

INDEX MEDICUS AND MEDLINE RECOGNISE NSW PUBLIC HEALTH BULLETIN

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We are very proud to announce that the *NSW Public Health Bulletin* will be indexed in *Index Medicus* and MEDLINE. This follows a successful review in February by the Literature Selection Technical Review Committee (LSTRC) of the National Library of Medicine, which is part of the National Institutes of Health, situated in Maryland, USA.

For authors, inclusion of the Bulletin in *Index Medicus* and MEDLINE means that their work is more readily accessible to a larger audience—nearly all literature reviews in the public health and biomedical fields start with a search of these indexes. We hope that this will make the Bulletin an even more attractive journal for high quality articles, and hence even more valuable for regular readers. The primary focus on NSW and Australia will, however, remain.

Index Medicus, a bibliographic index, was established in the 1870s,¹ and its electronic form MEDLINE was established in the 1960s.¹ They are major sources of citation and provide access to the international biomedical journal literature covering areas such as public health, medicine, health care systems, dentistry, and veterinary medicine. About 4,300 journals are included on the MEDLINE database and 3,400 in *Index Medicus*.²

The purpose of the LSTRC is to review the quality of journals and make recommendations regarding their inclusion in MEDLINE; journals may be added or removed. The LSTRC meets three times a year and at each meeting considers about 120 journals. Only 15–20 per cent of applications to be included in MEDLINE are successful.³ In a range of between 0 and 5 the LSTRC gave the Bulletin a score of 3.5–3.9, a ranking equivalent to 'very good'.

The quality of a journal is assessed using the following measures: scope and coverage (relevance to the biomedical field); quality of content (the scientific merit of the papers); quality of the editorial work (including processes such as peer review); production quality (layout, design, and graphics); audience (intended for health

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professionals); and types of content (certain types are preferred, such as statistical compilations and critical reviews).

The National Library of Medicine is in the process of converting MEDLINE input to direct electronic submission. The Bulletin has been asked to provide its content in XML-tagged format, using the PubMed system, which will reduce the time between publication and citation in *Index Medicus* and MEDLINE.

The editor and managing editor would like to thank all the many people who have contributed to this achievement, including: for content—guest editors,

authors, and reviewers; for direction—the Bulletin's Editorial Advisory Committee; and for distribution—the Public Health Network in NSW.

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THE BIG FALLS ISSUE

GUEST EDITORIAL

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This issue, which is the third in the *NSW Public Health Bulletin's* ongoing injury series, illustrates how falls in older people are on the rise—with predictions of the associated health care costs escalating two-and-a-half times by 2051. Encouragingly, however, we see how the attention of researchers, policy developers, and health promoters has been captured by falls—and in a big way.

The articles in this issue explore the:

- collaboration on falls prevention occurring among area health services in NSW;
- results of fitness promotion among older people;
- significance of eye disorders as a contributing factor to the risk of hip fracture;
- current research effort, which ranges from the perception of the risk of falls among those most at risk, to the biomechanics of falls.

In addition, two articles examine the current and future resource demands associated with falls in older people—with some rural and coastal areas of NSW predicted to be the most affected as they receive an increase in migration of older people.

We cannot afford to neglect the potential epidemic of falls. Perhaps two lines from Moller's article expresses it best: 'failure to fund prevention will lead to resource demands for treatment that will be difficult to meet. As treatment costs rise it will be difficult to find resources for prevention and the cycle of increased demand will be accelerated.'

Over the past year, the NSW Department of Health has been working on developing a policy for the prevention of falls, which is expected to influence health investment as well as policy and practice in the acute, residential care, and community based environments. In terms of its breadth, depth, and determination to reverse what could be a public health crisis by the middle of this century, this is an exciting development. ☘

CHANGING HEALTH RESOURCE DEMANDS FOR INJURY DUE TO FALLS IN AN AGEING POPULATION

Jerry Moller

New Directions in Health and Safety

The population of New South Wales is ageing. Over the next 50 years low fertility rates, relatively low rates of immigration of younger people, and the ageing of the post World War II 'baby boom' generation, will significantly increase the proportion of the population aged over 65. For many diseases, older people use health resources at a higher rate than younger people. Combined with the anticipated demographic shift, we can expect that this will increase the demand for health services rapidly over this period. This article considers the impact of these demographic changes on resources related to the treatment and rehabilitation of injury, which will be required if both current rates of incidence and treatment patterns continue over the next 50 years. In particular, the impact of population ageing on resources that are required for the treatment of injury due to falls is examined. The age-specific distribution of falls injury shows that both the incidence and severity increases rapidly in the older population. This, combined with the extended life expectancy of women, will result in a large increase in the resources required for the treatment of fall related injury, unless there is a reduction in the incidence, their severity, and/or the resources required to treat each case.

METHODS

The projected estimated incidence and cost of a range of causes of injury has been calculated using Australian

Bureau of Statistics (ABS) population projections to 2051 in conjunction with resource utilisation and cost estimates from the Australian Institute of Health and Welfare.^{1,2} Estimates have been made for each of the three ABS projection series (known as Series I, II, and III), each of which are based on differing assumptions about fertility, mortality, and migration.

The assumptions made in the calculations are that the NSW age-specific rates of injury and the resources used to treat these injuries will remain unchanged and will follow the patterns described for the Australian population by Mathers,³ and for the NSW population by Moller.⁴ Therefore, trends shown in the results presented can be attributed solely to the changing demography of NSW.

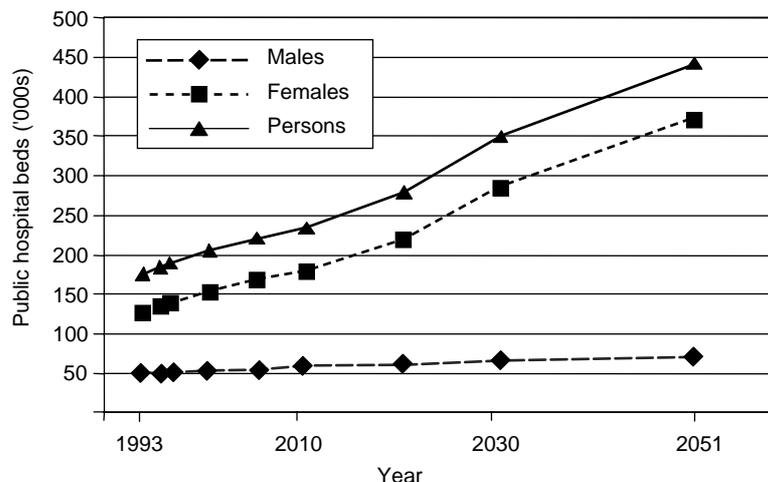
Cost estimates are based on the health system costs only.³ These are the recurrent health care costs that occur in one year apportioned according to cause. The cost estimates represent the cost to government of each cause of injury, but do not identify the total annual economic cost of each cause.

RESULTS

This article focuses on the resource implications of injury due to falls because, of all causes of injury, they show the most rapidly rising trend. Other causes of injury have been addressed in the full report developed for the Injury Prevention and Policy Unit of the NSW Department of Health.⁴ In order to present the broad implications of injury due to falls, results will be presented for:

FIGURE 1

PROJECTED UTILISATION OF PUBLIC HOSPITAL BED DAYS RESULTING FROM FALLS, NSW, 1993–2051 USING ABS SERIES I POPULATION PROJECTIONS



- public hospital bed days;
- nursing home places;
- total health system costs.

Comparison of the effect of different population projection series are presented only for public hospital bed days, as the patterns here are replicated in other resource areas. All other results will be based on ABS Series I, which predicts the lowest overall growth and the greatest demographic change for the period. Readers wishing information analyses using other projection series should contact the Injury Prevention and Policy Unit of the NSW Department of Health.

Public hospital bed days

Figure 1 shows that fall injuries will rise sharply over the next 50 years. The major component of the rise is among the female population, as women form an increasing proportion of the total population as they age, due to the earlier mortality of men.

Nursing home places

Different types of injuries produce different demands for nursing home places. Nursing home places are required where the injury is severe and disabling and where overall frailty determines the need for high levels of care. For both road traffic injury and self-harm, the effect on nursing

