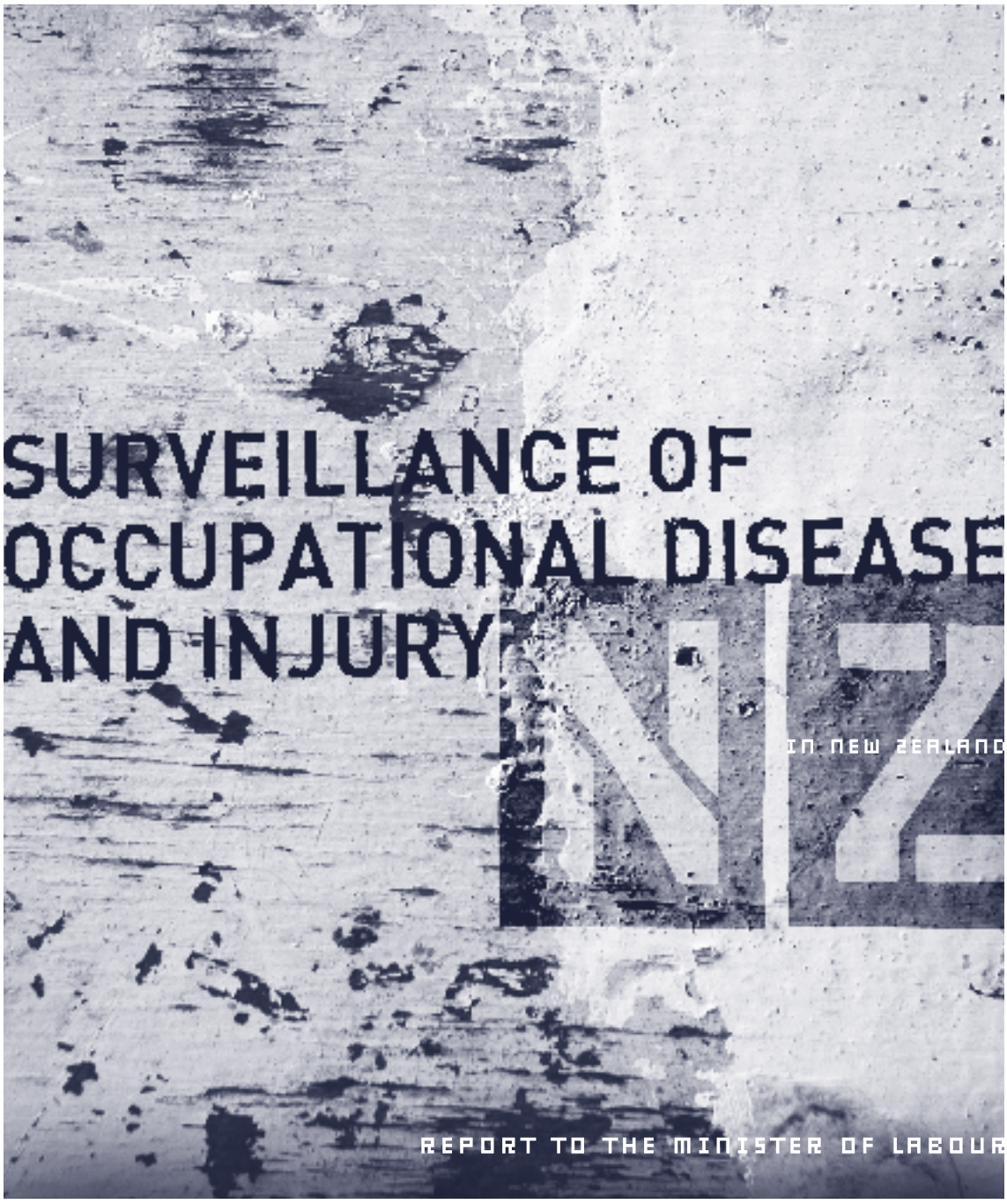
NOHSAC

National Occupational Health and Safety Advisory Committee

Komiti Tohutohu Mahi A-Motu Hauora me te Haumaru



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Foreword

This report represents the second stage of NOHSAC's work programme. It is accompanied by two technical reports that provide greater detail on the research methods and findings on which our conclusions and recommendations are based.

Effective occupational disease and injury surveillance systems are an essential part of an effective national occupational health and safety strategy. If we cannot measure occupational disease and injury, we cannot validly identify priorities, or prevent occupational disease and injury occurring, or measure how effective any prevention strategies are.

Sadly, the systems used in New Zealand for the surveillance of occupational disease and injury fail to meet these basic expectations and fall far short of internationally accepted practice, especially for the surveillance of occupational disease.

As we commented in our previous report on the burden of occupational disease and injury[1], "The Department of Labour and other government agencies do not know how many people die from work-related causes each year. More than 80% of work-related deaths (most due to disease rather than injury) are not documented or reported, and are not investigated".

This situation is not new. New Zealand has had to rely on one-off surveys and incomplete data sets to estimate the true incidence of occupational disease and injury. The surveillance systems currently in use are plagued by:

- a lack of common definitions and coding of occupation
- a lack of common definitions and coding of disease and injury
- poor capture of occupational history, particularly in relation to occupational disease
- inadequate or non-existent coding of the occupational history information that is collected
- lack of expertise and resources to manage and administer systems, particularly within the Department of Labour
- the lack of anyone "in charge" who can take responsibility for collecting, coding, analysing, and publishing information on the annual burden of occupational disease and injury.

Developing an effective surveillance system for occupational disease is a priority. The only system in New Zealand specifically designed for occupational disease reporting is the Notifiable Occupational Disease System (NODS), and this suffers from low reporting levels and support. NODS has not produced a report for five years.

This report proposes a way forward in line with international best practice.

We need to integrate existing data sets based on a unique identifier so that we can measure the frequency and trends of occupational disease and injury. This will require coordination between the various government agencies and the sustained commitment of resources to support the collection of data. This needs to be led by an independent unit with responsibility for occupational disease surveillance.

Only then can we begin to develop and enable solutions that will lead to healthier and safer workplaces.

PROFESSOR NEIL PEARCE

Chair, National Occupational Health and Safety Advisory Committee

Introduction

In November 2004, the National Occupational Health and Safety Advisory Committee released its first report: *The Burden of Occupational Disease and Injury in New Zealand*.

The report[2] estimated that each year in New Zealand there are:

- about 700–1,000 deaths from occupational disease, particularly cancer, respiratory disease, and ischaemic heart disease
- about 100 deaths from occupational injury
- 17,000–20,000 new cases of work-related disease
- about 200,000 occupational accidents resulting in ACC claims, about half of which result in disability and about 6% in permanent disability.

One of the key recommendations from the report was that a major emphasis should be given to the surveillance of occupational disease and injury so that we know how many work-related deaths and cases of work-related disease and injury happen in New Zealand each year[1].

Surveillance systems involve the ongoing and systematic collection, analysis, and interpretation of information on occupational disease and injury so that the major hazards can be identified, preventative action can be taken, and the effectiveness of prevention can be evaluated.

The implementation of integrated surveillance systems provides the foundation for a number of important strategic goals through:

- advancing the usefulness of surveillance information at the national level for prevention of occupational illnesses, injuries, and hazards
- strengthening the capacity of the labour, health, and accident compensation departments to conduct occupational surveillance
- strengthening surveillance of high-risk industries and occupations, and of populations at high risk, including any special populations
- promoting the effective occupational safety and health surveillance conducted by employers, unions, and other non-governmental organisations
- facilitating, and thereby increasing, research to improve occupational health and safety
- monitoring trends and effectiveness of interventions.

In the surveillance of occupational disease and injury in New Zealand, we have a long way to go in even identifying the size and nature of the problems, let alone developing effective interventions[3]. The lack of reliable New Zealand data means that we are unable to adequately document the size of the problem and suggest and enable solutions.

This report is based on the following NOHSAC Technical Reports[4, 5]:

- *Review of Methods and Systems used to Measure and Monitor Occupational Disease and Injury in New Zealand: NOHSAC Technical Report 2.*
- *International Review of Methods and Systems used to Measure and Monitor Occupational Disease and Injury: NOHSAC Technical Report 3.*

This report summarises the findings of the technical reports and identifies key characteristics of an integrated system for occupational disease and injury surveillance. The report acknowledges that surveillance of hazards/exposures is also important and should ideally be integrated with surveillance of disease and injury. However, this will be the subject of the next NOHSAC report and is not addressed in the current report.

Additionally, the report defines the gaps in existing systems that must be addressed, provides solutions on how we can build on existing systems, and provides specific recommendations for improving the surveillance of occupational disease and injury in New Zealand.

Surveillance of occupational disease and injury in New Zealand

In this section, we review the data that is currently available and the systems that are currently in use in New Zealand for the surveillance of occupational disease and injury. A more detailed review can be found in *Review of Methods and Systems used to Measure and Monitor Occupational Disease and Injury in New Zealand: NOHSAC Technical Report 2*[4].

