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BLUE-GREEN ALGAE HIT LAKE CARGELLIGO

Australia has had its first instance of the prohibition for human consumption of a town water supply because of a bloom of toxin-producing blue-green algae. The Department of Water Resources issued a media warning on November 20 last year that a high concentration of the potentially toxic blue-green algae, species *Anabaena circinalis*, had been detected in the water of Lake Cargelligo, 570km west of Sydney. On November 25 the Lachlan Shire Council warned that people should not drink water from the lake, even if boiled, because the algal toxin is heat stable.

Some of these algae produce powerful liver and neurotoxins[1]. Livestock deaths have occurred when thirsty animals were forced to drink the algal scum. In humans there have been some reports of illness caused by blue-green algae, also called cyanobacteria. Swimmers and canoeists have reported hay-fever like reactions, rash, eye irritation and pneumonia[2].

In 1979 a major outbreak of diarrhoea possibly associated with mild liver damage occurred in an Aboriginal community on Palm Island in Queensland after copper sulphate was used to treat a bloom of cyanobacteria in the local reservoir[3]. It is probable that this treatment caused the large amounts of toxin to be suddenly released into the water. Problems of odour and taste caused by algae have been reported in the water supply of a number of towns in rural NSW and Victoria.

The most abundant bloom-forming species of blue-green algae in Australia are *Microcystis aeruginosa* and *Anabaena circinalis*. About half the blooms are toxic. Unfortunately, the only method available to assay toxicity is to inject dried algal extract into mice. This is a time-consuming procedure which is performed at only one centre in NSW. But other test tube methods, such as high performance liquid chromatography and ELISA antibody tests, are being developed.

Three communities — Lake Cargelligo, Tullibigeal and Murrin Bridge — with a total population of 2000, draw their water directly from the lake. However, 40 per cent of houses in these communities are also served with rainwater tanks. Despite the contamination, the town water supply was not shut off because of the extreme fire danger in the area at the time. The Central West Public Health Unit continued to issue warnings about the hazards of drinking town water, assisted by local community groups.

Drinking water was delivered in tankers to Lake Cargelligo from Condobolin, 100km away.

Records of absenteeism for gastrointestinal illness from October 28 to November 30 were examined for 563 children attending the schools and preschools at Lake Cargelligo and Tullibigeal. There were reticulated and tank water outlets in the school playgrounds, making it impossible to determine whether children had consumed

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FIREARM INJURIES IN NSW

Debate on the relationship between gun ownership and preventable serious injury re-emerged after the shotgun deaths of seven people at Strathfield Plaza in Sydney in August and other firearm-related incidents in the following weeks. In view of these developments we reviewed the available mortality and hospital statistics collections to prepare a profile of firearm injuries in NSW. This report focuses on the numbers and trends in serious injury caused by firearms since 1969 and examines the role of firearms in suicide and homicide.

We extracted information on firearm-related deaths and hospital admissions from the NSW mortality data for the years 1969 to 1988 and the Inpatient Statistics Collection for the calendar years 1983, 1986 and the financial year 1988-9. We obtained mortality data from the Registrar of Births, Deaths and Marriages and reported them according to year of death between 1969 and 1987, and year of registration for 1988. A list of external cause codes used to identify firearm injury cases is contained in Table 1.

SERIOUS INJURY

In NSW each year an estimated 450 people are injured by firearms and either die or are admitted to hospital. In most cases the injuries are intentional, either being self-inflicted or the result of interpersonal violence. A smaller, but significant, number of cases is unintentional in nature. Importantly, nearly half serious firearm injury incidents result in death.

Deaths

In NSW for the five years between 1984-88 there were 1041 deaths caused by firearms, giving an annual figure of about 210 deaths. Firearms (8 per cent) ranked third as a cause of injury-related death after motor vehicle crashes (35 per cent) and falls (12 per cent), and caused more deaths than poisoning (4 per cent), drowning (4 per cent), fire (2 per cent) and bicycle accidents (1 per cent) (Figure 1).

These data indicate that males are 6.5 times more likely to die from a gunshot wound than females and that young people are at greatest risk from firearms with a death rate in the 15-24 age group of 5.7/100,000/year (Figure 2).

The fatality rate in urban residents was 2.7/100,000/year between 1984-88, while the rate for rural inhabitants was 6.1/100,000/year, making rural residents 2.3 times more likely to die from this cause.

