price.

Outpatient services

The total cost of outpatient services provided at public hospital is known, along with the costs of providing each outpatient service (purchase unit). The challenge is to identify which outpatient services are used by patients included in the definition of PHAS.

- How to define the patients included within PHAS

A survey was used to estimate the volume of patients who met PHAS criteria. This is quite complicated because the PHAS includes time criteria based on previous treatment or assessments.

- Which services are included?

The working group reviewed the list of about 70 service contracts (purchase units) that are provided in public hospital outpatient settings. They divided them into three categories: included, excluded, and partially included in the definition of PHAS.

Where the working group agreed that the outpatient service should be partially funded as a PHAS, the results of the survey (mentioned above) were used determine the number patients attending the clinics, and therefore what the funding proportion should be.

The outcome of this work was a list of the outpatient service contracts that were agreed to be included in the definition of PHAS, excluded from PHAS, and an agreed proportion for those that were partially funded as PHAS.

- What is the price?

The price of running outpatient clinics is not collected nationally so it was agreed to use the price associated with contracted volumes as a proxy. This was apportioned using the survey results identified in the preceding bullet point.

Emergency department

- How to define patients included in PHAS

There is no national database of patients treated at emergency departments – although each DHB has its own records. The working group agreed that all emergency department costs should be included in the PHAS payment for those patients who met the inclusion criteria.

- Which services should be included?

A survey was taken at each DHB emergency department to identify the proportion of patients treated who met the PHAS criteria. These results were aggregated to a national percentage of emergency department patients who were included in the PHAS definition.

- What is the price?

The working group agreed to pay the proportion of emergency department contract costs that was met by patients who met the PHAS criteria.

Accessibility to cost information

For hospital-provided emergency department and outpatient services, unit record data are not available at a national level. Costs of acute injury patient treated in these service areas is estimated from the national costs.

For inpatients and day-cases, unit record data are readily available that include the cost of treatment. (However, the unit record data would need to be confidentialised for privacy reasons.)

Annex 2: Costweights and casemix – a brief summary

What is casemix?

Casemix is a term used to describe the mix of medical/surgical patients (cases) that are discharged from a hospital. Analysis is often carried out on acute and arranged admissions (and the mix of these).

The theory is that for public hospitals the number and severity of acute admissions is reasonably predictable – almost a concept of fixed volumes of business. However DHB's make business decisions about which arranged services they are going to offer.

Acute admissions

Acute admissions are defined as cases where “the admission date is less than 7 days after the date the decision was made by the specialist that this admission was necessary”. There is a concept of urgency and preparedness for these cases.

All public hospitals have contracts to provide acute care. If the patient is admitted, (treated for more than 3 hours,) then payment is made based on discharge reporting to NZHIS, which results in a costweight being allocated to the event. If the patient is treated in the emergency department only then payment is made out of bulk funding.

NZHIS gets discharge records for patients who are admitted, but not for those who are discharged from the emergency department.

Arranged admissions

Arranged admissions are where the hospital staff have scheduled the patient to turn up on a given day for a pre-determined event (usually surgery or chemotherapy). The hospital will have a contract with either ACC, a DHB, private insurer, an accredited employer or with the patient to provide the service.

In public hospitals the discharge records for all of these patients are reported to NZHIS – along with details of who purchased the event, and for ACC cases the ACC45 number. NZHIS also gets this information for private hospitals.

What are costweights?

New Zealand has adopted costweights as a mechanism for valuing publicly funded inpatient and day-case events. A costweight is calculated for every hospital discharge record that is loaded into the NMDS (public and private, day-cases, and inpatients). There

is another process to decide if the event is publicly funded and if so which contract it is being funded from.

A costweight is similar to an index of costs. One costweight is worth about \$2,500.

The costweights used in New Zealand are derived in the same way as is done in Victoria, Australia, but using New Zealand discharge and cost data.

The New Zealand costweights are called WIES costweights (Weighted Inpatient Equivalent Separation). In 2003/04 versions 8C – ie WIES8C are being used.

How are costweight values determined?

Every year there is a project to review the costweights for the following year (DHB-NZ costweight working group).

From a simplistic perspective, two datasets are matched: hospital discharge data (including Diagnostic Related Groups or DRGs) and DHB costs for those discharge events.

One outcome of this analysis is a table showing the costweight for each DRG and possible length of stay in hospital.