DEATH CERTIFICATES AND CORONERS' REPORTS

Medical certificates of causes of death and coroners' reports are reported to the Births, Deaths and Marriages (BDM) electronic database of causes of death. The database is complete for all deaths occurring in New Zealand, and it records detailed information about direct, antecedent, and underlying causes of death. However, the medical certificate does not collect any information on whether or not the death is work-related, and the recording of occupation is unstructured.

Coroners' reports include data obtained from many sources and represent a potentially rich source of information on the nature and circumstances of some deaths. However, coroners are more likely to investigate deaths due to occupational injury than those due to occupational disease. Coroners' findings currently are not directly recorded electronically, and this represents a major barrier to the efficient retrieval of surveillance information.

NEW ZEALAND HEALTH INFORMATION SERVICE (NZHIS) MORTALITY COLLECTION

The New Zealand Health Information Service (NZHIS) maintains the Mortality Collection, which classifies the underlying cause of death for all deaths registered in New Zealand. It integrates data from a range of sources, including Births, Deaths and Marriages registration data, medical certificates of cause of death, coroners' findings, and post-mortem and toxicology reports. The National Health Index (NHI) number is used as a unique identifier on the Mortality Collection, facilitating linkage with other data sets.

Occupation and work-relatedness data is generally non-existent or inadequate for the surveillance of occupational disease and injury. The recording of occupation involves the use of a free-text field asking for "usual occupation, profession, or job of the deceased". Little guidance is given to funeral directors who complete the occupation details on the notification of death registration form. Although there is a work-relatedness flag on the database, it is only used where the cause of death was related to an accident at work.

NEW ZEALAND CANCER REGISTRY (NZCR)

The NZHIS maintains the New Zealand Cancer Registry (NZCR), which records all primary malignant diseases diagnosed in New Zealand, excluding squamous cell and basal cell carcinomas of the skin. It provides full coverage of cancer incidence since 1994, when compulsory reporting by laboratories was introduced, virtually complete (›90%) coverage since 1972, and partial coverage as far back as 1948. The NHI number is included as a unique identifier on the NZCR, facilitating linkage with other data sets.

Occupational information on the NZCR is inadequate for occupation disease surveillance, being sourced from the National Minimum Data Set (NMDS) of hospital discharges, where it is poorly recorded and uses free text. Moreover, since 1 July 1994, the occupational information from the NMDS has not been routinely imported into the NZCR. There is no indicator of work-relatedness on the NZCR.

NATIONAL MINIMUM DATA SET (NMDS)

The NMDS is a national collection of public and private hospital discharge information, including clinical information, for inpatients and day patients. It is maintained by NZHIS. A particular strength in the data set, aside from its completeness for public hospital discharges and near completeness for private hospital discharges, is the strong coding of diagnosis using the International Classification of Diseases (ICD). The NMDS includes two unique identifiers, which would facilitate linkage with other data sets. These are the patient's NHI number and, where applicable, their ACC claim number.

The recording of occupation, being under-recorded, is inadequate for the surveillance of occupational disease and injury. There is no work-relatedness indicator on the NMDS. However, the potential to identify work-related diseases and injuries using E codes has been improving with successive upgrades of the ICD-10-AM system, in particular the 3rd Edition, which is used in New Zealand from 1 July 2004.

DEPARTMENT OF LABOUR (DOL)

NOTIFIABLE OCCUPATIONAL DISEASE SYSTEM (NODS)

The Notifiable Occupational Disease System (NODS) is a voluntary reporting scheme whereby health professionals and other individuals can notify a health-related condition that is suspected to arise from work.

NODS is administered by the Department of Labour (DoL)). NODS was designed to supplement the statutory requirement for employers to notify serious harm and fatalities, by providing a vehicle for voluntary notification of suspected occupational diseases. However, the notification card implicitly restricts data collection to those occupational diseases included in the legislative definition of "serious harm" used by DoL.

The key strengths of NODS are that it was introduced specifically to record occupational diseases, and that anybody can make a notification.

NODS currently has low potential to contribute to the surveillance of occupational disease. Key problems include:

- poor diagnosis and under-reporting of occupational diseases to DoL
- a system design that does not lend itself well to the aggregation of data for surveillance purposes
- a low state of readiness of the data for integration with other data sets
- work practices that are intended to support efficient investigations and are not always consistent with the recording of high-quality surveillance data.

NODS notifications tend to contribute to the prevention of the recurrence of harm through the identification of individual cases rather than aggregated data. NODS data is recorded in HASARD.

DOL DISEASE PANELS

There are currently four panels, comprising medical and non-medical specialists, that were established to review and monitor specific occupational diseases and extend the evidence bases relating to the occupational origins of these diseases. These are the Cancer Panel, the Respiratory Diseases Panel, the Solvent Panel, and the Chemical Panel. These panels are linked to the NODS system, and cases of occupational disease identified by these panels are entered into the NODS system.

Cancer Panel

The Cancer Panel endeavours to review all cases of selected cancer sites reported to the New Zealand Cancer Registry to identify possible occupational causes[10]. Currently, the sites under review are bladder cancer, non-Hodgkin's lymphoma, and leukaemia. The review of cases from these sites ended in mid-2005, and the focus will be on lung cancer for the next two years.

Unlike the other DoL panels, the Cancer Panel is not solely reliant on notifications made to DoL. Instead, it has the significant benefit of access to New Zealand Cancer Registry data, covering all new cancers diagnosed in New Zealand. This represents a significantly different approach in that the panel takes a "top down" approach and starts with all cases of the cancer sites under review and then determines which cases are work-related (and which are not). Thus, it can, in theory, identify all of the work-related cases for these sites. This differs from the other panels, and the rest of the NODS system, which uses a "bottom up" approach that is reliant on individual voluntary notifications.

The demographic and diagnostic information provided by the Cancer Registry is combined with detailed occupational and exposure histories gathered through interviews with individual patients. Approximately 60–70% of all new cases of these cancers have been reviewed in the last three years. The Cancer Panel has successfully demonstrated that the incidence of these cancers from occupational causes in New Zealand is similar to that in other Western countries, and it has published an initial report on bladder cancers[11], with non-Hodgkin's lymphoma and leukaemia being the subject of two further initial reports currently in preparation. It is expected that a large number of further reports on these three cancer sites will follow in the next few years.

Respiratory Diseases Panel

The Respiratory Diseases Panel was established to review and monitor occupational respiratory disease notifications, including asbestos-related diseases, occupational asthma, and other respiratory diseases. It was formed out of two previous DoL panels in 2001: the Asbestos Panel and the Asthma Panel. The Asbestos and Asthma Panels contributed to the body of knowledge about asbestos-related diseases and occupational asthma through annual reports and ad hoc studies. However, notifications to the Respiratory Diseases Panel have declined in recent years, and staff turnover and vacancies at DoL are said to have resulted in the panel being poorly supported by head office. It is understood that few respiratory diseases, other than asbestos-related diseases, have been reported to the panel. The Asbestos Diseases Register covers an estimated 30% of mesotheliomas and a very small proportion of other asbestos-related diseases. Electronic recording of asbestos exposure and disease reports is understood to have ceased in the mid-1990s, when DoL transferred to a new computer system and problems were encountered transferring the data to the new system. It is understood that the data from the previous databases was subsequently lost or destroyed.

Solvent Panel

The Solvent Panel has been successful in demonstrating the existence and importance of chronic organic solvent neurotoxicity as an occupational illness, particularly within certain industries. Although only a small proportion of all cases are believed to be reported to DoL, these are probably among the more severe cases. The number of notifications has declined in recent years, however, and this is believed to be principally due to a decline in notifications from GPs. There has been no analysis of solvent neurotoxicity data in recent years.

Chemical Panel

The Chemical Panel was established to review and monitor notifications relating to diseases originating from chemical toxicity. The Chemical Panel has not convened in the last two years due to non-reporting of cases. In contrast, ERMA New Zealand data recorded 57 cases of poisonings or toxic effects as a result of workplace exposure to hazardous substances in 2003/04, with chemicals and chemical products being the most common substances associated with such incidents.

WORKBENCH (FORMERLY HASARD)

Occupational health and safety legislation requires employers to notify DoL about workers who suffer serious harm as a result of their work. The Health and Safety Accident Recording Database (HASARD) records serious harm notifications made to DoL. The legislative definition of serious harm includes certain occupational diseases which, when notified to DoL, are recorded in the NODS system as described above. The instances of serious harm recorded by the HASARD system are principally occupational injuries. Therefore HASARD has low potential to contribute to the surveillance of occupational disease.