FIGURE 2

PROJECTED UTILISATION OF NURSING HOME PLACES RESULTING FROM FALLS, NSW, 1993–2051

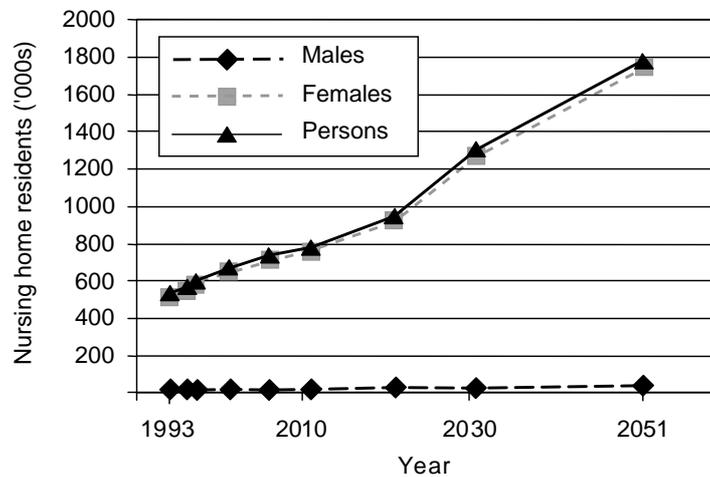


FIGURE 3

PROJECTED COSTS TO THE HEALTH SYSTEM FROM FALLS, NSW, 1993–2051

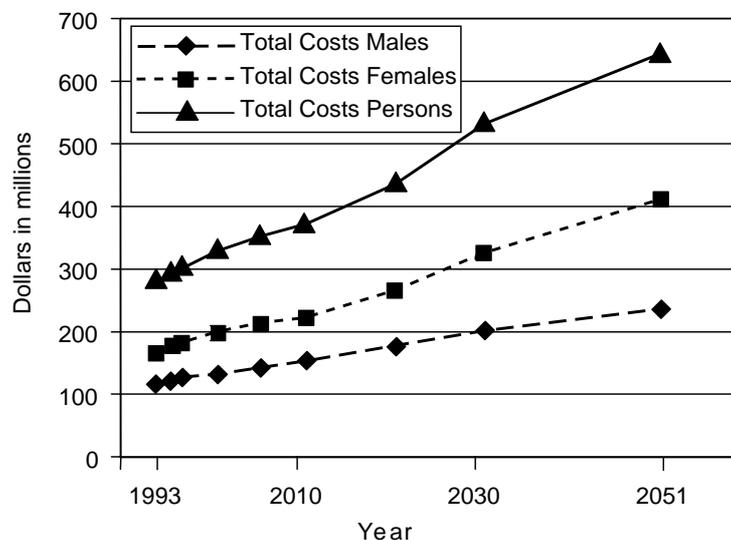
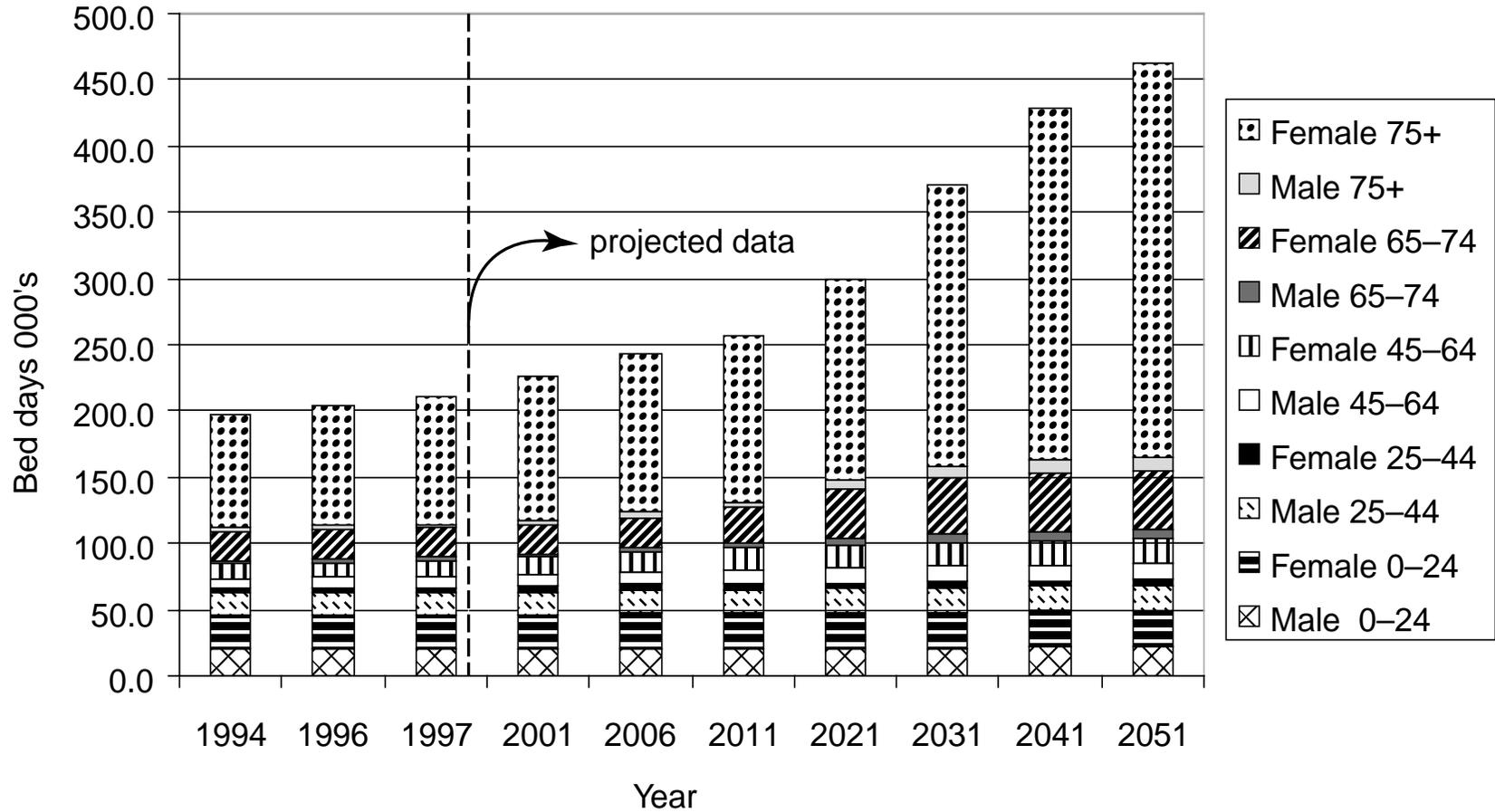


FIGURE 4

INFLUENCE OF AGE AND SEX ON PROJECTED DEMAND FOR PUBLIC HOSPITAL BED DAYS, BASED ON ABS SERIES I POPULATION PROJECTIONS, NSW, 1994-2051



home placement of an injury is almost gender neutral. This reflects the higher incidence occurring in younger people and the predominance of males in younger age groups offsetting the demand created by the larger older female population experiencing falls.

The picture for falls however is quite different. Figure 2 shows how it is women who drive the steep projected rise in demand for nursing home places. The combination of an increasing proportion of women in the elderly population, a higher incidence of disabling falls among older women, and the ageing effect, results in a very steep projected trend in the demand for nursing home beds related to fall injury (Figure 2).

Total health system costs

Mathers's estimates of overall health system cost have been used to determine the impact of the demographic shift on the costs of road traffic injury, injury due to self-harm, and injury due to falls. Analysis indicated that fall injury costs are more expensive than those for road injury and will rise at a much higher rate, increasing by almost double over the 50-year period as a result of the demographic shift (Figure 3).

The increasing proportion of women in the elderly population

One of the major features of the data describing injury due to falls is the influence of the increasing proportion of elderly women in the NSW population. This effect is best examined by considering the projected age and sex-specific demand for bed days.

Figure 4 demonstrates that the major contributor to the increased demand for bed days is women over the age of 75 years. Women 65 to 75 years of age also have some affect. Apart from these two groups, there is little trend in demand projected over the period.

DISCUSSION

The effect of demographic changes on the resources required to treat injury resulting from falls is significant. In the first 50 years of this century, the resources required can be expected to at least double if there is no change in the current incidence rate, severity or treatment patterns. The major increase in demand will come from women aged 75 years or more. The total additional number of bed days required equates to 800 additional hospital beds (that is, four 200-bed hospitals) and there will be a need for 1,200 additional nursing home places.

If this potential burden is to be reduced, a broad public health strategy that seeks to reduce the incidence, severity and treatment costs of fall injuries is required. Strategies to prevent falling and prevent or reduce the severity of fall injuries must be developed. More effective treatment, especially treatment for injuries that lead to

disability and high dependency care is required. Also alternative systems of care other than nursing homes need to be explored for elderly women.

More needs to be known about the effectiveness of primary prevention for falls and whether strategies targeting fall prevention or fall injury prevention or a mix of these two is needed. A number of preventive interventions have been shown to be effective, for example gentle exercise,⁵ and environmental change, in reducing falls and fall injury.

Further work is also needed to systematically assess and manage risk to the individual within the elderly population. Most of the current activity is a result of individual clinical assessment proximate to the time of risk. Unfortunately there is a paucity of evidence of effective interventions among the frail elderly. A long-term public health approach that targets both men and women, but in particular all women who will reach the age of 75 during the next 50 years is required.

However, while the problem emerges among the elderly it originates in patterns of exercise and diet in earlier years, which then interact with both the environments in which the elderly live and the processes of ageing. While the current approaches to falls risk management focus on those at immediate risk, a problem of this magnitude requires a systematic and multifaceted approach across the lifespan. Indeed, we need to ensure that the increase in demand for treatment does not reduce resources for prevention, as failure to fund prevention will lead to resource demands for treatment that will be difficult to meet. As treatment costs rise it will be difficult to find resources for prevention and the cycle of increased demand will be accelerated. A policy for the prevention of falls in older people, being developed by the NSW Department of Health, is a direct response to these future resource implications for the health system.

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NSW FALL INJURY INDICATORS—15 YEAR PROJECTIONS

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New Directions in Health and Safety

Falls are a major cause of morbidity and mortality in older people. In the financial year 1997–98, 16,951 people aged over 65 were hospitalised in NSW for more than one day due to a fall, which represents 14 per cent of all hospitalisations due to injury.¹ This article describes a 15-year projection of injury due to falls in NSW.

As individuals retire, they often change residence. Many retirees seek to live in a warmer climate near the coast. Some rural residents move to larger towns and cities to be closer to health and other services. Fall injury prevention and services, and associated health care resources, need to be located where older people choose to live.

The Injury Prevention and Policy Unit of the NSW Department of Health has attempted to identify where resources regarding fall injury prevention should be allocated in the next 15 years. To achieve this, information for each area health service, and each Statistical Local Area (SLA), has been generated regarding:

- population projections by age group;
- fall-related bed day projections by age group;
- fall-related health service costs and utilisation.

There are several ways of measuring the effect of falls. The indicators chosen for this projection are likely to be consistently measurable over time; however, they should not be taken as absolute measures of demand or cost.

An overview of the population projections for each area health service show that the population of some metropolitan area health services, which already have large populations of individuals aged 60 years or older—such as South Western Sydney, Northern Sydney, and South-Eastern Sydney—will continue to increase.

The projections suggest that the Wentworth and Western Sydney Area Health Services will have the greatest increase in the proportion of the population aged 60 years or older, when compared with the other area health services.

Utilising the fall-related bed day projections at the SLA level within the Western Sydney Area Health Service, the greatest bed day demand for fall injury will occur for those aged 75 years or older in the Baulkham Hills, Blacktown, and Parramatta SLAs. Having this type of local information available for each area health service should assist in the planning and provision of future fall injury prevention services.

As retirees relocate over the next 15 years, some area health services along the NSW coast and regional centres will have an influx of individuals aged 60 years or older. For example, projections of bed day demand in the Hunter Area, which has several coastal communities, suggest that the greatest bed day demand for fall injury will occur for those aged 75 years or older in the Cessnock, Lake Macquarie, Maitland, 'outer' Newcastle (Newcastle–Remainder), and Port Stephens SLAs. The most dramatic increase will occur in the Port Stephens SLA, with a 50 per cent increase in bed day demand for those aged 75 and over between 2001 and 2016. In the Macquarie Area Health Service, which has two regional centres, the greatest bed day demand for fall injury will occur for those aged 75 years or greater in the Dubbo SLA and to a lesser extent in the Mudgee SLA.

There will also be some smaller area health services where an increase in the proportion of those aged 60 years or greater will occur in particular SLAs. For example, in the Far West Area Health Service, the greatest bed day demand for fall injury will occur for the 60 to 74 year olds in the Bourke SLA, and for those aged 75 years or greater in the Broken Hill SLA.

The NSW Fall Risk Indicators for each area health service and each SLA are available at www.health.nsw.gov.au/public-health/health-promotion/improve/injury/fallinjuryindicators/injuryindicators.html.

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POOR VISION AND RISK OF FALLS AND FRACTURES IN OLDER AUSTRALIANS : THE BLUE MOUNTAINS EYE STUDY

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Falls become more frequent with increasing age, and studies have shown that around a third of elderly people living in the community have one or more falls each year. The consequences of falls are significant and include injury, physical deterioration, fear of falling, institutionalisation, and in some instances death.¹⁻¹⁰ It is well recognised that fall-related risk factors are a major contributor to hip fractures in the elderly. This article describes the Blue Mountains Eye Study, which systematically measured and graded visual function and eye disease in an older community-dwelling population. This study provides a good opportunity to examine the associations between poor vision, falls and hip fracture in an older population.

BACKGROUND

The consequences of a hip fracture for an independent living older person are great.¹¹ In a recent study, Salkeld et al. (2000) found that 80 per cent of women surveyed would rather be dead than experience the loss of independence and quality of life that results from a bad hip fracture and subsequent admission to a nursing home.¹² March et al. (1996) found that 12 months after hip fracture, among people who had been living in their own home prior to the fracture, 17.8 per cent were dead, 21.8 per cent had moved to a nursing home, and only 24 per cent were able to walk as well as they did prior to the fracture.¹³

Visual impairment

Many older people living in the community suffer from poor vision or eye disease. The prevalence of sight-threatening conditions such as cataract, glaucoma and macular degeneration all rise with age.¹⁴⁻¹⁸

Problems affecting vision are often treatable or preventable. For example, many older people could benefit from a change in their glasses' prescription. The Blue Mountains Eye Study found that 45 per cent of people would improve their visual acuity by one or more lines at testing with new glasses.¹⁹ The Melbourne Visual Impairment Project found that the number of people with visual impairment could be halved by the provision of a new spectacle correction.²⁰ Much eye disease in the

community is undiagnosed; for example, in the Blue Mountains Eye Study, 49 per cent of people identified with open-angle glaucoma were previously undiagnosed.¹⁸

Vision as a risk factor for falls and fractures

Other studies have found that contrast sensitivity,²¹⁻²³ poor visual acuity,²⁴⁻²⁶ self-reported poor vision,^{27,28} impaired depth perception,⁵ and visual field impairment,²⁹ were significantly associated with falls. There have also been several studies that have found that poor visual acuity was not related to falling;^{1,2,5,21,22} however, most of these studies evaluated only limited aspects of vision, such as visual acuity. No large community-based study has examined the relationship between falls and common ocular conditions in the elderly such as cataract, age related macular degeneration, glaucoma, or diabetes-related eye disease.