Therefore, the costweight may not match costs for each individual discharge from hospital, but it will cover the costs over the year for that DRG.

How is a costweight allocated?

There are two steps to the process. Firstly, the DRG is calculated for each event (based on the diagnosis and procedures that are reported along with the age of the patient, discharge type (died, transferred or discharged routinely) and weight (for babies).

Secondly, the length of stay is worked out. There are three options:

- Same day – treated for more than 3 hours but not overnight
- One day – stayed overnight
- More than one day (calculated from discharge date minus admission date).

For same day and one day cases, the costweights are documented in the costweight table. For more than one day stay, the following process calculates the costweight.

The costweight analysis (undertaken annually) identifies the spread of lengths of stay (LOS) for this DRG, and identifies high and low boundary points at the 95% confidence level:

- If the LOS for this event is lower than the low boundary point there is a per day costweight
- If the LOS for this event is higher than the high boundary point there is a per day costweight

- If the LOS is between the 95% high and low boundary points there is a per day costweight.

Who calculates the costweight?

NZHS calculates costweights as part of the process of loading hospital records into the NMDS.

When a file is successfully loaded into the NMDS a costweights report is generated which lists each record and the DRG, LOS, and costweight allocated to it. These are returned to the hospital whose data was loaded.

In addition, the Ministry uses costweight data to analyse planned and actual DHB performance.

Which costs are not included in costweights?

There are two types of costs that are not included in the weights. Firstly, interest depreciation and capital charges are not specifically addressed because they are covered as part of the dollar value of each costweight. Secondly, are the costs that are funded outside of costweights. These tend to be high cost procedures that are not applied to every case in the DRG. For example, there are DRGs for people who are on life support, but in the unusual situation where patients are on it for more than 96 hours the costs are not included in the DRG. In these cases a co-payment is made to the hospital to cover the additional costs.

Annex 3: Role of the Information Manager

This Annex provides a brief overview of the Injury Data Review and the Injury Statistics Project, with an emphasis on the role of the Injury Information Manager in relation to particular aspects of the costs of injury project: cost data and data access.

The Injury Data Review

The Injury Data Review was conducted during 2000–2001 in response to a need for information to monitor trends in injury events, identify emerging health and safety issues, and determine the cost of injury to society.

The Review:

- Recommended a conceptual framework for injury data
- Proposed a minimum set of statistical indicators to monitor trends in injuries
- Recommended a minimum dataset to support research
- Proposed adopting the ‘injury surveillance’ model for long-term management and reporting on injury information.

Proposed (cost) indicators

The Injury Data Review *proposed* a (minimum) set of indicator variables, including the following indicators of cost to address the policy question ‘What are the financial costs of injury’:

- The total cost of compensation, treatment and rehabilitation for all injuries
- The average cost of compensation, treatment and rehabilitation per new injury
- The average cost of compensation, treatment and rehabilitation per injury for all other ongoing injuries
- Cost of treatment for all injuries per \$GDP.

These indicators require the following numerator and denominator variables:

- Cost of treatment (associated with the injury event)
- Cost of rehabilitation (associated with the injury event)
- Cost of income compensation (associated with the injury event)
- Number of new injury events
- Number of on-going injury events
- GDP.

The proposed cost indicators reflect only some of the components of the total cost of injury to society.

The Review identified that further work was required on cost information.

Information management model

The chosen information model was an ‘injury surveillance’ model. This allows the analysis of injury indicators to occur through the integration of data from *all* injury-related agencies, including: ACC, NZHIS, Coroners Court, LTSA, CAA, MSA, Water Safety New Zealand, and OSH. A key feature of the injury surveillance model is the Information Manger who integrates and facilitates access to the data.

Role of the Information Manager

Part 8 of the IPRC Act is concerned with the management of injury-related information. An Information Manager function was set up to:

- a. Develop, set, publish and maintain standards after consultation with others
- b. Collect and aggregate injury-related information
- c. Facilitate access to (including by publishing) injury-related information and unit record data
- d. Consider and review current and future injury-related information requirements.

The new position was established to improve access to data and reporting that will:

- e. Monitor the incidence, trends and distribution of injury events
- f. Identify emerging health and safety hazards, including clusters of events and outbreaks
- g. Determine the cost of injury to society.

Currently injury information is collected by eight different agencies, using different quality standards and data definitions. An Information Manager should overcome this fragmentation by integrating the data from these agencies. Integration will eliminate overlap, identify gaps (vertical integration), and expand the information known about each injury (horizontal integration).