Three-quarters of firearm deaths were attributed to suicide, 20 per cent to interpersonal violence and 5 per cent to other causes such as police intervention, unintentional firearm deaths or undetermined in nature.

The number of firearm-related deaths has remained relatively stable since 1970. This means the crude mortality rate declined by less than 1 per cent a year from a three-year running average of 4.2/100,000 in 1970 to 3.7/100,000 in 1987 (Figure 3).

TABLE 1

EXTERNAL CAUSE CODES USED TO IDENTIFY FIREARM INJURIES

Type of Firearm Injury	ICD-9	ICD-8
Homicide	9650-9654	9650-9659
Suicide	9550-9554	9550-9559
Unintentional	9220-9229	9220-9229
Undetermined purpose	9850-9854	9850-9859
Legal intervention	9700-9709	9700-9709

Hospitalisations

In NSW during the 1988-9 financial year, 244 hospital separations were due to firearm injuries. These cases accounted for less than 1 per cent of the total hospital admissions for injury that year and they occupied 2158 hospital bed days (with stays ranging from one day to more than three months). Males with gunshot wounds outnumbered females five to one.

In contrast to firearm deaths, only a small proportion of the hospital cases had injuries that were caused intentionally; 15 per cent of all cases with firearm injury were self-inflicted and 11 per cent due to interpersonal violence. In most cases (65 per cent) the injury was unintentional and in 9 per cent the intent was undetermined.

The number of hospitalisations attributed to firearm injury fell in the 1980s. In 1983, there were 398 admissions due to gunshot wounds in NSW hospitals. The number of admissions subsequently fell to 322 in 1986 and 244 in 1988-9, a 40 per cent reduction on 1983 numbers. A closer examination of the data reveals the decline occurred only for unintentional firearm injuries, which fell from 301 admissions in 1983 to 159 in 1988-9. It is not clear whether this reflects a change in admission policy or a major decline in the number of serious cases.

INTENTIONAL INJURY

Self-inflicted injury

Most cases of serious firearm-related injury were self-inflicted. Self-inflicted injuries accounted for 75 per cent of firearm deaths and 15 per cent of the hospital admissions. About 190 people each year make a serious suicide attempt using a firearm and around 80 per cent of these attempts result in death.

In the broader context of suicide, firearm-related suicides accounted for 24 per cent of the 3124 suicides recorded between 1984 and 1988 in NSW. Firearms were the most common agents used in male suicides (29 per cent).

Interpersonal violence

The use of firearms intentionally to injure other people was responsible for 20 per cent of firearm-related deaths and 11 per cent of hospital admissions. About 70 people are seriously wounded by firearms as the result of interpersonal violence each year and

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an estimated 60 per cent of these victims die from their injuries. Furthermore, the 204 firearm homicides in 1984-88 represented 37 per cent of the total of 542 homicides recorded during that time.

UNINTENTIONAL INJURY

In most hospital admissions for firearm-related injuries, the shootings were unintentional in nature (65 per cent) while less than 5 per cent of the deaths were similarly classified. Overall, there were around 200 serious unintentional firearm injuries in NSW during 1988-9. This figure appears to have fallen quite dramatically during the 1980s. Less than one in twenty of the serious injuries in this category resulted in death.

WHERE TO FROM HERE

Firearm injuries are a significant problem in NSW; they rank third as a cause of injury death, and cause an estimated 450 serious injuries a year. Of particular concern are the high rates for young people, males and rural residents, and the major role of firearms in intentional injury. An attempted suicide with a firearm has an 80 per cent chance of succeeding. In addition, the number of firearm deaths has remained relatively stable since the late 1960s, while other major causes of injury death — such as motor vehicle crashes — have declined dramatically.

To generate further information to guide prevention strategies for firearm injuries we will:

- analyse data (including more recent data) relating to the magnitude, characteristics and circumstances of firearm injuries;
- obtain information about the number, type and distribution of firearms in NSW, including regulations relating to firearm ownership and use;
- monitor the impact of changes in firearm regulations and other interventions on firearm injuries and deaths; and
- review the international literature.