HASARD currently has potential to contribute to the surveillance of occupational injury. Key problems include under-reporting of serious harm by employers, a system design that does not lend itself well to the aggregation of data for surveillance purposes, a low state of readiness of the data set for integration with other collections, and work practices that are intended to support efficient investigations and do not always support the recording of high-quality data.

Consequently, serious harm notifications to DoL tend to contribute to the prevention of the recurrence of harm, through the identification of lessons from individual investigations rather than the identification of trends from aggregated data. In this regard, the Department of Labour should take note of the developments in the Department of Justice, where a coronial database is being scoped with a view to moving coroners from a position of thinking about prevention in regard to each death isolated from any other, to one where reference back to historical cases can be made.

In the development of Workbench to replace HASARD, the key change has been to address most of the system design issues, however, HASARD and its limitations have otherwise been replicated in the current version of Workbench.

ACCIDENT COMPENSATION CORPORATION (ACC)

The ACC claims database provides a record of all cases that meet the criteria for compensation and for which compensation is claimed. The ACC scheme provides cover for occupational diseases and injuries specified in legislation. The scheme excludes incapacity during the first week of a work-related injury (for which the employer must compensate the employee) and fatal accidents (unless a claim is made for funeral expenses or support for dependants).

The ACC claims database provides the most complete coverage of most types of injury and is the only major source of statistics on "minor" occupational injury. Cover for occupational disease is very specific, and it includes certain occupational diseases linked to specific exposures and other diseases that meet the legislative definition of a "personal injury caused by a work-related gradual process, disease, or infection".

Although there is a financial incentive for individuals to submit claims, it is unclear how comprehensively the database reflects the true incidence of diseases and injuries covered by the scheme.

The structure and coding systems of the ACC database are, in many respects, well suited to the surveillance of occupational disease. For example, the database records the ACC claim number and, where available, the claimant's NHI number, facilitating record linkage to NZHIS databases. Occupation and industry are coded according to the standard Statistics New Zealand classification systems. There is a specific indicator for work-relatedness, although its usage is incomplete. Latterly, work-related injuries (excluding motor vehicle traffic crash injury) can be identified, since they are paid from the Employer and Self-Employed accounts. For a recent series of fatal injury data, the work flag was set for all deaths that were compensated from these two accounts. The diagnosis field accommodates both ICD-10 and Read codes, and ACC routinely maps Read codes to ICD-10. The database records robust and objective cost information, including time off work.

However, the overriding functions of the ACC database have been administrative, such as:

- determining eligibility for a claim
- determining which ACC account should fund the claim
- facilitating case management
- providing data to inform the setting of levies.

These administrative objectives are not always consistent with surveillance imperatives. In particular, these objectives do not always require complete and accurate data on occupation.

EPISURV

EpiSurv records all notifiable diseases that have been reported to Medical Officers of Health. Reporting of these diseases is mandatory, and there is a strong emphasis on completeness and accuracy of data entry. Coverage is variable by disease type, depending upon the proportion of total cases that result in a GP visit. Detailed information is recorded on the diagnosis and the basis of diagnosis. Exposure information is also captured where available.

There is a free-text field for recording occupation and, although it is under-utilised overall, it is fairly well completed for work-related cases. The database includes patients' NHI numbers, facilitating linkage to NZHIS data sets.

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY (ERMA)

ERMA has a specific mandate to measure and monitor impacts of the legislation governing hazardous substances and new organisms on health and the environment.

The workplace is a major source of exposure to hazardous substances. Substances are still being transferred into the new legislative regime from previous pieces of legislation, and ERMA is in the process of developing its surveillance capability.

Current data analysis is based on aggregated and confidentialised data from a range of sources, including the NMDS, Fire Service, HASARD, and some directly received reports of hazardous substance incidents. Occupation data is not specifically recorded, but may in some instances be included in free-text fields.

The Ministry of Health is also working with the Institute of Environmental Sciences and Research to facilitate progress toward the development of a Chemical Injuries Surveillance System. Technical and process issues identified to date suggest that implementation of such a system may be a few years away and not necessarily on a full national scale.

INJURY INFORMATION MANAGER

The Injury Information Manager role was established to produce coherent injury statistics in New Zealand, by collecting and aggregating injury-related information. Statistics New Zealand was given this responsibility in June 2002. The Injury Information Manager is directly accountable to the Minister of Statistics and the Minister for ACC.

The Ministers purchase outputs from the Information Manager, but do not control the methodology used to produce the results or the manner of their publication and dissemination. The Ministers also receive advice from a Ministerial Advisory Panel, which provides advice on the data sets, reporting, and the direction and strategy of the injury surveillance model.

Development of the new injury statistics system began in August 2002. In the first year of the project, a trial integration (pilot) stage was carried out using ACC and NMDS data, which represent the bulk of the available injury information. The primary objective of the pilot study was to establish the feasibility of integrating the two primary sources of data. The feasibility report from the pilot study was submitted in May 2004. As a result of this study, it was also decided to include information from road traffic crash records from the then Land Transport Safety Authority (LTSA). An integrated injury database of NMDS, ACC, and LTNZ information is expected to be released in May 2006.

The *Injury Data Review*[6] recommended that, in principle, occupational disease should be included in the definition of injury. However, it was excluded from the project until a clear picture of the incidence of occupational injuries in New Zealand is obtained, the surveillance systems measuring occupational disease can be improved, and further research can be undertaken to decide the most appropriate means of occupational disease surveillance. As a result, the project has taken deliberate measures to identify and exclude occupational disease cases.

If numbers of injuries can be successfully established using all available data sources, other measures will be developed, including determining the number of injured persons and developing time-based risk indicators related to various exposures, occupations, and other factors.

CIVIL AVIATION AUTHORITY (CAA)

The Civil Aviation Authority (CAA) establishes civil aviation safety and security standards, and monitors adherence to those standards. The principal function of the CAA is to promote safety at reasonable cost. The CAA carries out accident and incident investigations, as defined by the Civil Aviation Act 1990, and collates this material to establish an industry-wide safety picture. This becomes the basis of safety initiatives ranging from education campaigns to increased monitoring and regulatory action.

The CAA has only recently been mandated to receive notifications and undertake investigations under the HSE Act in relation to aircraft as workplaces. Data from serious harm notifications is recorded on the existing CAA database, which was originally established to record details of air accident and incident reports and investigations. CAA data is structured around events (rather than individuals). Pilots' and crew members' names are recorded. Identifying details of passengers are not recorded.

By definition, specialist agencies such as the CAA cover a small percentage of the population of work-related deaths and injuries. Nevertheless, these agencies may identify deaths and injuries which are not recorded by ACC or DoL.

MARITIME NEW ZEALAND

The principal objective of Maritime New Zealand (MNZ) is to undertake its safety, security, marine protection, and other functions in a way that contributes to the aim of achieving an integrated, safe, responsive, and sustainable transport system.

The Accident Investigation Division of MNZ maintains a database to record and analyse common causes of accidents. From May 2003, MNZ has been designated under the HSE Act to receive serious harm notifications and undertake occupational safety and health investigations in relation to ships as places of work. Prior to that time, occupational safety and health for crew on board commercial ships was covered under Part II of the Maritime Transport Act 1994.

As a specialist agency, MNZ covers a small percentage of the population of work-related deaths and injuries, but may be able to identify some deaths and injuries not recorded by ACC or DoL. The database records identifying details of injured people and, where the injured person is a seafarer, details of their occupation. Injury type, site, and seriousness of the injury are categorised at a broad level. Serious harm reports are not copied to DoL for inclusion on the HASARD database.

TABLE 1 Completeness of occupational disease and injury coverage – selected systems

DATA COLLECTION	COMPLETENESS OF OCCUPATIONAL INJURY COVERAGE
Civil Aviation Authority (CAA)	Injuries from the vast majority of air accidents, most air incidents, and a proportion of other occurrences of serious harm.
Injury Information Manager: NZ Injury Database	All ACC claims and all hospital admissions for injury.
Death certificates, coroners' reports, and Mortality Collection	All registered deaths in New Zealand, by cause of death. Occupational disease and injury deaths are not explicitly distinguished from other deaths. Occupational information is collected but not coded. Deaths caused by an accident while working may be identified by a work-related flag in the Mortality Collection and in the text of coroners' paper files.
Workbench (formerly HASARD)	Partial and patchy coverage of occupational injuries within the HSE Act definition of "serious harm" and possibly isolated reports of other occupational injuries.
Maritime New Zealand	A large proportion of injuries to seafarers.
National Poisons Centre	A large proportion of poisonings. However, poisonings at work cannot be distinguished from other poisonings. Individuals are not identified.
New Zealand Cancer Registry	All primary malignant diseases in New Zealand, except squamous cell and basal cell carcinomas. Occupational cancers are not explicitly distinguished from other cancers. Occupational information is currently rarely included, even though it is often available in related data sets.
National Minimum Data Set	All public and most private hospital inpatient and day patient discharges in New Zealand. Hospital stays related to an occupational disease are not explicitly distinguished from other hospital stays. Since the mid-1990s, occupational information is rarely collected.
Notifiable Occupational Disease System (NODS)	Partial and patchy coverage of occupational diseases within the HSE Act definition of "serious harm" and possibly isolated reports of other occupational diseases. The Cancer Panel (currently) and the Solvent, Asthma, and Asbestos Panels (previously) have been successful in providing estimates of the extent of occupational disease in these areas.
ACC claims database	All ACC claims related to occupational diseases covered in Schedule 2 to the IPRC Act. Possibly some coverage of other diseases individually assessed as being a "personal injury caused by a work-related gradual process, disease, or infection". All major non-fatal occupational injuries and an unknown proportion of minor occupational injuries. Apart from work-related motor vehicle traffic accidents, the majority of work-related injuries can be identified by the work-related flag.
EpiSurv communicable disease database	All notifiable diseases that have been reported to Medical Officers of Health. Occupational diseases are not explicitly distinguished from other diseases.
Environmental Risk Management Authority	Partial but growing coverage of the public health effects of hazardous substances. Occupational diseases are not explicitly distinguished from other diseases. Individuals are not identified.