There have been three longitudinal studies that have examined the relationship between poor vision and hip fracture.³⁰⁻³² The Framingham study found that for women with poor or moderately impaired vision, the risk of hip fracture was doubled, but that neither cataract nor other common eye diseases had an independent effect on fractures of the hip after adjusting for visual acuity.³² The EPIDOS (Epidémiologie de l'ostéoporose) study found reduced visual acuity was an independent predictor of hip fractures.³⁰ However, the Study of Osteoporotic Fractures found that while poor contrast sensitivity and depth perception were associated with fractures, poor visual acuity was not.³¹

Previous studies of poor vision, falls and fractures have all lacked systematically-measured, well-validated measures of eye disease and visual function. While results of most previous studies suggest a relationship between measures of visual impairment and falls and fractures, they are also inconclusive as to which aspect of visual impairment is the most important.

METHODS

The Blue Mountains Eye Study is a population-based study of eye disease in older community dwelling people living in the Blue Mountains, west of Sydney. All residents aged 49 years and older living in two postcode areas (comprising Katoomba, Leura and Wentworth Falls) were eligible for inclusion in the study, and 3,654 individuals (82.4 per cent of the eligible population) were examined. The baseline examination consisted of an extensive eye examination and an interviewer administered questionnaire, including questions about falls in the last 12 months. Tests of vision performed included tests of

visual acuity, contrast sensitivity (a measure of the ability to differentiate between objects of high and low contrast) and visual field (peripheral vision). Details of the study have previously been described.^{16-18,33}

After five years, subjects were invited to return for further examination. Of the 3,654 participants in the baseline study, 2,326 (63.5 per cent) returned to the five year follow-up examination. Details of hip fractures were collected from self-report at the five year follow-up examination, and a search was made of radiology records and discharge summaries at the local hospital. All fractures were radiologically confirmed. Loss to follow-up was estimated to be around five per cent.

RESULTS

Analysis of baseline cross-sectional data

Of the 3,654 individuals in the baseline study, 3,299 (90.3 per cent) answered the questions about falls. Of those aged 65 years and over, 29.6 per cent reported one or more falls. Tests of visual function that had a statistically significant association with two or more falls after adjustment for confounders were visual acuity (prevalence ratio (PR) 1.9 for visual acuity worse than 20/30), contrast sensitivity (PR 1.2 for a one unit decrease at six cycles per degree) and visual field screening (PR 1.5 for five or more points missing).³³ The presence of posterior subcapsular cataract (PR 2.1), and use of non-miotic glaucoma medication (PR 2.0) had a statistically significant association with two or more falls, while presence of age-related macular degeneration, diabetic retinopathy and cortical or nuclear cataract did not.³³

Analysis of longitudinal data

Analyses were carried out after both two and five years of follow-up. We believed that stronger associations for the shorter period were to be expected because the level of visual impairment present at the time of a hip fracture would be much better reflected by a recent eye examination than an eye examination performed many years in the past. There were 59 subjects who had sustained a fracture of the hip after five years of follow-up, and 17 subjects sustained a hip fracture after two years of follow-up. As expected, visual impairment of any type did not predict risk of hip fracture during five-year follow-up.

Risk factors that were predictive of hip fracture after two years of follow-up were:

- corrected visual acuity (that is, the best visual acuity attained after refraction);
- visual field deficits;
- presence of posterior subcapsular cataract (data as yet unpublished).

No other eye disease was predictive of hip fracture, probably because of the small numbers involved.

CONCLUSION

The Blue Mountains Eye Study has confirmed that visual impairment is strongly associated with an increased risk of falls and hip fracture. Having poor visual acuity, posterior subcapsular cataract or a visual field deficit were all associated with increased risk of both falls and hip fracture. Because of the frequency of visual impairment, it seems likely that a high proportion of falls and hip fractures are due to visual impairment. Ensuring that older people have access to regular eye examinations and have timely treatment for eye diseases, such as cataract, may substantially reduce the incidence of falls and subsequent hip fracture in the community.

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REACHING THE COMMUNITY AND SPECIFIC POPULATIONS

A Community and Specific Populations Advisory Council (CASAPAC) has been formed to advise Fitness NSW on community fitness issues. CASAPAC evolved from the former National Association for Gentle Exercise (NAGE). CASAPAC will focus on two main issues in the short term:

- to determine the appropriate training requirements/ standards for fitness professionals to work with specific population groups (including older persons) and the availability of such training;
- to develop a strategy, in conjunction with the NSW Department of Health, to train fitness professionals to provide fitness services that would support NSW Health's fall injury prevention initiatives.

If you would like to become involved with CASAPAC or would like to contact members of the committee, please contact Fitness NSW on (02) 9460 6200 or email fitnessnsw@fitnessnsw.com.au.

MAKE A MOVE : ENHANCING FALLS PREVENTION THROUGH WORKING IN PARTNERSHIP

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It has often been said that working in partnerships is 'like dancing with an octopus'. However, a coalition of six area health services and the NSW Department of Health's Injury Prevention and Policy Unit working on a falls prevention program for people aged 65 years and over, may disagree. The six area health services are: Western Sydney, South Western Sydney, South Eastern Sydney, Northern Sydney, Central Sydney, and Central Coast Health. This article outlines the process of working in partnership to prevent falls in older people and describes the advantages to collaboration in the development of planning frameworks across area health services and the NSW Department of Health.

Initially, the directors of health promotion in these six area health services met to discuss how they could work together to increase resources for a major health issue. Falls in older people was identified as the issue to focus on, NSW Health became interested in the collaboration, and the *Make a Move* program was born.

The *Make a Move* program has five objectives, which are to:

- increase preventive awareness of risk factors, and in particular the benefits of gentle exercise to reduce the risk of falling among the older community (65 years and over) across Sydney;
- increase awareness among carers and supporting relatives of the increased risk of falls in older people;
- develop suitable communication strategies for older people in key communities from a non-English speaking background;
- substantially increase local programs providing gentle exercise programs for older people;
- develop a suitable evaluation methodology within the key target group to measure increased participation in gentle exercise programs.

The Injury Prevention and Policy Unit offered project funding in the first year, and in August 2000 an executive officer, managed by the Western Sydney Area Health Service, was employed. The first year was directed at raising awareness of the risk factors of a fall and the benefits of physical activity. Focus testing identified

'Make a Move—It's Never Too Late' as an appropriate message to promote the issue of falls prevention.

A *Make a Move* management committee was established, with representation from across the six area health services; and there were three sub-committees, one each for communication, injury, and evaluation. Evaluation of the overall project was put into place, including monitoring of the management committee. The Capacity Building Checklist 1 'Assessing the Strength of a Coalition' was used to review the committee.¹

At the initial stage, members of the committee and sub-committees had unclear expectations, both of the project and their roles. Consequently, all committee and sub-committee minutes were circulated to members via a listserv to create a common understanding of the process.

Identified strengths of the partnership model are: teamwork and alliances, combined knowledge and expertise, and confirmed and accepted leadership.

Working across area health services can be a challenge. However, this program has shown that with increased resourcing, and commitment to a priority issue, it is worth pursuing. An external consultant is conducting a comprehensive evaluation to determine the benefits of future collaborations of this type.

ACKNOWLEDGMENTS

The *Make a Move* management committee; the *Make a Move* communication, injury, and evaluation and sub-committees; and representatives of the area health services and the NSW Department of Health's Injury Prevention Policy Unit.

For more information about the resources developed for *Make a Move* visit www.health.nsw.gov.au/public-health/health-promotion/improve/injuryprev/fallsprevention/falls_tips.htm or www.nsh.nsw.gov.au/HealthInfo/HealthProm/ProgProj/MakeMove/Index.htm.

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A COLLABORATIVE APPROACH : THE RURAL FALLS INJURY PREVENTION PROGRAM

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Health promotion workers from rural and regional areas often work in relative isolation. This article describes a program that provides these health promotion workers with an opportunity to come together to build the infrastructure and capacity required for sustainable change through health promoting programs.

Research suggests that one of the best ways to reduce the heavy burden of falls among older people is to increase the participation of older people in appropriate exercise and activities to improve their strength, balance, flexibility and mobility.^{1,2,3} One of the greatest challenges facing health workers in rural and regional NSW is to find ways to increase the access of older people to these activities.

To address this challenge, the *Rural Falls Injury Prevention Program* (RFIPP) has brought together 10 NSW area health services: Greater Murray, Hunter, Illawarra, Macquarie, Mid North Coast, Mid Western, New England, Northern Rivers, Southern and Wentworth. These area health services are collaborating on the RFIPP, which has been funded by the NSW Department of Health's Injury Prevention and Policy Unit and is being managed by the Hunter Centre for Health Advancement. A project team has been established to support the RFIPP.

The first objective of the program is to conduct a comprehensive audit of the opportunities that older people have to participate in appropriate exercise and activities. A telephone survey is being conducted by the Computer-Assisted Telephone Survey (CATI) facility within the Hunter Centre for Health Advancement. The survey targets

a range of service providers in regional and rural areas, and aims to develop a profile of opportunities to increase access to exercise, and to identify barriers to service provision. The audit will provide data to facilitate the development of local action plans that will be implemented in 2002.

This innovative collaborative model has several advantages. It allows for the sharing not only of resources, but of experience and insight as well. There will be a focus on organisational and workforce development, resource allocation, building partnerships, and local leadership.

For more information about the RFIPP, please contact Deborah Radvan on (02) 4924 6246 or by email at deborah.radvan@hunter.health.nsw.gov.au.

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STAYING ACTIVE—STAYING SAFE : DEVELOPMENT OF A PHYSICAL ACTIVITY AND FALLS PREVENTION RESOURCE FOR OLDER PEOPLE WHO DWELL IN THE COMMUNITY

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Staying Active—Staying Safe is an initiative of the Northern Sydney Health Promotion unit and the *Safe Communities* project in Ryde. The aim of the initiative is to develop a resource that promotes exercises that can be completed at home by the more frail members of the older population. The resource consists of an audiotape and a booklet, which facilitate exercise at a pace and at a level of simplicity that is appropriate for this age group. This article describes the development and evaluation of the resource, and considers the ways in which the resource is useful in increasing physical activity, functional mobility, and self-efficacy in completing everyday tasks.

BACKGROUND

Health surveys of older people have determined that about one-third of people aged over 65 years, and 50 per cent of those over 80, have had a fall in the previous 12 months.^{1,2} About 50 per cent of these people will fall again. The injuries sustained—and the subsequent effect on independence, confidence, and quality of life—have a direct effect on the ability of the ageing population to live in the community.^{3,4} Fear of falling and low self-efficacy (that is, the confidence and ability to perform everyday activities) are independent risk factors for functional disability, which correlate with depression and social isolation.^{3,4} These risk factors are identified in approximately 25–49 per cent of older adults, many of whom have not actually fallen.⁵

Research has shown that gentle exercise has value in reducing falls in older people, through increasing lower limb strength, and by improving balance.⁶ Community surveys have determined that up to two-thirds of older adults prefer to exercise as an individual, and studies of home-based programs of physical activity have found the programs to be effective in improving the health of older people.⁷ Home-based programs are particularly pertinent to the more frail community dwellers who are unable to access exercise classes offered in the community.⁷ To prevent falls in older people, the NSW Department of Health recommended in 2001 that plans should be developed at a local level to implement home-based programs in conjunction with community health providers.⁶ By developing a resource of simple, gentle exercise activities, which could be safely completed at home, it is hoped that increased physical activity and safer functional mobility will be achieved.