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FIGURE 1

MAJOR CAUSES OF INJURY-RELATED DEATHS NSW, 1984-1988

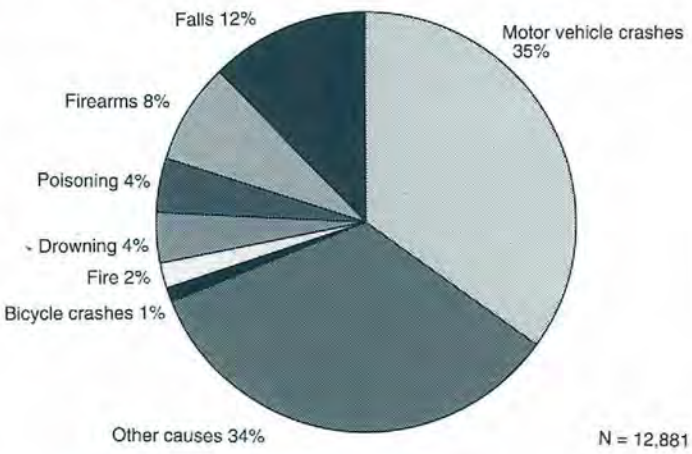


FIGURE 2

FIREARM-RELATED DEATHS BY AGE AND SEX NSW, 1984-1988

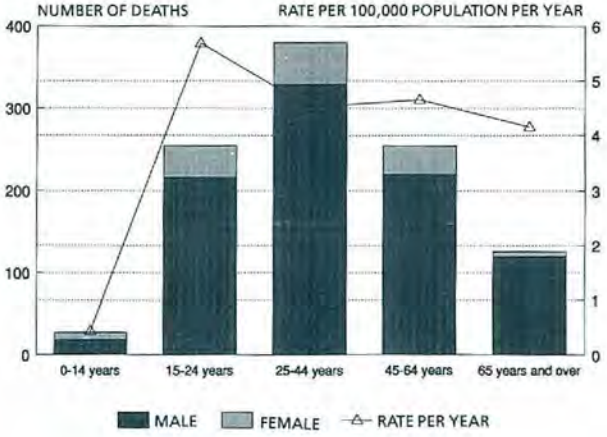
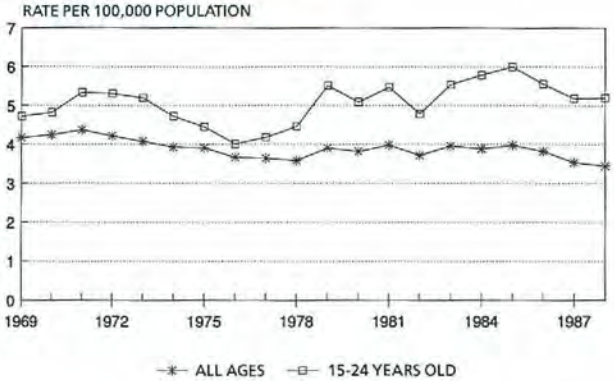


FIGURE 3

FIREARM-RELATED MORTALITY RATES (THREE-YEAR MOVING AVERAGE) NSW, 1969-1988



NITRATES IN BORE WATER: CAUSE

In June 1991 a member of a large extended family living on a small hobby farm near Oberon, NSW, contacted the Orana and Far West Public Health Unit for advice about the family's bore water supply. Tests conducted on water drawn from a bore on the property showed that it contained 38mg/L nitrate (as nitrogen) and was unfit to drink. On the day these results became available the family switched to drinking rainwater exclusively. Within a few days of doing this, health problems experienced by the whole family disappeared.

All 10 family members, ranging in age from 6 to 65, had a six-month history of symptoms of breathlessness, fatigue, chest pain and muscle cramps (Figure 1). The three adult males were employed and spent most of their weekdays away from the farm. Two of the men had relatively minor symptoms. The third male was the most severely affected family member. He also worked in town but he drank large quantities of tea and coffee while at home (20-30 cups a day). He had severe and persistent muscle cramps for more than six months. A subsequent muscle biospy was normal. All female family members spent most of their time on the farm and the children were educated at home. The family had consulted its local general practitioner who corroborated this history. Sheep and peacocks on the property also drank bore water and have been unwell.

The family has lived on this farm for three years. Its members eat a mixed diet of meat and vegetables. Spinach and lettuce are grown in the garden and watered with bore

Blue-green algae at Lake Cargelligo

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TABLE 2

SYMPTOMS AMONG 95 LAKE CARGELLIGO SCHOOL CHILDREN

Nausea	74 (79%)
Abdominal cramp	57 (60%)
Headache	54 (57%)
Vomiting	37 (39%)
Fever	12 (13%)

contaminated water. Ninety-five children (17 per cent) were ill during this period. The frequency of reported symptoms is shown in Table 2.