Barriers to effective surveillance

The following barriers to effective surveillance have been identified with regard to the current methods and systems used for measuring and monitoring occupational disease and injury in New Zealand:

EXPERTISE REQUIRED TO MANAGE AND ADMINISTER SURVEILLANCE SYSTEMS

Maintaining a database of occupational disease and/or injury data requires specialist knowledge and skills, in areas such as epidemiology, statistics, and health informatics. It also requires skills in relationship management, as external relationships with providers and users of data, and internal relationships with those who enter and those who use data, can have an important bearing on data quality. The range of skills required suggests that a multi-disciplinary team is needed, in most instances, to manage and administer an occupational disease or occupational injury surveillance system. This requires a high level of resource.

The lack of expertise available to manage and administer the systems is compounded by the fact that the various systems are disparate, with little coordination between them. Crucially, nobody has been appointed as the responsible person for doing the coordination at DoL. At Statistics New Zealand, the Injury Information Manager has started to address this issue for occupational injury. However, quite different skills, systems, and methods are required for occupational disease.

INADEQUATE HAZARD/EXPOSURE ASSESSMENT

The reviewed databases, on the whole, collect minimal information on exposures to hazards and risk factors, such as environmental, technological, organisational, human, and other factors that contribute to occupational injury and disease. This limits the current potential for conducting robust analysis of incidence, prevalence, distribution, and trends of occupational disease and injury.

DATA OWNERSHIP AND ACCESS ISSUES

Ethical and privacy issues present potential barriers for access to identified micro-data for linkage purposes. There are potential cost issues if data requests are complex or time-consuming for data managers to meet. Fundamental conflicts in purpose can create a barrier in certain circumstances. For example, from a DoL perspective, it is desirable to have access to ACC data as soon as possible to identify potential serious harm occurrences for investigation and enforcement. However, from an ACC perspective, such an arrangement would be undesirable if it created a disincentive for individuals to claim.

KNOWLEDGE GAPS

Key knowledge gaps include:

- significant gaps in the coverage and accuracy of the existing data sets
- the inability to identify new associations between occupational disease/injury and factors such as occupation,

industry, and exposures, due to the lack of accurate and appropriate numerator data and a shortage of appropriate denominator data
- a lack of knowledge on the part of some GPs, employers, and employees regarding matters such as occupational disease risk factors, the existence of NODS and Workbench (formerly HASARD), and statutory reporting requirements.

REPORTING

Collecting, analysing, and disseminating data can involve significant costs, and these can present a barrier to effective surveillance. These problems are exacerbated by a lack of electronic data (requiring time-consuming searches of paper-based records), a lack of coding (requiring extra data preparation and cleaning), and gaps in the available data (requiring expensive one-off studies, such as surveys, to address data requirements).

Presently, no agency is providing regular, comprehensive reporting on occupational disease and injury incidence, prevalence, trends, and distribution, due to limitations inherent in the surveillance systems.

PRIMARY PURPOSE OF DATA COLLECTION

Currently, there are no systems that exist specifically to collect occupational disease and occupational injury data. Furthermore, the primary purpose of each agency conflicts to some extent with surveillance objectives. For example:

- NODS and Workbench (formerly HASARD) support occupational health and safety investigation and enforcement. Fear of investigation and/or prosecution is a disincentive for employers to report cases to DoL. Efficient use of investigation resources by DoL involves filtering and prioritising of cases for investigation, which impacts on data collection.
- The ACC claims database primarily supports claims administration and case management. Full registration of all claims is unnecessary for these purposes and is therefore an unnecessary cost that can be avoided by entering limited information for minor claims. Also, the claims database only records cases that fall within ACC eligibility criteria and for which a claim is submitted, which results in incomplete coverage of some circumstances of injury and disease. For work-related chronic diseases, these problems of incomplete coverage are significant, with only a tiny fraction of cases being identified through ACC claims.
- The purpose of the NMDS is to provide comprehensive hospital discharge information on inpatients and day patients. Thus, it offers good capture of acute occupational disease cases but potentially poor capture of chronic occupational disease.

STANDARDISATION, ACCURACY, AND INTEGRITY AND WORK-RELATED FIELDS

The following table summarises key data elements for the major occupational disease and injury surveillance systems. Much of the data collected for the surveillance of occupational disease and injury is of a moderate standard, with moderate use for surveillance purposes.

The table indicates *what* data elements are captured within each system, *how* they are captured, and, where possible, *how well* they are captured.

TABLE 2 Standardisation of data elements – occupational disease and injury

DATA ELEMENT	ACC	WORKBENCH (HASARD)	NMDS	NODS	MORTALITY	NZCR
Unique identifiers	ACC45, NHI [H]	Case ID [H]	NHI, ACC45 [H]	Case ID [H]	NHI, BDM registration number [H]	NHI, NMDS event ID, record ID, tumour ID [H]
Other identifying and demographic details	Name, age, sex, address [H]	[M]	Name, age, sex, address [H]	Name, age, address	Name, age, sex, address	Name, age, sex, address
Ethnicity	Non-standard coding system [L–M]	[L–M]	Stats NZ Level 2 [L–M]	Non-standard coding system [M]	Stats NZ Level 2 [M]	Stats NZ Level 2 [M]
Occupation	Stats NZ [M–H for work-related claims]	[L–M]	Free text or occ code [L]	Non-standard coding system [L–M]	Free text [L]	Free text [L]
Occupational history	May give partial longitudinal history	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded
Industry	Stats NZ [M–H]	[L]	Not recorded	Non-standard coding system [L–M]	Not recorded	Not recorded
Work-relatedness indicator	Yes [H – for occ disease]	[H]	E code (since 1 July 2004)	All cases should be work-related	Injury [M]	No
Work-relatedness scope	Employee at work (incl in work car), *inter alia*	Not recorded	Injury while working for income	Not applicable	Accident while working at place of paid employment	Not applicable
Diagnosis	ICD-10-AM and Read codes [M–H]	Not recorded	ICD-10-AM [H]	Non-standard, non-specific coding system [M]	ICD-10-AM [H]	ICD-10 [H]
Injury type	[H]	[M]	[H]	N/A	Injury [H]	Not applicable
Death	[L]	[M–H]	[H]	Not recorded	ICD-10-AM [H]	Not recorded
Severity	ICD-10-AM, Read codes [L–M]; Time off work [H]	Not recorded	ICD-10-AM [L]	Not recorded	E codes [L for occ disease]	ICD 10 [H]
Site	Non-standard coding system [M–H]	[H]	ICD-10-AM [H]	Non-standard coding system [M]	Not recorded	ICD 10 [H]
Activity	[H]	Not recorded	[H]	N/A	Injury [M]	Not recorded
Mechanism	[L–M]	[M]	Not recorded	N/A	Injury [M]	Not recorded
Agent/exposure	Non-standard coding systems [L–M]	[M]	E codes [L for occ disease]	Non-standard coding system [M]	Not recorded	Not recorded
Cost	ACC and claimants costs recorded. Hosp costs imported from NMDS [H]	Not recorded	Relevant (hospital admission) cost weights recorded [H]	Not recorded	Not recorded	Not recorded

Key: *H Collected to a high standard of specificity, completeness, and accuracy and in a format suitable for data linkage and surveillance*
M Collected to a moderate standard or in a format with moderate utility for surveillance (e.g. non-specific coding; partially recorded)
L Collected to a low standard or in a format with low utility for surveillance (e.g. not coded; not recorded electronically)
NA Not applicable or irrelevant

Occupational disease and injury surveillance internationally

In this section, we review methods and systems that are in current use internationally for the surveillance of occupational disease and injury. We outline the major methods used and identify the key features of successful systems. The surveillance systems used in Finland are discussed in depth, as the Finnish model stands as an international benchmark for the surveillance of occupational disease and injury. A more detailed review can be found in *International Review of Methods and Systems used to Measure and Monitor Occupational Disease and Injury: NOHSAC Technical Report 3*[5].