The *Staying Active—Staying Safe* audiotape and booklet contain exercises designed to increase strength and

mobility of the lower limbs. Side A of the audiotape has seated, gentle exercises and Side B has chair-assisted, standing exercises. Each side of the audiotape takes approximately 20 minutes to complete. The booklet illustrates the exercises in a diagrammatic form, which correspond to the audiotape. The audiotape and booklet both include safety tips and information about risk factors for falls. The exercises were compiled and recorded by a health promotion staff member who is a physiotherapist experienced in the provision of gentle exercise programs for older people.

The partnership that developed the resource was formed between Northern Sydney Health Promotion and the Ryde *Safe Communities* Falls Working Group, with joint funding provided from the Northern Sydney Area Health Service and Ryde Council. This funding provided for 1,000 tape and booklet packages, which were distributed free of charge to community dwelling residents in the Ryde and Hunters Hill local government areas. The target group for the distribution of the resource was older people who were aged 65 years or over, frail, socially isolated, mostly housebound, unable to access community exercise classes, and who were at risk of falling.

RESOURCE DEVELOPMENT

Development of the resource was undertaken in a number of phases over approximately two years. The initial phase consisted of trialling draft versions of the tape and booklet with older inpatients in a hospital-based falls prevention group, and with the older community members of the falls working group. Following these trials, the resource was refined, the tape was professionally recorded, and the booklets were printed.

Subsequent phases involved the development of the evaluation tools, including pre- and post-trial questionnaires and modifying assessments tools such as the Tinetti Falls Self Efficacy Scale.⁸ The resource was then piloted in the community over two three-month periods to determine: ease of use, changes in physical activity levels, functional mobility, and any changes in a participant's ability to manage their own self-care. The pilots were co-ordinated by the Northern Sydney Health Promotion unit in conjunction with inpatient allied health staff from Ryde Hospital and occupational therapy students from the University of Sydney. Other partnerships in this process included community allied health staff from Ryde Hospital Aged Care and Rehabilitation Service, Northern Sydney Home Nursing, and Home and Community Care Services. The occupational therapy students were responsible for conducting the assessments and collating the results under the direction of a health promotion supervisor.

RESULTS

A total of 29 older people agreed to participate in the community-based pilots. The small sample size was drawn from a larger group of 70 people, who were mostly unable to participate due to lack of access to tape recorders. The collated results from the pilots were averaged and are as follows:

- the majority of participants were female and over 75 years of age;
- 75 per cent were aged between 79–94 years;
- 92 per cent of participants reported finding the tape and booklet instructions easy to follow;
- 89 per cent found the exercises to be the correct degree of difficulty;
- 50 per cent of participants reported increasing their level of physical activity, using the resource 2–7 times per week;
- 64 per cent found the resource useful for staying active in their own home.

The evaluation determined that the participants who used the resource and increased their physical activity also felt more confident in their functional mobility and self-care activities.

DISCUSSION

The pilot findings support the appropriateness of the resource as a home-based program of gentle exercise. It was indicated that it could be used easily and safely by the target group without intervention by carers or health service providers. Participants reported an increase in their physical activity, and noticed a corresponding increase and improved confidence in their functional mobility and self care. Improvement of confidence and functional mobility are very important in the prevention of falls. A proportion of participants were found to use the tape and booklet together initially, but came to use the booklet alone as they became more familiar with the exercises. As a number of older people may not have access to a tape recorder, this may have implications for how the resource could be used in the future.

When consulting with community service partners during the pilot phases, the resource was found to have a wider potential than just individual home-based use. Responses from the community indicated that aged care day centres, hospitals, retirement villages, and nursing homes, saw the potential for using the resource for group activities and for individual clients at risk of falling. The resource may also have potential for use in rural and remote areas, where access to community-based gentle exercise programs may be more limited than in metropolitan areas. In response to this, Northern Sydney Health Promotion is currently producing the resource commercially, to enable the resource to reach a wider audience.

CONCLUSION

A fear often expressed by older people, which is supported by the literature, is the potential of falling and sustaining an injury that could reduce their ability to remain independent at home.^{2,3} The use of simple resources such as *Staying Active—Staying Safe* has the potential to reduce this fear by increasing physical activity and safety through home-based, gentle exercise. The facilitation of actual ability and greater confidence in functional mobility and self-care has important implications for older people in reducing falls and increasing their perceptions of self-efficacy in managing safely in their own homes.

Information about obtaining the resource is available on the Northern Sydney Health Promotion Web site www.nsh.nsw.gov.au/healthpromotion.htm.

ACKNOWLEDGMENTS

The authors wish to acknowledge the Ryde *Safe Communities* Falls Working Group, in-patient and community based allied health staff of Ryde Hospital, occupational therapy students from the University of Sydney, home nurses in Northern Sydney, and community service providers in the Ryde area, for their assistance and support in the development of this resource.

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IMPROVE YOUR BONE AND MUSCLE TONE : EVALUATION OF A STRENGTH TRAINING PROGRAM ON THE CENTRAL COAST OF NSW

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Central Coast Area Health Service

Ageing is a complex process involving changes in physiological and psychological functioning, which often results in decreased functional capacity, loss of independence, and poor quality of life.¹

Through improvements in muscular strength and endurance, strength training can reduce sedentariness, increase levels of incidental and planned physical activity, and improve ability to carry out activities of daily living. In doing so strength training can contribute to an improvement in the overall health and wellbeing of older adults.²

Strength training involves applying a resistance or load to a muscle-generating force. To achieve increases in strength, the load must be progressively increased, and be perceived by the individual as 'somewhat hard' to 'hard'.^{3,4,5} Fitness centres have appropriate equipment and personnel, and are well-placed to oversee safe and effective strength training for older adults.

Private fitness centres on the Central Coast have demonstrated their commitment to older residents by collaborating with the Health Promotion Unit of the Central Coast Area Health Service, in providing popular, successful, and high quality gentle exercise programs for older adults. Provision of strength training programs offers fitness centres an opportunity to build on existing gentle exercise programs, thus providing a wider variety of activities for older adults. This article describes an evaluation of the first 12 months of the *Improve Your Bone and Muscle Tone* program implemented in private fitness centres on the Central Coast of NSW in October, 2000.

METHODS

The four objectives of the *Improve Your Bone and Muscle Tone* program were to:

- increase the proportion of providers offering strength training programs;
- increase the number of older Central Coast residents participating in strength training programs;
- increase participants' strength, fitness, physical-activity levels, and confidence in carrying out daily activities;
- measure the increase in strength of participants through a 12-month audit of fitness centre records.

Several strategies were used by the Health Promotion Unit to encourage the local fitness industry to provide strength-training programs specifically for older people. These strategies included:

- small grants offered to fitness centres to initiate the *Improve Your Bone and Muscle Tone* program;
- specialised training workshops for staff and managers of participating centres;
- providing training guidelines, a range of promotional resources, and ongoing newspaper advertising, for participating centres.

In the course of evaluating the *Improve Your Bone and Muscle Tone* program:

- participating centres provided monthly data on the number of male and female participants and class frequency, as well as a six-monthly written progress report;
- all participants were asked to complete a baseline questionnaire on commencement of the program, which included questions on current physical activity levels, perceived fitness and strength, and satisfaction with initial instruction from fitness centre staff;
- six months after the classes commenced, consenting participants completed a follow-up telephone questionnaire to ascertain their current level of participation, length of attendance, reason for stopping and/or intention to continue, and confidence in carrying out daily activities.

Physical activity levels, perceived fitness and strength, and satisfaction with instruction from staff were reassessed twelve months after implementation of the *Improve Your Bone and Muscle Tone* program. Fitness centre records were used to objectively measure strength gains made. Exercise type, weight lifted, and number of sessions attended were recorded.

RESULTS

Prior to the launch of the program in October 2000, there were no specific strength training programs for older people offered on the Central Coast. Since then, 50 per cent of Central Coast fitness centres have successfully established, maintained, or expanded the *Improve Your Bone and Muscle Tone* program.

A total of 19 strength-training classes are now available at five fitness centres. Currently, there are a total of 650 attendances per month, which has increased from 120