Injury Statistics Project

Statistics New Zealand was appointed as the Information Manager in June 2002.

*Project description and timeframe*⁸⁴

The primary business objective of the Injury Statistics Project is to produce official statistics by integrating injury data. The overall project has funding for 3 years and it is anticipated that it will take 3 years to complete. The project has been split into four stages:

- Pilot stage (completed in February 2004)
- Database solution stage (October 2003 to June 2004)
- Full integration stage (October 2003 to November 2004)
- Dissemination stage (November 2004 to December 2005).

⁸⁴ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Privacy Impact Assessment*.

The primary business objective of the *pilot stage* was to establish the feasibility of integrating two prime sources of data at the injury event level: ACC accident claims data and (NZHIS) hospital discharge data.

The pilot evaluated the statistical properties of the data, to assist in the specifying the required data content of the final datasets and to investigate and establish the feasibility of the integration process, including systems to assure data security and confidentiality.

The final deliverable of the pilot stage was a feasibility report, provided to the Government Statistician in April 2004. The key findings of the report were that:

- ACC and NZHIS data can be integrated to a suitable level of quality
- The creation of an injury database, based on the pilot prototype, is feasible.

Based on this report an executive decision to proceed into the next stage of the project was made. As a result, Statistics New Zealand will establish a system of public reporting of official statistics and establish an injury database service providing data to a range of users within the next 3–5 years.

The *database solution stage* covers the process of documenting technology solution requirements (ie Sybase database versus data warehouse), detailed system design, product purchase (if needed), system construction and test (using pilot data). The final outcome will be the solution for input, integration and output of the injury data.

The *full integration stage* will have tasks similar to pilot stage with the evaluation of integration of data from other sources (eg LTSA, OSH, CAA, WS, DOL, Coroner's Court).

The *dissemination stage* will cover the dissemination of integrated injury data (ie standard reports, web, data access). Outputs from the fully integrated dataset will be produced after the end of full integration stage (mid 2005).

Uses of the Data

Injury data will only be used for statistical and research purposes. The data will not be available for operational or administrative purposes. Output from the injury project will be in one of two forms:

- Published official statistics
- Unit record datasets made available for bona fide statistical research.

Any proposal to link additional injury data to this framework will require separate approval including a further Privacy Impact Assessment and approvals by the Government Statistician, the appropriate data stewards and may be subject to comment or other process by the Privacy Commissioner operating under the Privacy Act.

Micro data access

The role of the Information Manager includes making (unidentifiable) data set(s) available for research and statistical purposes by developing and implementing protocols for access including managing privacy issues.

Access to integrated micro level data is governed by Statistic New Zealand's micro data access and data integration protocols.

To enable the Government Statistician to make a decision (as to whether to allow access to integrated micro level data) a detailed research proposal must be submitted to Statistics New Zealand.

The data access solution for the Injury Statistics database will be decided during the second stage of the project. The second and third stages run parallel. The micro data access protocols currently state that no off-site access to integrated data sets will be approved under any circumstances. Whether data are given out will be considered on a case-by-case basis. Remote access is unlikely, but data sets could be taken away if approved. Statistics New Zealand will be developing a micro data access proposal specifically for this project that will set the rules for access.

Release of the data

All information released, whether in the form of official statistical series or research outputs, will be required to meet Statistic New Zealand's confidentiality requirements. Prior to the release of any material from Statistics New Zealand all output is subject to independent scrutiny by its staff to ensure this material complies with confidentiality requirements.

Cost data

Proof of concept and feasibility for some of the injury costs indicators proposed by the Injury Data Review (discussed above) has been demonstrated in the pilot stage, with prototype cost indicators produced.⁸⁵ Further outputs along these lines, however, are subject to the further work on defining the scope of the injury database and the recommendations in this report.

In terms of the Costs of Injury Framework, it is possible that the Information Manager will only consider reporting treatment and rehabilitation costs, not output and productivity or human costs — simply because of the availability of reliable administrative data sources.

Statistics New Zealand has received cost data from both ACC and NZHIS.

Statistic New Zealand has reported some ACC aggregate claim cost information for work related injuries in their publication Injury Statistics 2001/2002. They will continue to report this information until such time as the full injury database is available, at which time this information will form part of wider reporting.

⁸⁵ Statistics New Zealand (May 2004). *Injury Statistics Project Pilot: Output Report*.