The most successful occupational disease and injury surveillance systems internationally have been developed specifically for that purpose i.e. they are concept driven[5].

Concept-driven or purpose-specific surveillance systems:

- are established on sound theoretical grounds
- develop indicators that are based on the health outcome(s) of interest, irrespective of the routine availability of data
- operationalise indicators that are primarily science-based and valid, in contrast with data-driven systems that are based on what is currently feasible or available
- collect data that is sensitive and specific.

Most surveillance systems however, have been data-driven, typically making opportunistic use of information collected for administrative or financial purposes.

Data-driven models of surveillance have a particular strength in that they are feasible, i.e. the data can be obtained from existing sources. However, data-driven models have significant problems in that:

- data is often incomplete, especially if it is of secondary interest to the agency's core activities
- data is often not relevant to the purpose (disease and injury prevention)
- the data lacks reliability (poor coding of data).

MAJOR METHODS FOR THE SURVEILLANCE OF OCCUPATIONAL DISEASE AND INJURY

Comprehensive occupational disease and injury surveillance systems utilise data from many different sources.

MANDATORY DISEASE OR INJURY REPORTING OF SPECIFIC DISEASES OR INJURIES BY HEALTHCARE PROVIDERS OR FACILITIES

This is perhaps the oldest and most traditional approach. It tends to be more relevant for occupational disease than injury. The major strength is that it is based in an expert system, using clinicians to recognise specific diseases or injuries. The major weakness is low compliance. The proportion of cases that are reported may vary widely,

but, in practice, most organisations operating a mandatory reporting system report very disappointing levels of compliance. There is frequently a problem of perception about why, and for whom, the data is being collected. Whether correct or not, many clinicians perceive that the primary function of surveillance systems is to enforce occupational health and safety legislation. There is also widespread cynicism that the data is actually used for any worthwhile purpose. This gives healthcare providers little incentive to participate. Some organisations have tried to improve compliance by offering payments of small fees, however, this seems to be met with mixed success. It is worth noting that the more severe the disease or injury is, the more likely it is to be reported. Case definition may be influenced by the fact that clinicians tend to provide diagnoses and not necessarily highly specific information (e.g. the heavy metal or virus). Nevertheless, this type of surveillance alerts public health authorities to potential problems, especially when they manifest as a severe disease.

MANDATORY DISEASE OR INJURY REPORTING BY EMPLOYERS OR WORKPLACES

This is a variation on the first approach, but uses employers or workplaces as the target for mandatory reporters. It tends to be more relevant to cases of occupational injury than diseases that may not be recognised by non-clinicians. The major strength is that the employer or workplace should have the best knowledge that an accident has occurred with injury. Most workplaces are required to maintain some form of accident record anyway. The major weakness is that it is perceived as having punitive results for the employer, namely, a visit from an inspector, if the accident was serious enough, and the potential for some form of sanction. It is worth noting that small and medium employers have much lower rates of compliance with reporting, and the self-employed tend to have even lower rates still. Again, this is likely to be due to the perception that only negative consequences might ensue, and there is no perception that it may be worthwhile.

REPORTS BY LABORATORIES

Laboratories are usually highly compliant with reporting results, far more so than healthcare providers. This might be, at least in part, since they are set up to report results as their standard modus operandi. This means that the greatest strength, along with accurate identification of diagnosis and causes, is a high capture rate, but this is only for the population referred for laboratory testing. Hence, the greatest weakness is that this type of surveillance system is very limited in detecting meaningful problems in the wider population. In developing countries, diagnostic accuracy may be much lower, and the ability to communicate with other laboratories may be limited. However, in developed countries, pooling of surveillance findings from laboratories is an added strength, since this increases the chances of detecting potential problems while they are still at the stage of having small base rates.

SENTINEL SURVEILLANCE

A sample of reports from individuals and organisations, such as clinicians, laboratories, and hospitals, are used in sentinel surveillance. This can be effective when the goal is to estimate the magnitude and trends of a disease or injury. It is less effective in detecting the earliest cases, or providing data on the entire population of cases.

By focusing on a specific sample of reporters, the system has a good chance of obtaining accurate and higher-quality information. Sentinel surveillance systems should be sensitive enough to detect more common diseases, but may lack sensitivity to detect localised outbreaks or epidemics.

PERIODIC OR ONGOING PREVALENCE SURVEYS

These can be used to assess prevalence trends over time and to help "fill the gaps" left by other types of surveillance systems, e.g. those that have low compliance for reporting. The major strengths of these surveys are as complementary approaches and when designed specifically to meet the needs of groups responsible for policy formulation. They are able to help generate hypotheses and can also be used to evaluate the effectiveness of public health or occupational health and safety interventions.

VITAL RECORDS

This type of surveillance system uses records such as births and deaths to estimate the magnitude of certain diseases or injuries. It may be an under-used system. The major strength is the ability to track trends and help set priorities. The major weakness is that it is not suitable for less severe disease or injury.

SECONDARY ANALYSIS OF DATA SETS COLLECTED FOR OTHER PURPOSES

Data is collected for myriad reasons by a host of agencies. The major advantage is that there are little or no extra resources required. However, data protection and privacy issues may be a problem especially when merging data with other data sources.

EXPERT OPINION

When data is lacking, expert opinion may fill a vital role. It can be useful in generating hypotheses. However, it is known to be subject to systematic biases and current "fads" in both theory and practice, hence, it needs to be used with caution, but may be invaluable in the short term under certain circumstances.

MIXED SYSTEMS

Comprehensive modern surveillance systems usually deploy a mixture of the above techniques, in order to exploit the advantages of more than one approach and try to compensate for the weaknesses of others. The major strength of a mixed system is that it can be more comprehensive. However, the potential weakness is that it requires careful planning, design, implementation, and analysis.

Key features of high-quality occupational disease and injury surveillance systems

The review of international systems for the surveillance of occupational disease and injury[5] revealed several key features of high-quality occupational surveillance systems. (Note, these are not ranked in importance.)

DATA INPUTS

Both worker health and injury are monitored with an equal focus on occupational disease and injury. The division between "health" and "injury" is arbitrary and depends on the context existing in each jurisdiction. Surveillance systems that focus on only one or the other are necessarily weakened by the types of boundary disputes over causation and responsibility that occur.

The work environment is comprehensively monitored, in addition to worker health status (due to illness or injury). The effectiveness of surveillance systems is derived from observing correlations between factors in the work environment and workers' health status.

Multiple data capture techniques are used, in a targeted and effective manner, including:

- mandatory disease or injury reporting by healthcare providers or facilities
- mandatory disease or injury reporting by employers or workplaces
- reports by laboratories
- sentinel surveillance
- periodic or ongoing prevalence surveys
- vital records
- secondary analysis of data sets collected for other purposes
- expert opinion
- mixed systems.

Data should be included from national, regional, and enterprise levels.

SURVEILLANCE SYSTEM – INCLUDING FUNCTIONS, CHARACTERISTICS AND QUALITY ASSURANCE

Case definitions are standardised and accurately applied. These should be based on the best available standard international classifications, augmented by expert agreement.

The system of defining cases needs to be able to effectively manage ill-defined health and injury problems, such as the spectrum of clinical "syndromes" over which there may not be either clinical or administrative agreement. This requires development of a classification system that has forward flexibility, allowing inclusion of more detailed sub-categories as soon as expert agreement can be obtained.

A standardised minimum data set should be used, which conforms to international trends for data collection, allowing "harmonised" data to be compared and contrasted meaningfully.

The system should provide suitable incentives to maximise data capture. The types of incentives used can range from providing contributors with information on why the surveillance system exists, right through to mandatory reporting requirements.

The system should comply with legislation and international treaty obligations.

The system should have a core concept-driven design, based on excellent theoretical models, but also take advantage of opportunities to collect secondary data wherever possible. This means it should make use of multiple data sources, including opportunistic and custom-designed ones.

The system should be capable of effectively managing data collected for other purposes to minimise bias.

The system uses a comprehensive range of selected indicators and, wherever possible, collects information in free-text fields.

Systems need to be well-designed and implemented, with the core attributes of sensitivity, specificity, representativeness, timeliness, simplicity, flexibility, and acceptability.

Systems should include appropriate validity and reliability checks.

Those responsible for managing the system should act responsibly to minimise both false positives and false negatives. The strength of evidence underlying estimates from the surveillance system should be reported.

It should be cost-effective.

Ongoing system improvement should be based on usefulness, cost, and quality.