FIGURE 1

PERCEIVED STRENGTH OF PARTICIPANTS AT INITIAL VISIT AND 6 MONTHS AFTER COMMENCING THE PROGRAM

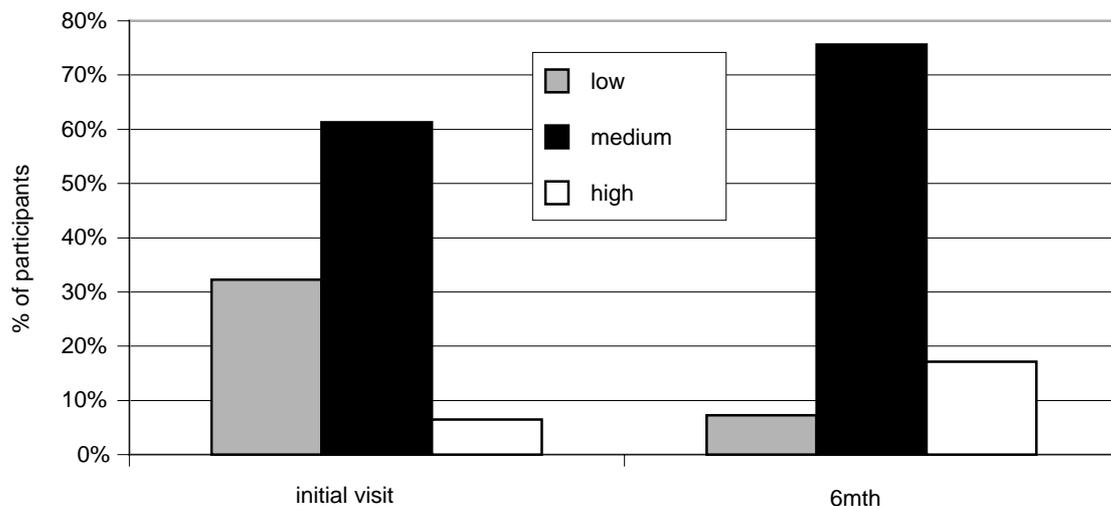


FIGURE 2

PERCEIVED FITNESS OF PARTICIPANTS AT INITIAL VISIT AND 6 MONTHS AFTER COMMENCING THE PROGRAM

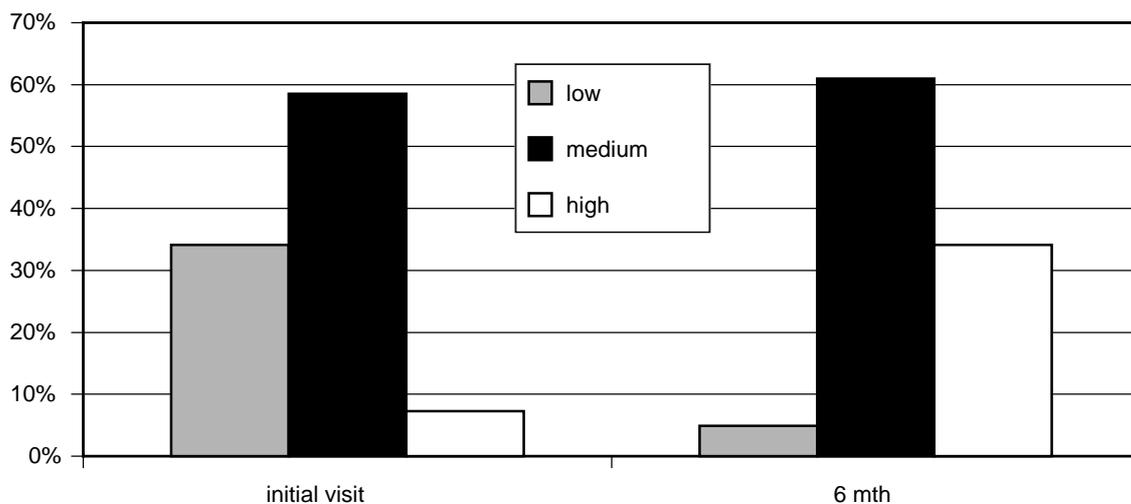


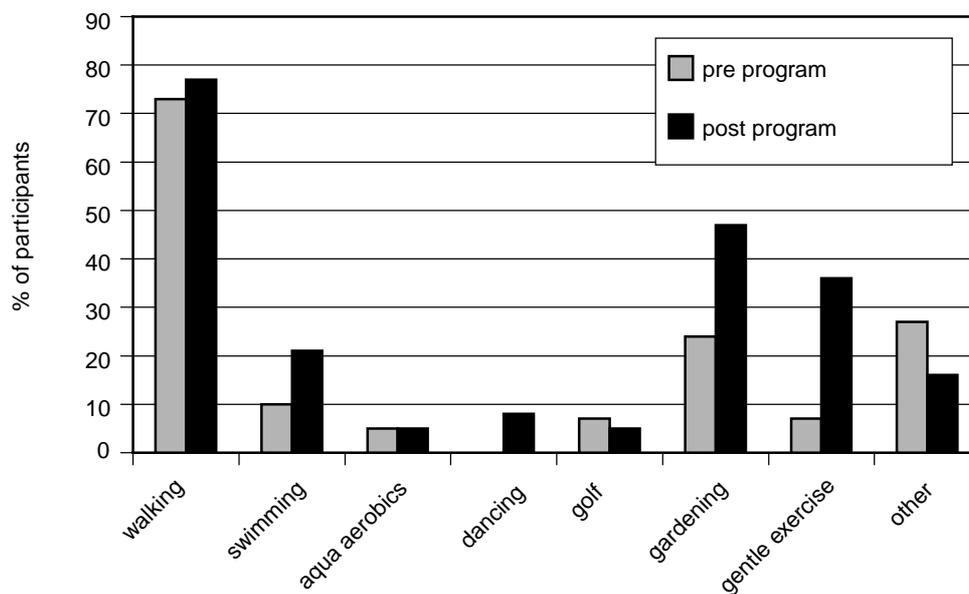
TABLE 1

MEAN WEIGHT LIFTED BY PARTICIPANTS AT FIRST AND LAST VISITS FOR EACH EXERCISE

Type of exercise	Mean weight lifted at first visit	Mean weight lifted at last visit	Mean difference	Sample size	P value
Leg press	18.4 kgs	27.4 kgs	9 kgs	123	<0.001
Chest press	11.7 kgs	17.6 kgs	5.8 kgs	127	<0.001
Lat pull-down	17.8 kgs	23.28 kgs	5.4 kgs	114	<0.001
Shoulder press	6 kgs	8.7 kgs	2.6kgs	104	<0.001
Seated row	14.8 kgs	21.7 kgs	6.9 kgs	94	<0.001

FIGURE 3

TYPES OF PHYSICAL ACTIVITY UNDERTAKEN



attendances per month since December 2000. Seventy per cent of participants are women and 30 per cent are men, with a mean age of 65 years.

All sixty-two participants who attended the initial session in the first four fitness centres that adopted the *Improve Your Bone and Muscle Tone* program completed the baseline questionnaire. Of these, 55 agreed to be followed up at six months, and 41 were able to be contacted by telephone at six months. Of these 41, 66 per cent were still participating. Only one person cited that they found the cost prohibitive, and another that they did not enjoy the program. Ninety-three per cent of participants reported that instructors were ‘very helpful’ initially, with the same percentage stating instructors remained ‘very helpful’ after six months participation. Forty-two percent of participants rated their strength level as higher after six months participation (Figure 1). Fifty-six percent of participants rated their fitness level as higher after six months participation (Figure 2).

Sixty-three per cent indicated that strength training had given them either moderately more confidence (30 per cent) or a lot more confidence (33 per cent) in carrying out daily activities such as shopping, climbing stairs, other exercise, gardening, or rising from a chair.

Thirty-six per cent of participants were ‘insufficiently active’ according to Active Australia Guidelines at the time they commenced the program.⁶ This had decreased to 22 per cent after six months participation. Figure 3 illustrates involvement in other types of physical activity,

before starting the *Improve Your Bone and Muscle Tone* program, and after six months in the program.

Participants’ records from four *Improve Your Bone and Muscle Tone* fitness centres were audited 12 months after the commencement of the program. Only those participants who had been strength training for three sessions or more were included in the sample. This comprised 137 participants.

For each participant, weights lifted (in kilograms) at the first and last visits were recorded for each type of exercise. Differences in weight lifted between first and last visits were calculated. Students’ T-tests were carried out to ascertain whether participants showed significant increases in the amount of weight they could lift.

Significant increases in amount of weight lifted were found in all types of strength training exercise (Table 1).

DISCUSSION

The *Improve Your Bone and Muscle Tone* program met all four of its objectives. Five of the 10 Central Coast fitness centres provided 16 strength training classes for older people, with 650 attendances per month. Most participants were satisfied with the instruction they received, and reported a perceived increase in strength and fitness. Records of weights lifted confirmed participants increase in strength. Almost all participants reported feeling more confident in performing daily activities after completing the *Improve Your Bone and Muscle Tone* program.

A 66 per cent retention rate of participants was considered to be reasonable, given that most of those who had dropped out reported intending to return to the program. Rapport with instructors, the camaraderie of one's own age group, measurable feedback on progress, and the self-paced and individualised nature of the program, appear to contribute to enjoyment of strength training.

Two-thirds of participants were sufficiently active before commencing the program and the increase in the percentage of sufficiently active participants was small. While the program may be 'preaching to the converted', it is worth noting that strength training provides specific benefits for older people that cannot be gained through the other forms of exercise reported.^{7,8,9} No participants were involved in specific strength training prior to the commencement of the program, though many were undertaking some form of weight-bearing exercise.

Nearly one-third of the participants in the *Improve Your Bone and Muscle Tone* program were men. Gentle exercise programs conducted for the same age group by private fitness centres in cooperation with the Health Promotion Unit have consisted of less than 10 per cent males. This is an important positive outcome for the program, because it represents a feasible population health strategy to increase physical activity among older men.

CONCLUSION

The *Improve Your Bone and Muscle Tone* program has been effectively established and maintained by the local fitness industry in collaboration with the Health Promotion Unit of the Central Coast Area Health Service. It is a good example of a sustainable physical activity program for older people, which has resulted in significant positive outcomes for its participants. The next 12 months will see more centres join in providing strength training for older people. A new aspect will be to publicise an 'easy start' component for people newly engaging in physical activity or lacking confidence in this environment.

An ongoing challenge is ensuring that fitness centre staff are adequately prepared for providing this program for an audience of older people who have not historically been customers. Development of guidelines for the State, in association with Fitness NSW, will be an important step.

For further information on *Improve Your Bone and Muscle Tone*, contact Gina Stuart by telephone on (02) 4349 4813; by fax on (02) 4349 4866; or by email at gstuart@doh.health.nsw.gov.au.

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CENTRAL SYDNEY TAI CHI TRIAL : METHODOLOGY

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Falls are a significant health risk for older people, and can result in fractures that, with increasing age, can lead to medical and social complications, which can further result in a decrease in quality of life.

In NSW, demand on health resources due to injuries resulting from falls in older people is increasing. According to population growth predictions it is estimated that by 2051, in NSW approximately four 200-bed hospitals would have to be built just to cope with fall injuries in older people.¹

More than 400 individual risk factors for falls have been identified in the research literature.^{2,3,4} The principal risk factors are: impaired balance; fear of falling; and lack of physical activity.

There have been several studies that have investigated the effects of exercise on various risk factors. These have demonstrated improvements in balance, functional capacity, and a reduction in fear of falling. In particular, Tai Chi has been shown to be effective in not only addressing risk factors, such as balance and fear of falling, but also in reducing the number of falls experienced by older people.⁵ However, there are few studies that have examined Tai Chi as a falls prevention strategy, and there are none set in an Australian community context. Previous studies have typically used hospital out-patients as subjects and, as they provided free classes more than once a week, failed to replicate 'real world' conditions.

The goal of the *Central Sydney Tai Chi Trial* is to investigate the effectiveness of a community-based Tai Chi program for people aged over 60 years, in increasing the time to their first fall and improving their balance. Specifically, the objectives of the study are to demonstrate the effect of the 16-week Tai Chi program on:

- time to first fall after commencing the program;
- the average number of falls over six months;
- balance after 16 weeks of Tai Chi;
- levels of the fear of falling;

- functionality.

The study design is a randomised control trial and will run over two-and-a-half years. Subjects are randomly allocated to either an initial-intervention group or a waiting-list control group. The intervention consists of 16 weeks of Tai Chi classes of one one-hour session per week. Falls are monitored for both groups by means of a six-month self-reported falls calendar. Participants return a calendar each month to the research team, which indicated the days they had fallen in that month. Recruitment of subjects is via a social marketing campaign, using local and community newspapers as well as promotion to community agents (such as general practitioners, pharmacists, allied health workers), libraries, and local clubs.

There are currently about 16 classes in progress and their location is distributed throughout the inner western and southern suburbs of Sydney. It is anticipated that, as part of this study, a further 30 classes will be started over the next two years. Preliminary results should be available by February 2004.

The *Central Sydney Tai Chi Trial* is funded by the NSW Department of Health's Health Promotion Research Demonstration Grants Scheme.

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STEP OUT WITH CONFIDENCE

Alison Sewell

Commonwealth Department of Health and Aged Care

The Commonwealth Department of Health and Aged Care commissioned a study of the information needs and perceptions of older Australians concerning falls injury and the prevention of falls. This article describes the findings of the study, which were used to inform the planning of communication activities for the National Falls Prevention for Older People Initiative, *Step out with confidence*.

METHODS

Fifty-nine older Australians from metropolitan and rural areas participated in the study. Some had experienced a fall, and some were the carers of those who had experienced a fall. Participants included individuals from culturally and linguistically diverse backgrounds. Information was obtained through seven group discussions and 10 in-depth interviews.

RESULTS

The investigation found that falls were generally known to be a problem among those aged 65 or older. However, there was considerable variation in the way that the problem was acknowledged by people in this age group. Typically, those more accepting of the personal risk of falling had already fallen or had experienced aged-related health problems that significantly affected their lifestyle. Having had a fall was found to be the most likely incident to trigger acceptance of personal risk: *'It has happened and it could happen again.'* Older people who did not identify themselves as being 'old', and who had a more active lifestyle, tended to minimise their personal risk of falls and the relevance of falls prevention measures: *'It won't happen to me.'*

FACTORS PERCEIVED TO CONTRIBUTE TO FALLS

The term 'fall prevention' was unfamiliar to the participants. However, the risk factors for falling that they identified included both extrinsic and intrinsic factors as follows:

Extrinsic factors—or external to the individual:

- tripping on steps, stairs, and uneven footpaths;

- slipping on polished floors, or on mats;
- poor footwear choices, such as high heels.

Intrinsic factors—or internal to the individual:

- hurrying and/or carelessness;
- feelings of being unsteady on their feet;
- poor vision.

Falls were attributed more readily to extrinsic factors, which are more tangible and more easily understood. Generally, older people felt that there is less they can do to prevent falls caused by intrinsic factors other than being very careful or using a walking aid.

STRATEGIES TO PREVENT FALLS

The extent and nature of falls prevention techniques adopted by participants was found to vary according to the perceived likelihood of falling. Many strategies were found to have been adopted for other reasons, with falls prevention being an additional benefit. Strategies adopted to prevent falls included:

- being more careful in the way that they do things;
- avoidance of certain situations that they perceived to be 'risky' in terms of falling;
- altering footwear to flat shoes and slip ons;
- increased use of walking aids.

While some individuals are prepared to use such aids, others are reluctant because they perceive the use of aids to signal acceptance of being old.

CONCLUSIONS

This research identified a clear need for easily accessible information for older Australians regarding falls prevention that:

- emphasises the preventable nature of falls;
- identifies the range of strategies that are available to prevent falls and how they prevent falls. ☒

A full copy of the report: *National falls prevention for older people initiative Step out with confidence: A study into the information needs and perceptions of older Australians concerning falls and their prevention* is available from www.health.gov.au/pubhlth/strateg/injury/falls/documents.htm.

NHMRC HEALTH RESEARCH PARTNERSHIP : PREVENTION OF OLDER PEOPLE'S INJURIES

Stephen Lord and Catherine Sherrington
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This article provides an overview of the background to, and research planned as part of the NHMRC Health Research Partnership *Prevention of Older People's* (POPI) program. Through this partnership, two major research projects are being undertaken by a consortium led by the Prince of Wales Medical Research Institute: falls among older people, and transport injuries to older people.

BACKGROUND

In April 1999, the National Health and Medical Research Council (NHMRC) published the document *Paradigm Shift: Injury from problem to solution*.¹ This document provided a comprehensive overview of the burden of injury in Australia, and the current status of injury research. Future directions for injury research were identified. Later that year the Health Research Partnerships in Injury Committee was formed as a joint initiative of the NHMRC's Strategic Research Development Committee and Research Committee. Applications for funding of injury research were invited. In order to be eligible to receive NHMRC funding, applicants were required to assemble a team of researchers with complementary expertise as well as secure funding from a range of organisations.

The POPI program is one of two programs funded under the NHMRC Health Research Partnerships initiatives. Research is expected to commence in 2002. The POPI program focuses on the two most frequent causes of injury in older people, falls and transport injuries.

PREVENTION OF INJURIES IN OLDER PEOPLE PROGRAM PARTICIPANTS

Table 1 lists the nine POPI chief investigators and their affiliated institutions, and six core participating organisations.

The POPI program has 31 associate investigators who bring clinical and research expertise from a broad range of backgrounds including: nursing, podiatry, physiotherapy, psychology, optometry, engineering, human movement, public health, health promotion, physiology, and biomechanics; and the medical specialties of rehabilitation, aged care, neurology, rheumatology, and ophthalmology. These associate investigators are from a number of universities (University of New South Wales, University of Western Sydney, University of Sydney, Queensland University of Technology); hospitals (Port Kembla Hospital, Royal Prince Alfred Hospital, Westmead Hospital, Greenwich Hospital, Royal North Shore Hospital, Calvary Hospital,

Bankstown–Lidcombe Hospital, Princess Alexandra Hospital Brisbane); and other organisations (South Western Sydney Area Health Service, and the Centre for Research on Ageing).

RESEARCH INTO FALLS AMONG OLDER PEOPLE

The falls aspect of the research program includes a range of related studies directed to reduce falls and related injury in older people. The work will investigate:

- the basic physiology and biomechanics of human balance (including stepping, trips–slips, and walking);
- risk factors for falls in community dwellers and among those with Parkinson's disease (with a focus on the vestibular system, vision, and neuropsychological aspects);
- by studying of large populations, prediction of people who are at risk of falls and injury and develop practical screening tools for clinical use in Australia;
- the effect of different aspects of shoe design with an aim of developing safer footwear for older people;

TABLE 1

CHIEF PARTICIPANTS IN THE PREVENTION OF OLDER PEOPLE'S INJURIES PROGRAM

The POPI program is directed by Stephen Lord, Prince of Wales Medical Research Institute. There are eight other chief investigators:

Graham Kerr	School of Human Movement Studies, Queensland University of Technology
Kaarin Anstey	Centre for Mental Health Research, Australian National University
Anthony Broe	Prince of Wales Hospital and Medical Research Institute
Ian Cameron	Rehabilitation Studies Unit, University of Sydney,
Robert Cumming	Department of Public Health and Community Medicine, University of Sydney
Richard Fitzpatrick	Prince of Wales Medical Research Institute
Julie Steele	Department of Biomedical Science, University of Wollongong
Joanne Wood	School of Optometry, Queensland University of Technology.

The core participating organisations are:

NSW Department of Health
NRMA Insurance
Medical Benefits Fund of Australia (MBF)
Vincent Fairfax Family Foundation
Illawarra Retirement Trust
Northern Sydney Area Health Service *Good Age Trust*.

- through large randomised controlled trials (including multi-faceted programs and home-based and group exercise), identification of whether targeted falls intervention programs can prevent falls in older people staying in acute hospitals and in community dwelling people at high risk of falls.

RESEARCH INTO TRANSPORT INJURIES TO OLDER PEOPLE

Another arm of the research program will investigate older drivers. Crashes involving older drivers already cost the Australian economy \$500 million annually and have a major effect on the quality of life of the community. These statistics will rise as the population of older drivers grows by 25 per cent per decade, approximately twice the rate of younger age groups.² There has been little research into motor vehicle crashes involving older drivers in Australia. At the population level, crash rates, both per driver and per kilometre, begin to increase at 65 years and are much higher for people over 85.³ As with falls, age per se does not cause crashes but age-related sensorimotor and cognitive changes probably do.

The transport research program uses a wide range of sensorimotor and cognitive tests and applies them prospectively in a large population of older drivers; and, finally, links the results of these tests with crash data. The transport research program aims to develop and validate an assessment screen for accurately identifying older drivers who are not capable of safe driving due to visual, cognitive, or sensorimotor impairments.

IMPLEMENTATION

A key aspect of the NHMRC Health Research Partnership *Prevention of Injuries in Older People* is the dissemination of the results of research to clinicians from a range of disciplines, as well as to health promotion practitioners, policy officers, and older people themselves. Researchers are increasingly recognising the need to take active steps to facilitate the translation of research findings into practice. Accordingly, strategies to be undertaken will include: publication of findings in a range of media (including professional journals, local newspapers, and newsletters of older people's organisations); presentations at and hosting of meetings, conferences, and workshops (ranging from local to international); representation on policy committees as appropriate and the maintenance of a Web site.

To view the *Falls and Balance Research Group* Web site visit www.powmri.unsw.edu.au/FBRG/FBRGhome.htm.

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TUBERCULOSIS IN NSW, 1991–2000

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Mohammad Habib*

Communicable Diseases Surveillance and Control Unit

The control of tuberculosis remains an important public health challenge in NSW. While rates in the state remain among the lowest in the world, the fact that many people in the state's population have lived in countries with high prevalences of the disease, means that the potential for an increase in its incidence is ever present.

Tuberculosis is caused by infection with the bacteria *Mycobacterium tuberculosis*. Only about 10 per cent of people who are infected with the bacteria will go on to develop the disease at some time in their life. Half the risk of disease occurs in the first two years after infection. The disease can affect many organs, but in most cases it affects the respiratory system. Tuberculosis is spread when a person with tuberculosis of the lungs or larynx exhales the bacteria into the air, usually by coughing, and another person inhales it. Tuberculosis can usually be cured with a six-month course of multiple antibiotics. Preventive therapy with specific antibiotics can also markedly reduce the risk that infection will lead to disease.¹

Surveillance is essential for identifying patients with tuberculosis, both to ensure that they receive optimal treatment, and to ensure that other people who have been in contact with them are counselled, tested, and treated if they are infected with tuberculosis. These services are provided in NSW free of charge by the network of chest clinics within the area health services. On a population level, surveillance enables health departments to identify groups at risk and long term trends in the disease, which inform the development of prevention policies.

METHODS

We reviewed NSW Department of Health annual reports from 1929—when statewide reporting of tuberculosis began—to obtain historical summaries of tuberculosis case counts for NSW and to identify major policy changes in the control of tuberculosis. Under the *NSW Public Health Act 1991*, all doctors, laboratories and hospitals must notify suspected cases of tuberculosis to the local public health unit (PHU). PHU staff record case details on a confidential statewide database. We analysed the characteristics of cases of tuberculosis, hospitalisations, and deaths notified to PHUs between 1991 and 2000. Incidence rates were calculated using the Australian Bureau of Statistics estimated mid-year population for the relevant year, except for Aboriginal and Torres Strait Islander status, for which 1999 estimates were used. Country of birth was only reliably available in the

database for cases from 1995, and analysis on this variable was only included for cases notified from 1995 to 2000.

RESULTS

Historical reports

Before World War II, the incidence of tuberculosis was around 60–70/100,000. The incidence of tuberculosis declined sharply in the 1950s and 1960s. This decline occurred following the introduction of antibiotic treatments, the introduction of chest x-ray screenings of the population, and improved living conditions (Figure 1). The decline levelled out in the late 1970s, most likely reflecting changing immigration patterns to NSW, and the case rate has been maintained at around 7/100,000. In 1960, of the 1540 tuberculosis cases reported, 78 per cent were Australian born, 19 per cent European, two per cent Asian, and one per cent of cases came from other countries. This is a very different pattern from that seen in the last decade, which is described below.

Case notifications 1991–2000

In 2000, 433 cases were notified, (a rate of 6.7/100,000) (Table 1). For 1991 to 2000, 4181 cases of tuberculosis were notified in NSW, an average of 418 per year (6.8/100,000).