Universal usage of a unique identifier so that different data sets can be directly compared and integrated.

The system should be effective at managing ethical matters, such as privacy issues arising from tracking workers across job changes.

The system should be capable of rapid response to emerging problems.

Surveillance of occupational disease and injury in Finland

This section summarises the key components of surveillance systems in Finland. Full details of each system are contained within the *International Review of Methods and Systems used to Measure and Monitor Occupational Disease and Injury: NOHSAC Technical Report 3*[5].

Finland has a population of just over 5 million people. The Finnish workforce is about 2.5 million. Occupational safety and health matters are primarily the responsibility of the Ministry of Social Affairs and Health[7]. Additionally, the Federation of Accident Insurance Institutions is also important, as employers are obliged to take out statutory workers' compensation insurance.

The Finnish Institute of Occupational Health is funded by the Ministry of Social Affairs and Health and governed by a board of directors responsible to the Minister. It was founded in 1945 and has approximately 600 permanent staff and about 300 project contractors. There is a surveillance division, headed by Dr Timo Kauppinen.

The Occupational Safety and Health Inspectorates and the Occupational Safety and Health Department of the Ministry of Social Affairs and Health are the enforcement authorities of occupational safety and health legislation concerning workplaces. Control of products used at work is also exercised by these authorities, in response to Finnish membership of the EU. The Occupational Safety and Health Department and the Occupational Safety and Health Inspectorates supervise the conformity of machines, equipment, chemical substances, and personal protective equipment used at work by means of market surveillance, in order to ensure that only safe and conforming products are used at workplaces.

Institutions responsible for occupational safety and health in Finland:

- Centre for Occupational Safety
- Consumer Agency
- Federation of Accident Insurance Institutions (FAII/VAKES)
- Finnish Institute of Occupational Health
- Finnish Work Environment Fund
- Ministry of Labour
- Ministry of Social Affairs and Health
- National Product Control Agency for Welfare and Health (SSTV)
- Occupational Safety and Health Inspectorates
- Radiation and Nuclear Safety Authority
- Safety Technology Authority (TUKES)
- Technical Research Centre of Finland (VTT)

There are several Finnish surveillance systems, registers, and related surveys in operation. These include the following:

- The Finnish Working Life Barometer
- Registry of Biological Monitoring
- Registry of Employees Occupationally Exposed to Carcinogens
- Dose Register of Occupational Radiation Exposures
- Registry of Industrial Hygiene Measurements
- Database of Descriptions of Severe Occupational Injuries

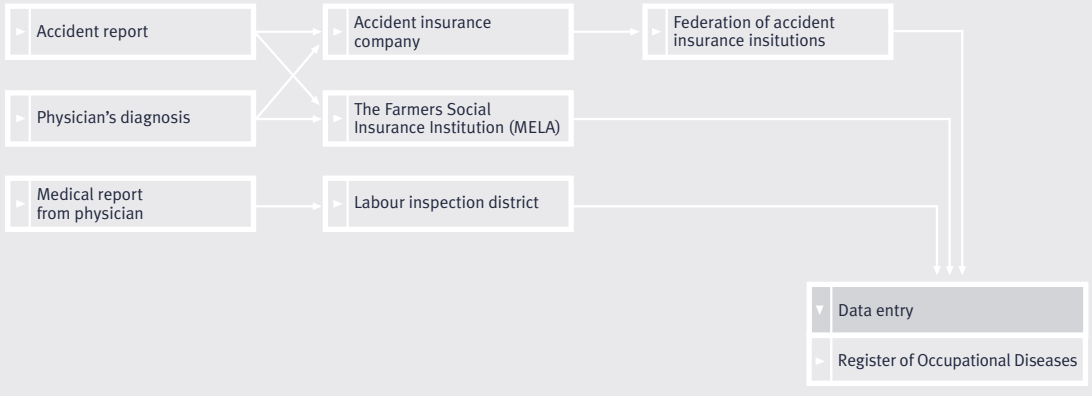
- Living Conditions and Causes of Death 1985 Database, Disability Database
- Noise Register MELU
- Occupation/Cancer Incidence Database
- Finnish Register of Occupational Diseases
- Database of Occupational Injuries
- Product Register
- The Quality of Working Life Survey
- IARC Database of Industrial Hygiene Measurements in Pulp and Paper Industries
- The Finnish Register of Congenital Malformations
- Labour Force Survey
- Finnish Job-Exposure Matrix
- Register of Occupational Injuries and Diseases in Finland
- (Finnish) Cancer Registry

OCCUPATIONAL DISEASE

Information on occupational diseases is held in a number of databases. The principal one is the Finnish Register of Occupational Diseases (FROD), and this is supplemented by other important registers e.g. the Finnish Cancer Registry. All occupational diseases are required to be reported to FROD[8].

The aim of the FROD system is to provide statistical information on occupational diseases for labour protection, occupational healthcare, and research. Intended users include administrative and field personnel in labour protection and healthcare organisations and researchers of occupational health.

FIGURE 1 Data flows into the Finnish Register of Occupational Diseases



The detailed classification of information in FROD makes the Register potentially very useful for the prevention of occupational diseases. The major limitation to the data set is the lack of any information on costs of claims or cases. Coverage of the Register is "incomplete" due to issues regarding diagnostic clarity, causal certainty, and an unknown degree of under-reporting.

OCCUPATIONAL INJURY

Surveillance of occupational injuries is provided by the insurers providing compulsory cover for workers.

The principal database is the Database of Occupational Injuries (FINOCCINJB). All accidents that result in three or more days off work are included. Insurers are obliged to provide the Register with data on every case reported to them, regardless of compensation decisions.

The aim of the FINOCCINJB system is to provide statistical information on occupational injuries for labour protection, occupational healthcare, and research. Intended users include administrative and field personnel in labour protection and healthcare organisations and researchers of occupational injury. Each year, there are approximately 120,000 occupational injuries recorded. The number of fatalities is in the range of about 50 cases.

A supplementary source of information is the Database of Descriptions of Severe Occupational Injuries (FININJDESC). This is designed to capture information on all severe accidents that are examined by statutory inspectors.

Statistics are made available regularly. Access to the database is restricted. The quality of data is not measured. The FIOH are open in suggesting that there are reasons to believe it is not of high quality. The codes that are used to categorise accidents are not considered good.

Nearly all accidents that result in three or more days off work are likely to be included in the system. The system can be used to measure how many accidents occur in different industries and occupations. However, it provides little information about how the accidents happened and the probable causes.

The exceptions to this are the serious injuries that are attended by labour inspectors, but the quality of this data is dependent on the ability of the inspectors to make useful analyses of the accidents.

COMBINED REGISTER

The Register of Occupational Injuries and Diseases in Finland (Tyotapaturna – ja ammattitautirekisteri, TPSR) is a combined register that is designed to capture data on all accidents at work or occupational disease in Finland. This system is run by the Federation of Accident Insurance Institutions and contains information on all injuries and diseases that have been compensated on the basis of statutory workers' compensation. All insurance companies practising statutory accident insurance in Finland are under an obligation by law to deliver this data.

The general aim of the TPSR is to provide statistics of accidents at work and occupational diseases over a long period of time. Statistics can then be provided on the basis of numerous variables. These include:

- the injured body part
- means of transport (if the accident happened while commuting)
- primary cause of the disease and its medical diagnosis
- the amount of compensation paid.

The system does not contain text fields so its main use is in the creation of numeric statistical information, on the basis of which conclusions can be made and appropriate actions taken. The intended users are government officials, insurance companies, the FIOH, and other interested parties. The information is considered reliable, since the database has a long continuous history and a relatively high capture rate.

SUMMARY

The Finnish model of occupational disease and injury surveillance provides a template for developing an effective integrated system for the surveillance of occupational disease and injury in New Zealand. The Finnish system for the surveillance of occupational disease and injury is not without flaws and suffers from some data quality issues, but crucially the Finnish system:

- is concept driven
- is led by a dedicated surveillance unit that includes appropriately qualified and experienced personnel
- collects data from a variety of sources including, where appropriate, unique identifiers that enable data and cases to be matched
- is adequately resourced.

Lessons and conclusions

Work-related disease and injury is responsible for considerable morbidity and mortality in New Zealand. For mortality, disease represents a considerably greater (10-fold) burden than does injury: about one-third of work-related deaths are due to cancer, and substantial proportions are due to respiratory disease and ischaemic heart disease. On the other hand, work-related injuries represent a greater burden of morbidity.

The 1996 *Governmental Inquiry into the Administration of Occupational Safety and Health Policy* stated that, "The current state of the non-existence of meaningful statistics, which has been the case for 20 years, cannot be allowed to continue".

Regrettably, in the field of occupational disease and injury, we still have a long way to go in even identifying the size and nature of the problems, let alone developing effective interventions. The lack of New Zealand data means that we cannot adequately document the size of the problem and suggest and enable solutions.

It will therefore become even more essential to be able to measure and monitor occupational disease and injury effectively in order to identify risk factors, identify priority areas for preventive action, and evaluate preventive actions.

This report has identified significant weaknesses and gaps across the current systems for measuring and monitoring occupational disease and injury in New Zealand. It is important to emphasise that these findings are not new and have been detailed within a range of earlier reports.

KEY FEATURES OF AN EFFECTIVE OCCUPATIONAL DISEASE AND INJURY SURVEILLANCE SYSTEM (ODISSY)

The key features of an effective Occupational Disease and Injury Surveillance SYstem (ODISSY) that have been identified:

- It is crucial that the surveillance system is coordinated by an independent unit that has occupational disease and injury surveillance as its primary responsibility, rather than being an "afterthought" of an agency which has other primary agendas. Such a unit could be "stand-alone" or housed within a particular agency; in the latter case, it is crucial that the unit and its funding are "ring-fenced" to enable it to work autonomously. It is also crucial that such a unit has adequate and secure funding, personnel, and resources.
- The unit should be advised by an independent expert advisory group, to provide independent advice on priorities and options for surveillance.
- The surveillance system should be concept-driven rather than data-driven, i.e. the unit should decide what data is required and then ensure that the appropriate data is collected, rather than simply collating data that is collected by various agencies for other purposes.
- Different systems are required for surveillance of occupational injury and occupational disease, but these different systems should ideally be housed within a single agency.
- An effective surveillance system will utilise data from multiple sources and agencies (i.e. mortality, cancer registrations, hospital admissions, NODS registrations, ACC claims). Thus, a "whole-of-government approach" is required, and there must be a commitment from all other government agencies. We recognise that these

various agencies may have other priorities and collect their data for other purposes. The surveillance system should "add value" to the work of the agencies and provide incentives for them to report.

- These incentives would include the unit providing appropriate feedback to the contributing agencies on a regular basis, including audit of data quality and completeness, analysis of trends, identification of priorities for interventions, and assessment of effectiveness of interventions.
- In order to compare and integrate data from multiple sources and agencies, it is crucial that a unique identifier (such as the NHI number) is used in a standardised manner across all the relevant agencies and data collections. Standardisation of other information (e.g. coding of occupation, ethnicity, disease, etc) is also essential.
- The unit should, as well as producing publications on more specific issues, produce an annual report on the burden of occupational disease and injury in New Zealand, which integrates the data obtained from the various agencies.
- Research into occupational safety and health is essential, and the unit should ensure that the data they collect is available for research as well as more routine surveillance purposes.

THE CURRENT SITUATION IN NEW ZEALAND

The current situation in New Zealand falls far short of what is required for an effective surveillance system.

The establishment of the Injury Information Manager has led to the development of a comprehensive injury statistics database. While acknowledging that this work is in its infancy, much work remains to be done. Significant issues remain:

- The capture and coding of data on occupation, industry, work-relatedness, and ethnicity in most databases.
- A lack of capture of occupational history and inability to determine the victim's current occupation at the time of the injury or death. This is important for the calculation of accurate occupation-specific rates. The 1998 *Australian Work-Related Fatalities Study*[9] estimated that about 12% of deaths involved people whose documented usual occupation was different from their occupation at the time of the fatal incident.
- The lack of information on the costs of occupational injury in New Zealand (other than ACC data).
- The low potential of the Workbench (HASARD) system to contribute significantly to occupational injury surveillance, due to under-reporting and shortcomings in system design.

Occupational disease is a larger problem in terms of mortality and morbidity, but is harder to identify, measure, and monitor than occupational injury. In addition to existing or traditional occupational health problems, a significant number of new occupational health issues are expected to emerge, often with multi-factorial and multi-causal origins.

There are no comprehensive sources of routinely collected data on occupational disease in New Zealand. The low potential of New Zealand's only purpose-built occupational disease surveillance system (NODS) to contribute significantly to occupational disease surveillance, due to under-reporting and shortcomings in system design, is cause for grave concern.

In addition, there is little coordination and no aggregation of other existing sources of data, no regular reporting on occupational disease statistics, poor recording of occupation and work-relatedness in data sets that could otherwise make a significant contribution to occupational disease surveillance, and poor access to suitable denominator data.

Existing systems are under-utilised at present. In particular, there are seven databases which, if integrated in a suitable manner and backfilled with coded occupation information, have the potential to provide strong coverage of a range of occupational diseases:

- Accident Compensation Corporation claims database
- Workbench (HASARD)
- Injury Information Manager
- National Minimum Data Set (NMDS)
- Notifiable Occupational Disease System (NODS)
- Mortality Collection
- New Zealand Cancer Registry.

All of these databases should record NHI numbers, thus providing a strong foundation for record linkage. Additionally, all seven databases should use ICD-10 codes or use codes that are able to be mapped to ICD codes.

Although linking these data sets would provide only partial coverage of occupational disease, it stands to enhance New Zealand's ability to implement other parts of the solution, by helping to identify gaps and priorities for focused research, and providing a data set that makes the best use of existing data sources and can be augmented through additional, targeted studies and surveillance systems.

STRATEGY FOR IMPROVEMENT OF OCCUPATIONAL DISEASE AND INJURY SURVEILLANCE

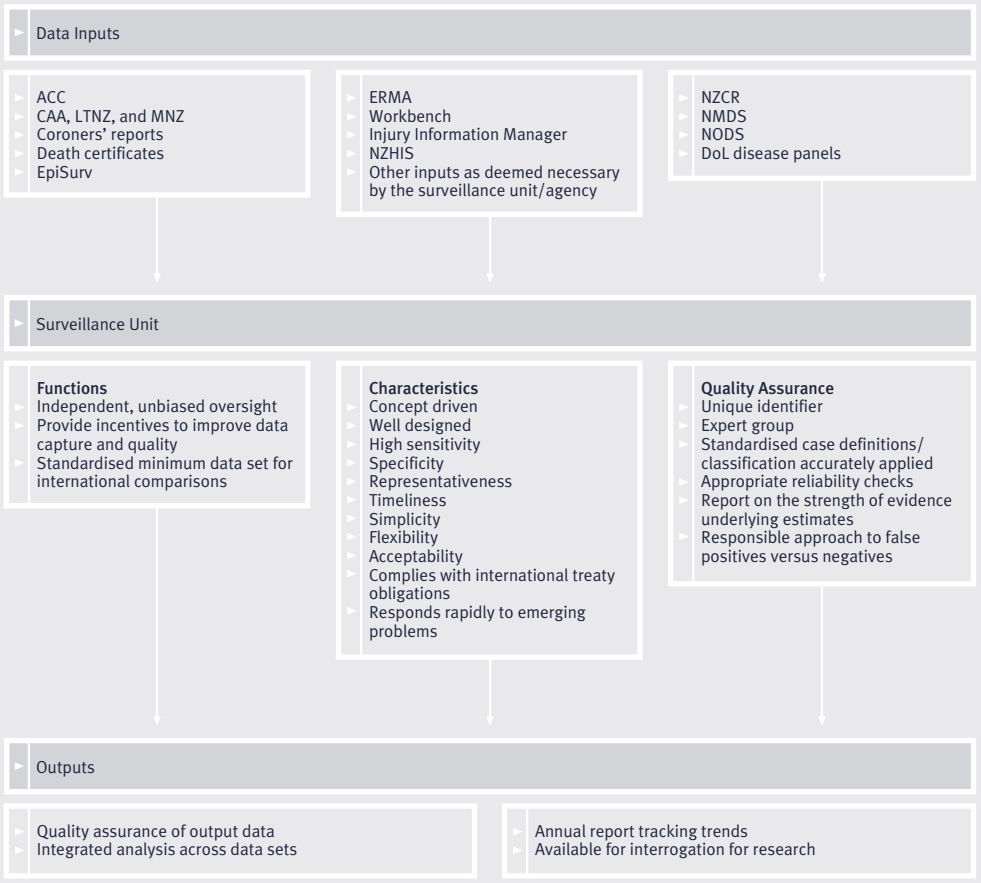
The recommendations that follow have been made in light of the above considerations. In making these recommendations, we have attempted to distinguish between what is feasible in the short term, and the "ideal" situation which is only achievable in the medium/long term.

As noted above, the establishment of the Injury Information Manager has resulted in some progress in the development of a comprehensive injury statistics database, and this work should be continued and enhanced. However, the situation is quite different with regards to surveillance of occupational disease.