Demographics

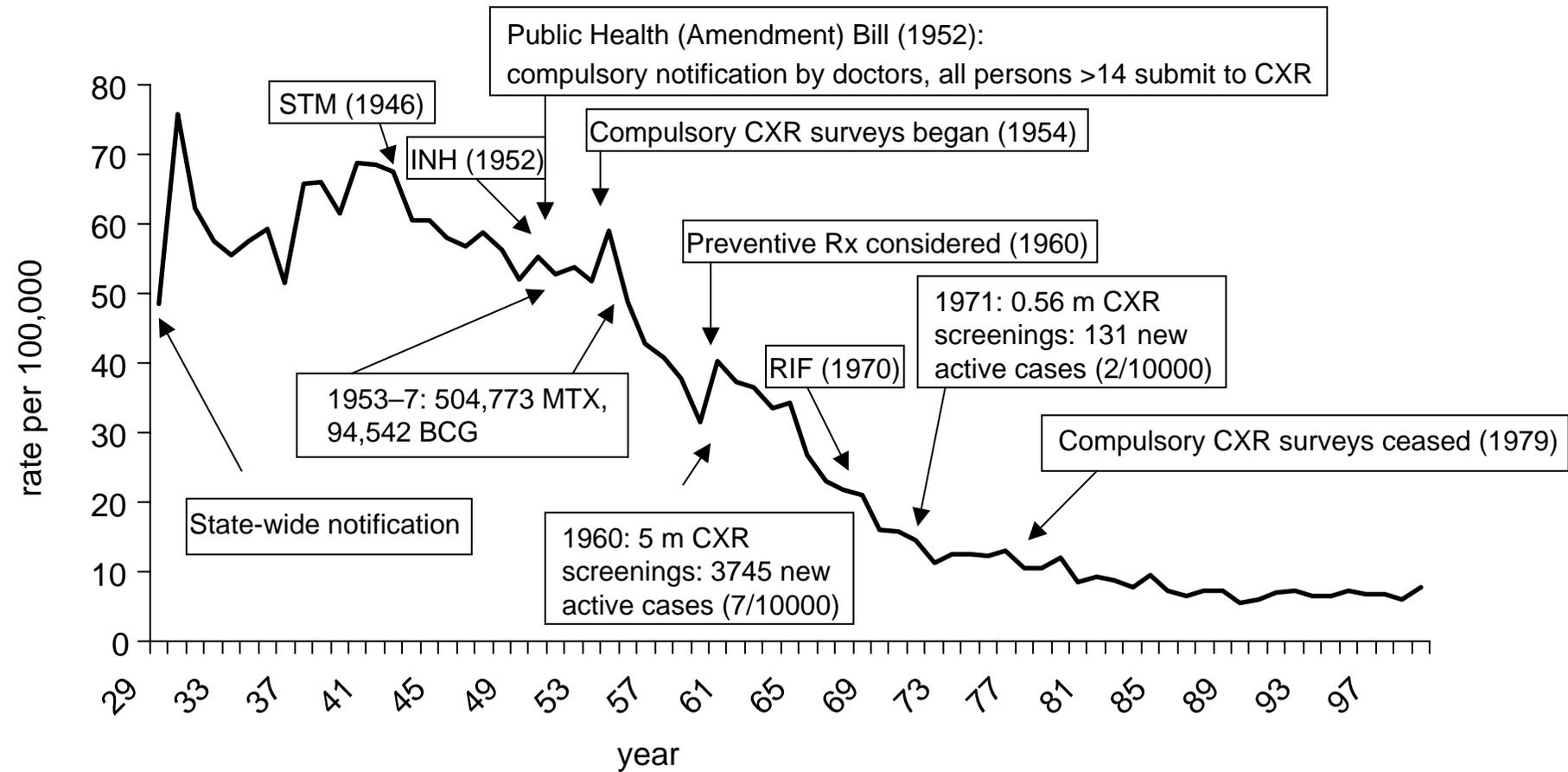
In 2000, the incidence of tuberculosis was much higher among people living in the Sydney metropolitan area, reflecting the fact that most people from high prevalence countries tend to initially settle in Sydney (Table 2). The incidence was similar by sex, but varied with age: it was highest among people aged 65 years and older, and lowest among children and adolescents. Preschool-aged children had a higher rate than older children. In 2000, Aboriginal or Torres Strait Islander people accounted for one per cent of patients. By birthplace, 83 per cent of cases were born overseas, mostly in Asia (64 per cent of all cases). The rate of disease was lowest in people born in Australia, and highest among people born in Asia. A similar pattern was seen for the decade 1991–2000. The proportion of patients who were born in Australia has steadily declined in the last 10 years, from 21 per cent in 1991 to 17 per cent in 2000.

Disease

In 2000, the most common reported site of disease was the lung, followed by the lymphatic system, and the pleura. Reporting of the site of disease has improved in recent years, and the pattern is similar to that reported for 1991–2000 (Table 3). For 2000, case classification was reported as new disease for 87 per cent, reactivated for seven per cent, and was not reported for six per cent.

FIGURE 1

NOTIFICATIONS OF TUBERCULOSIS, 1929-2000, NSW, WITH DATE OF SELECTED POLICY CHANGES HIGHLIGHTED



STM = streptomycin therapy introduced	BCG = BCG vaccinations administered
INH = isoniazid therapy introduced	CXR = chest x-ray
RIF = rifampicin therapy introduced	RX = therapy
MTX = Mantoux test done	

TABLE 1**PATIENTS NOTIFIED AND HOSPITALISED, AND THOSE PATIENTS WHO DIED WITH TUBERCULOSIS, NSW, 1991–2000**

Case characteristics	Notified cases	Rate/100,000	Hospital admissions (% of cases)	Notified deaths (% of cases)
Year of onset				
1991	430	7.3	63 (15)	9 (2)
1992	394	6.6	143 (36)	20 (5)
1993	389	6.5	216 (56)	28 (7)
1994	394	6.5	205 (52)	24 (6)
1995	443	7.2	225 (51)	22 (5)
1996	410	6.6	191 (47)	16 (4)
1997	422	6.7	227 (54)	16 (4)
1998	383	6.0	204 (53)	27 (7)
1999	483	7.5	227 (47)	25 (5)
2000	433	6.7	210 (48)	39 (9)
Total	4181	6.8	1911 (46)	226 (5)

TABLE 2**CHARACTERISTICS OF PATIENTS NOTIFIED AS HAVING TUBERCULOSIS, NSW, 1991–2000**

Case characteristics	Cases 1991–2000 (% total)	Cases in 2000 (% total)	Rate/100,000 In 2000
Total	4181 (100)	433 (100)	
Residence			
Sydney area	3523 (84)	389 (90)	10.6
Other NSW	615 (15)	43 (10)	1.6
Overseas/unknown	43 (1)	1 (<1)	
Sex			
Male	2198 (53)	215 (50)	6.7
Female	1971 (47)	218 (50)	6.7
Age group			
<5	144 (3)	14 (3)	3.3
5–9	57 (1)	2 (<1)	0.4
10–14	47 (1)	1 (<1)	0.2
15–19	119 (3)	4 (1)	0.9
20–24	334 (8)	44 (10)	9.9
25–44	1593 (38)	169 (39)	8.6
45–64	857 (20)	98 (23)	6.7
65+	1030 (25)	101 (23)	12.2
Aboriginal or Torres Strait Islander	34 (<1)	6 (1)	5.1
Region of birth (1995–2000)			
Australia	620 (18)	72 (17)	1.4
Europe	370 (11)	29 (7)	4.0
Asia	1944 (58)	278 (64)	60.1
Middle East	60 (2)	12 (3)	11.3
Africa	79 (2)	10 (2)	13.5
Oceania	129 (4)	21 (5)	13.5
Americas	38 (1)	6 (1)	6.8
Not reported	117 (3)	5 (1)	
(Total)	3357 (100)	433 (100)	6.7

TABLE 3**CLINICAL CHARACTERISTICS OF PATIENTS NOTIFIED AS HAVING TUBERCULOSIS, NSW, 1991–2000**

Case characteristics	Cases 1991–2000 (% total)	Cases in 2000 (% total)
Total	4181 (100)	433 (100)
Main site		
Lung	2111 (50)	251 (58)
Lymphatics	546 (13)	70 (16)
Pleura	160 (4)	37 (9)
Kidney–genito-urinary	117 (3)	5 (1)
Bone–joint	106 (3)	12 (3)
Gastro-intestinal	48 (1)	5 (1)
Central nervous system	41 (1)	6 (1)
Other	193 (5)	17 (4)
Not reported	859 (21)	30 (7)
Case classification		
New diagnosis	3135 (75)	376 (87)
Reactivation	230 (6)	29 (7)
Not reported	816 (20)	28 (6)
Laboratory confirmed		
Pulmonary cases only	2967 (71)	339 (78)
	2164 (100)	254 (100)
Direct smear positive		
Yes	711 (33)	99 (39)
No	730 (34)	114 (45)
Not reported	723 (33)	41 (16)
Culture positive		
Yes	1004 (46)	142 (56)
No	437 (20)	71 (28)
Not reported	723 (33)	41 (16)

Over three quarters (78 per cent) of all cases were reported to have been confirmed by laboratory tests (Table 2).

Sputum

In 2000, 254 cases were reported to have pulmonary disease. Of these, sputum microscopy results were reported for 84 per cent. Of the 254 cases, acid fast bacilli (AFBs) were identified in 39 per cent on direct sputum smears, and 56 per cent were reported to have *M. tuberculosis* cultured in the sputum.

HIV co-infection

For 1991–2000, HIV co-infection was reported in 63 patients, including eight patients in 2000. Tuberculosis is one of 26 illnesses that, when combined with HIV infection, defines the Acquired Immune Deficiency Syndrome.

Drug resistance

For cases notified in 2000, drug sensitivities were reported incompletely. Twenty-four patients were reported to have organisms resistant to isoniazid, three patients had organisms resistant to pyrazinamine, and six patients had organisms resistant to rifampicin. There were six patients

with multi-drug resistant tuberculosis (with resistance to at least isoniazid and rifampicin). These patients ranged in age from 22 to 73 years, and half were male. Five were born in Asia, and one was born in the Pacific Islands. One patient had tuberculosis that was resistant to isoniazid and rifampicin alone, three had tuberculosis that was resistant to isoniazid, rifampicin, and rifabutin, and two had tuberculosis resistant to these and other drugs. The management of these cases was reviewed by the state Multi Drug Resistant Tuberculosis Advisory Committee.

Hospitalisations and deaths

Of the 433 cases of tuberculosis notified in 2000, just under half were hospitalised (Table 1). In the same year, 39 patients (nine per cent) died, although not necessarily of tuberculosis. Two thirds of the patients who died were 70 years of age or older. For the decade 1991–2000, 46 per cent of patients were reported to have been hospitalised, and five per cent were reported to have died.

DISCUSSION

The incidence of tuberculosis in NSW has remained steady for the last two decades. On one hand this is frustrating, in that NSW has been unable to sustain the rate of decline of the disease established in the 1950s and 1960s. On the other hand it is reassuring, because it reflects a modest decline in the local transmission of the disease given the proportional increase in cases among people who have lived in high prevalence countries.

These data are limited by incomplete reporting of some types of information, notably drug resistance patterns and sputum results. In an effort to improve the reporting of these data, the NSW Department of Health will introduce a new data checking system in 2002, whereby the area health services will be asked to forward hard copies of notifications and test results to the Communicable Diseases Surveillance and Control Unit for review.

The surveillance, treatment, and prevention of tuberculosis still challenges public health professionals around the world. The control of tuberculosis depends on effective collaboration among general practitioners and specialist doctors, laboratories, chest clinic staff, public health units, the NSW Department of Health, and affected patients and communities.

ACKNOWLEDGEMENTS

We acknowledge the role of the staff of chest clinics, public health units, laboratories, and doctors, in collecting and reporting data on NSW tuberculosis cases.

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RABIES AND BAT LYSSAVIRUS INFECTION

WHAT IS LYSSAVIRUS?

Lyssaviruses are a group of viruses that include rabies and bat lyssavirus.

Rabies is an infection of mammals that are able to bite and scratch. While it occurs in many parts of the world, it does not occur in Australia. Infection with rabies can sicken and kill the affected mammal, and when people are infected they usually die.

Bat lyssavirus is a virus that is related to, but is different from rabies. In Australia, the virus is carried by bats. It rarely infects humans. Only two cases of human infection with bat lyssavirus have been recorded in Australia, both in Queensland in the mid-1990s. Both died.

WHAT ARE THE SYMPTOMS?

Rabies and bat lyssavirus are thought to cause similar symptoms. These include headache, fever, malaise, sensory changes around the site of the bite or scratch, excitability, an aversion to fresh air and water, weakness, delirium, convulsions, and coma. Death usually follows several days after the onset of symptoms.

HOW ARE THEY SPREAD?

Both rabies and bat lyssavirus are spread from infected mammals to people or other mammals through bites or scratches. Biting or scratching can inject the viruses—which are contained in the animal's saliva—into the exposed person's body.

Overseas, mammals that carry rabies include: bats, dogs, cats, raccoons, skunks, monkeys, and other mammals that can bite and scratch. Australian mammals do not carry rabies. In Australia, only bats—both the larger flying foxes (or fruit bats) and the smaller insectivorous (or micro) bats—have been found to carry bat lyssavirus.

WHO IS MOST AT RISK?

For rabies, people overseas who come into contact with wild mammals that bite and scratch—and domestic mammals that have not been vaccinated against rabies—are at increased risk of the disease. Rabies infects many local people overseas, and has infected some Australians travelling or living overseas. Areas free of rabies in the year 2000 include Australia, New Zealand, New Guinea, Japan, Hawaii, Taiwan, Oceania, parts of Europe, parts of the West Indies, and islands in the Atlantic Ocean.

In Australia, people who handle bats are at risk of bat lyssavirus infection.

HOW IS IT DIAGNOSED AND TREATED?

Diagnosis can be difficult, and confirmation requires laboratory tests for the presence of the virus in skin, blood,

spinal fluid, and nervous tissue or other tissue. There is no cure once the disease begins.

HOW IS IT PREVENTED?

Unless it is part of your job, and you have been trained in and use the proper protective equipment, do not attempt to handle wild mammals. Bat lyssavirus and rabies are only two of the many infections that animals can transmit to people.

Thoroughly washing any wounds caused by animals, and applying an antiseptic solution such as povidone-iodine will help prevent infection.

Rabies vaccine helps prevent both rabies and bat lyssavirus infection. People who handle or come into contact with bats in Australia—for example, bat carers, wildlife officers, and veterinarians; or people travelling overseas who plan to handle any unvaccinated mammal that can bite and scratch—should receive a course of vaccine from their local doctor. There will be a charge for the vaccine.

Even if you have not been vaccinated beforehand, a post-exposure course of rabies vaccine, along with another injection called rabies immunoglobulin, can prevent infection if given soon after the bite or scratch.

If you are bitten or scratched by a bat in Australia, or by a wild mammal (or any unvaccinated animal) overseas:

- thoroughly wash the wound immediately with soap and water;
- apply an antiseptic solution;
- see a doctor as soon as possible to care for the wound, and to assess whether you might be at risk of infection;

If you are at risk of infection, then you will need to have a course of rabies vaccine and rabies immunoglobulin. In NSW, post-exposure vaccine is provided free to doctors through public health units.

After a bite or scratch from an infected mammal you will still need to be revaccinated, even if you have been vaccinated beforehand. However, you will only need booster shots of the vaccine.

If you find an injured or distressed bat, do not attempt to handle it yourself, but call your local wildlife rescue service.

For further information please contact your local public health unit, community health centre, or doctor.

January–February 2002 ☞

COMMUNICABLE DISEASES REPORT, JANUARY–FEBRUARY 2002

TRENDS

Notifications of communicable diseases through to November are noteworthy for the expected seasonal declines in **influenza**, **invasive pneumococcal disease**, and **meningococcal disease** (Figure 1, Table 1). However, declines in notifications of gonorrhoea and pertussis depicted in Figure 1 probably owe more to reporting delays than to real declines in incidence.

With the onset of summer, NSW can expect a marked increase in disease caused by the mosquito-borne arboviruses **Ross River virus** and **Barmah Forest virus**, mainly in rural areas and possibly in the bushland areas on the outskirts of Sydney. It is therefore timely to remind

people living in those areas, or who plan to visit those areas in the holidays, to protect themselves against infection by:

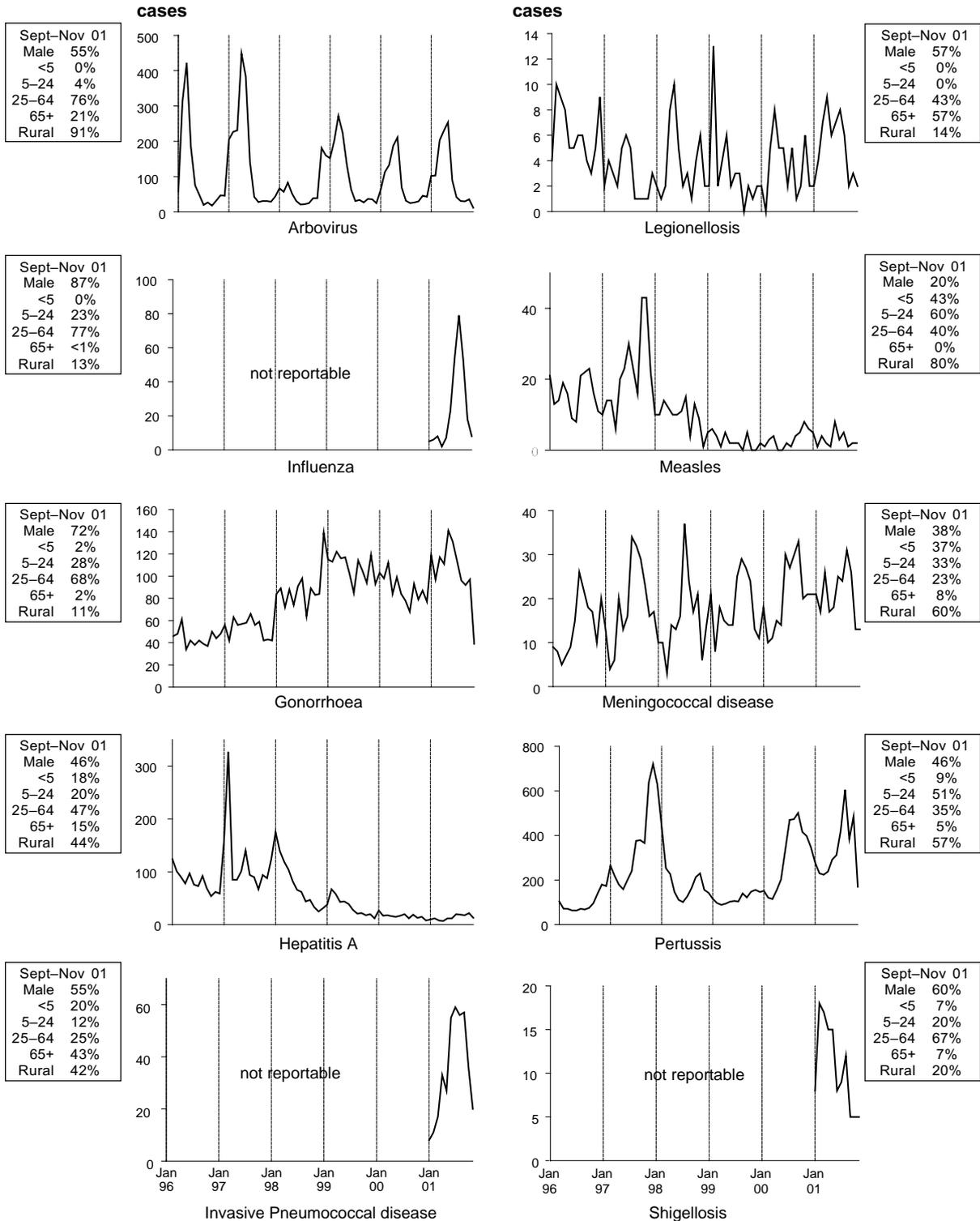
- ensuring that screens on their windows and doors are in good repair to protect against insects;
- avoiding going outdoors when mosquitoes are common (especially around dusk and dawn) unless they are protected against mosquito bites;
- protecting themselves against mosquito bites by wearing loose fitting clothes that cover their arms, legs and feet; and by applying insect repellent to exposed skin;
- using insect sprays to kill any mosquitos in the house before going to bed. ☼

FIGURE 1

REPORTS OF SELECTED COMMUNICABLE DISEASES, NSW, JANUARY 1996 TO NOVEMBER 2001, BY MONTH OF ONSET

These are preliminary data: case counts for recent months may increase because of reporting delays. Laboratory-confirmed cases, except for measles, meningococcal disease and pertussis.

NSW population	
Male	50%
<5	7%
5-24	28%
25-64	52%
65+	13%
Rural*	42%



* For definition, see *NSW Public Health Bulletin*, April 2000

TABLE 1 REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN NOVEMBER 2001 BY AREA HEALTH SERVICES

Condition	Area Health Service (2001)																	Total		
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	CHS	for Nov [†]	To date [†]
Blood-borne and sexually transmitted																				
AIDS	-	2	1	-	-	1	1	1	7	2	-	-	-	-	-	-	-	-	15	99
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	30	25	40	17	1	4	19	15	63	23	14	6	10	4	3	9	4	4	295	4,076
Gonorrhoea*	13	8	3	1	-	-	1	-	53	1	2	1	1	-	-	-	-	-	84	1,210
Hepatitis B - acute viral*	-	1	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	5	74
Hepatitis B - other*	43	39	6	9	1	9	5	10	56	3	1	-	1	1	1	2	-	1	189	4,147
Hepatitis C - acute viral*	1	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-	1	5	178
Hepatitis C - other*	90	46	17	39	81	34	47	38	78	26	22	7	7	6	-	13	8	26	589	8,048
Hepatitis D - unspecified*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12
HIV infection*	1	1	1	-	2	-	-	-	5	-	1	-	-	-	-	-	-	-	11	382
Syphilis	7	4	9	3	-	1	-	4	19	2	-	-	1	1	-	-	1	2	54	690
Vector-borne																				
Barmah Forest virus infection*	-	-	-	-	-	-	1	-	-	3	2	-	1	-	-	2	1	-	10	384
Other arboviral infections*	-	2	-	-	-	-	1	-	-	-	2	-	-	-	-	-	1	-	6	62
Ross River virus infection*	-	-	-	-	-	-	2	-	-	4	1	-	1	-	4	-	-	-	12	754
Malaria*	-	1	2	-	-	1	2	-	-	1	-	-	-	-	-	-	-	-	7	138
Zoonoses																				
Anthrax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptospirosis*	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	65
Lyssavirus*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	3	32
Q fever*	-	-	-	-	-	-	4	-	-	4	3	-	4	-	1	-	-	-	16	141
Respiratory and other																				
Blood lead level*	-	1	-	1	-	-	13	8	2	-	1	-	1	-	5	1	-	-	33	473
Influenza*	-	2	1	2	1	-	4	1	2	-	1	-	-	-	-	-	-	-	14	264
Invasive pneumococcal infection*	-	4	6	3	-	2	6	-	1	-	-	1	-	2	-	7	-	-	32	380
<i>Legionella longbeachae</i> infection*	1	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	27
<i>Legionella pneumophila</i> infection*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32
Legionnaires' disease (other)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Meningococcal infection (invasive)	2	-	-	-	2	2	-	-	1	1	1	-	3	2	-	-	-	-	14	237
Tuberculosis	4	5	5	-	3	-	-	1	10	-	1	-	-	-	-	-	-	-	29	354
Vaccine-preventable																				
Adverse event after immunisation	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	1	-	-	4	86
H.influenzae b infection (invasive)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Measles	-	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-	-	3	35
Mumps*	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	27
Pertussis	16	42	42	42	26	10	83	19	41	68	12	6	29	24	3	19	9	-	491	3,936
Rubella*	-	-	1	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	4	63
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Faecal-oral																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cryptosporidiosis*	-	-	2	-	-	-	-	1	1	-	2	-	-	-	-	1	-	-	8	151
Food borne illness (not otherwise specified)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31
Gastroenteritis (in an institution)	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	450
Giardiasis*	-	8	10	4	-	1	10	5	11	2	7	4	-	-	3	1	-	-	66	907
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Hepatitis A*	1	3	6	-	-	-	-	1	5	-	-	-	-	-	-	-	-	-	16	164
Hepatitis E*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Listeriosis*	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	13
Salmonellosis (not otherwise specified)*	5	8	1	7	-	2	8	4	18	15	9	1	3	2	1	6	3	-	93	1,507
Shigellosis*	-	3	-	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	8	118
Typhoid and paratyphoid*	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	40
Verotoxin producing E. coli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* lab-confirmed cases only

† includes cases with unknown postcode

CSA = Central Sydney Area
NSA = Northern Sydney Area
WSA = Western Sydney AreaWEN = Wentworth Area
SWS = South Western Sydney Area
CCA = Central Coast AreaHUN = Hunter Area
ILL = Illawarra Area
SES = South Eastern Sydney AreaNRA = Northern Rivers Area
MNC = North Coast Area
NEA = New England AreaMAC = Macquarie Area
MWA = Mid Western Area
FWA = Far West AreaGMA = Greater Murray Area
SA = Southern Area
CHS = Corrections Health Service

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