In the short term, what is required is to establish an independent unit to develop an effective system of surveillance of occupational disease. Such a unit would ideally be "stand-alone", but could also be housed within a particular agency – the obvious possibilities include the Department of Labour, the Ministry of Health (Public Health Intelligence or the New Zealand Health Information Service), ACC, or Statistics New Zealand. Wherever it is housed, it is crucial that the unit and its funding are "ring-fenced" to enable it to work autonomously. It is also crucial that such a unit has adequate and secure funding, personnel, and resources. It is also crucial that such a unit be placed in an agency which supports its activities and has existing experience and expertise in the methods required for effective surveillance (including epidemiology and biostatistics).

In the medium/long term, what is required is to establish an independent agency which would integrate the surveillance of both occupational disease and occupational injury. As noted above, these require different surveillance systems, but it is important that the two systems, and the related registers, are housed within a single agency, as is currently done in Finland. This agency must have the ability and authority to work with the various agencies to improve the quality of the source data collected by the various agencies.

FIGURE 2 Model for the surveillance of occupational disease and injury in New Zealand



Recommendations

Currently, responsibility for collecting occupational disease and injury surveillance data is dispersed amongst a variety of organisations. Surveillance objectives are often over-ridden by the diverse priorities of individual organisations.

While there will always be legitimate and unavoidable reasons for some differences in data collection, other differences may be addressed through better oversight and coordination of data collection.

GENERAL RECOMMENDATIONS

1. ESTABLISH AN EXPERT GROUP

We recommend the establishment of an expert group, whose principal function is to advise on the development of an effective system of occupational disease and injury surveillance, including the establishment of an independent unit and/or agency. Membership should be time-limited, allowing staged turnover to maximise fresh ideas. This group would advise the occupational disease and injury surveillance agency/unit on key topics and priority areas, including:

- case definitions
- coding, categories, and key indicators
- data capture techniques, including those that should be mandatory
- analysis, especially of narrative fields
- publications
- the development of surveillance of specific occupational health issues.

2. ESTABLISH AN INDEPENDENT UNIT FOR THE SURVEILLANCE OF OCCUPATIONAL DISEASE AND INJURY

In the short term, there should be an independent unit with particular responsibility for occupational disease surveillance and also injury surveillance:

- Such a unit could be "stand-alone" or housed within a particular agency; in the latter case, it is crucial that the unit and its funding are "ring-fenced" to enable it to work autonomously. It is also crucial that such a unit has adequate and secure funding, personnel, and resources.
- It is also crucial that such a unit be placed in an agency which supports its activities, and which has existing experience and expertise in the methods required for effective surveillance (including epidemiology and biostatistics).
- Research into occupational safety and health is essential, and the unit should ensure that the data collected by the unit is available for research as well as more routine surveillance purposes.

3. ESTABLISH AN INDEPENDENT AGENCY FOR SURVEILLANCE OF OCCUPATIONAL DISEASE AND INJURY

The long-term goal should be to establish an independent agency for occupational disease and injury surveillance, which should:

- have overall responsibility for the surveillance of occupational disease and injury in New Zealand
- report to a nominated Minister who will champion the agency and its needs across government
- as well as producing publications on more specific issues, produce an annual report to the appropriate Minister(s) on the burden of occupational disease and injury in New Zealand, which integrates the surveillance data obtained from the various agencies
- have the mandate and authority to coordinate the data collection of the various agencies.

4. ESTABLISH AN INTEGRATED CONCEPT-DRIVEN OCCUPATIONAL DISEASE AND INJURY SURVEILLANCE SYSTEM (ODISSY) WITHIN THE INDEPENDENT AGENCY

- The surveillance system should be concept-driven rather than data-driven, i.e. the unit should decide what data is required and then ensure that the appropriate data is collected, rather than simply collating data that is collected by various agencies for other purposes.
- Different systems are required for surveillance of occupational injury and occupational disease, but these different systems should ideally be housed within a single agency/unit.
- An effective surveillance system will utilise data from multiple sources and agencies (i.e. mortality, cancer registrations, hospital admissions, NODS registrations, ACC claims). Thus, a "whole-of-government approach" is required, and there must be a commitment from all other government agencies. We recognise that these various agencies may have other priorities and collect their data for other purposes. The surveillance system should "add value" to the work of the agencies and provide incentives for them to report.
- These incentives would include the unit providing appropriate feedback to the contributing agencies on a regular basis, including audit of data quality and completeness, analysis of trends, identification of priorities for interventions, and assessment of effectiveness of interventions.
- In order to compare and integrate data from multiple sources and agencies, it is crucial that a unique identifier (such as the NHI number) is used in a standardised manner across all the relevant agencies. Standardisation of other information (e.g. coding of occupation, ethnicity, disease, etc) is also essential.
- Characteristics of the system would include high sensitivity, specificity, representativeness, timeliness, simplicity, flexibility, and acceptability.
- The system should comply with legislation and international treaty obligations.
- The system should enable rapid response to emerging problems.

SPECIFIC RECOMMENDATIONS FOR IMPROVING DATA QUALITY

1. IMPROVE RECORDING OF OCCUPATION IN NZHIS DATA

- Start coding occupation in the Mortality Collection, NZCR, and NMDS using the standard classification systems used by Statistics New Zealand, and code the backlog of occupation using the methods recently recommended by the report from the Centre for Public Health Research (CPHR)[12].

- Include occupation in the NHI database, and record occupation histories of each patient by entering a new occupation and associating it with the date of each event using the methods recently recommended by the report from CPHR[12].

2. EXTEND AND IMPROVE THE CODING OF INDUSTRY IN NZHIS AND DEPARTMENT OF LABOUR DATA

Industry is an important variable as it can add depth to the information captured in the occupation field. For example, people whose occupation is classified as "sales representative" could be exposed to different risk factors depending whether they sell office equipment, meat packing equipment, or fertilisers. Therefore, opportunities to improve data collection include:

- including industry as a variable in the Mortality Collection, NZCR, and NMDS, using the standard Statistics New Zealand classification system
- aligning the industry classification system in NODS/HASARD with the standard Statistics New Zealand classification system.
- developing common definitions, identifying or developing a classification system for coding and dating exposure history, and encouraging the recording of exposure histories in patient case notes where a disease has suspected occupational roots.

3. IMPROVE DATA ACCURACY

- NZHIS should work with hospitals to improve the use of work-related E codes in ICD-10-AM 3rd Edition.
- ACC should improve the coding of work-relatedness, proximal cause, and occupation for all claims.
- ACC should ensure claim data is updated on the claims database (e.g. following a change in diagnosis).
- DoL should review the classification systems and field structures used for recording occupation, industry, diagnosis, agent, and mechanism, with a view to aligning these with standard classification and coding systems and using hierarchical pick-lists for data entry.
- DoL should ensure case data is updated upon completion of each investigation.
- All agencies should regularly audit the quality of data and publish the results of these audits.

4. EXTEND AND IMPROVE THE NOTIFIABLE OCCUPATIONAL DISEASE SYSTEM (NODS)

The Department of Labour should take deliberate steps to increase reporting by general practitioners and others of suspected occupational disease cases. Examples of potential steps include:

- targeting employees, unions, and employers and disseminating information about key disease risks (e.g. by industry/occupation) and symptoms to monitor
- targeting GPs with information about key disease risks, associated symptoms, questions that they could ask their patients to assist in identifying suspected cases, and to raise awareness about NODS reporting
- providing feedback to GPs and others to promote the value of NODS data (acknowledging the current low base and demonstrating improvement in data capture over time)

- continuing to enhance those aspects of NODS which are currently working well, including the work of the DoL disease panels. This must include providing adequate resources for the panels, including the resources for collection of data.

5. IMPROVE RECORDING AND INVESTIGATION OF WORK-RELATEDNESS OF DISEASE AND INJURY

- Establish a coronial database to enable surveillance and systemic learning from coronial findings, with a specific module for work-related deaths.
- Expand the role of the Coroners' Court to include inquiry into suspected cases of occupational disease (as occurs in some other countries including the US, Ireland and Hong Kong).
- Modify death certificates to capture the certifying medical practitioner's opinion as to whether the disease was work-related.
- Amend the BDM database to capture this information.
- Broaden the definition of work-relatedness associated with the corresponding indicator in the Mortality Collection to include suspected occupational disease.
- Record the medical practitioner's opinion within the Mortality Collection.

6. COLLECT ADDITIONAL INFORMATION ON WORK-RELATEDNESS, OCCUPATIONAL HISTORY, AND EXPOSURE HISTORY

- Develop a common definition of work-relatedness to apply in the recording of occupational disease and injury by NZHIS, DoL, and ACC.
- Develop a staged indicator of work-relatedness, for example, to record whether a case is suspected or confirmed, for use by NZHIS and DoL (not applicable to ACC).
- Develop common definitions and fields for recording current occupation (at time of diagnosis) and usual occupation (if different from current occupation) in order to identify both potential sources of exposure (applicable to all systems).
- Develop common definitions and fields for coding and dating occupation history and encourage the recording of occupation histories in patient case notes where a disease has suspected occupational roots (applicable to all systems).

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