The two medical practitioners at Lake Cargelligo had seen about 20 adults and children in the previous month with symptoms believed to be those of viral gastroenteritis. Two instances of conjunctivitis and one of a rash had been attributed to swimming in the lake. Liver function tests were performed in eight of these people and all results were normal. In the four patients in whom viral blood tests were performed, the results were inconclusive.

On December 24 the Lake Cargelligo water supply was proclaimed safe for human consumption. The bloom of *Anabaena* disappeared but of concern was a subsequent bloom of another potentially toxic algae, *Microcystis*. The NSW Department of Water Resources predicted that blue-green algal blooms are likely to recur in Lake Cargelligo this summer. Weekly monitoring and toxicity assays are to be instituted.

EDITORIAL NOTE

Ensuring the provision of uncontaminated drinking water has been a canon of public health practice since the time of John Snow. Across much of the Australian continent potable water supplies are threatened by the eutrophication of our inland lakes and rivers. Eutrophication is an alteration in the balance of nutrients such as phosphates in these waterways, favouring the proliferation of blue-green algae (cyanobacteria) and other unwanted micro-organisms. The major causes of eutrophication are phosphate- and nitrate-based fertilisers and sewage from human population centres and livestock. Australian Bureau of Statistics data[4] indicate that total tonnage of superphosphate fertilisers used in the Central West of NSW increased by 21.8 per cent in the two years from 1986 to 1988. Even more significantly, the use of superphosphate fertilisers in the Central Tablelands statistical subdivision, where the Lachlan River which flows into Lake Cargelligo rises, increased by 94.3 per cent in the same period.

The most likely explanation of the apparent infrequency of human illness caused by algal toxins is that the unpleasant taste and odour of the contaminated water is an effective deterrent to ingestion. The potential toxicity of long-term, low-dose exposure to these toxins or their effect on sensitive subgroups in the population is unknown.

The Palm Island incident is an illustration of why copper sulphate has fallen into disrepute as an effective treatment for algal blooms. Furthermore, the elimination of one species, as was seen in Lake Cargelligo, can rapidly be followed by an overgrowth of a different species. Rainfall or increased flows can flush out a bloom. Individual town water supplies can be secured by the installation of charcoal filtration systems. In the long term, prevention of eutrophication of inland waterways will depend on changes in methods of waste water treatment, agricultural and land management practices.

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Acknowledgements: We are thankful for the assistance and advice received from Mr D. Clarke, Chief Executive Officer of Lake Cargelligo Hospital, and his staff; Mr G. Thomas, Eastern Area Health Services; Mrs K. Stenhouse, Lake Cargelligo Central School; the staff of Applied Chemical Laboratories, Sydney; Dr D. Fox and Dr S. Corbett of the NSW Health Department.

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water. No artificial fertilisers are used on the land. Neighbouring land is used to graze cattle and some artificial fertilisers are used on this property. The bore was sunk to only five metres and was on the side of gently sloping land below another farm. It was the only source of drinking water for this family and the animals on the farm.

Water from the bore was tested not because of the presence of symptoms, but for water hardness before the family installed a new hot water system. The family was advised on June 26, 1991 that the water was unfit to drink because of high levels of nitrate. The level of 38mg/L of nitrate (as nitrogen) exceeds the maximum level recommended by the National Health and Medical Research Council (NH&MRC) in Australia for nitrate in drinking water of 10mg/L[1]. The water also contained high levels of calcium salts. No faecal coliforms or other organisms were detected in the water.

Shallow bores such as the one on this property can easily become contaminated during periods of flooding by run-off containing chemical fertilisers uphill from the bore. A reported flood in the area in August 1990 could have caused a rapid increase in nitrate levels of the bore water, but the source of the nitrate contamination in this bore is unknown.

The symptoms experienced by family members may have been due to chronic methaemoglobinaemia (MHA) caused by high levels of nitrate in their drinking water. However, blood taken from one family member five weeks after the family switched to drinking rainwater contained no methaemoglobin (MetHb). Nitrates may also cause some of these symptoms independently of their ability to oxidise haemoglobin (Hb). Although other causes for these symptoms have not been excluded, the high nitrate levels, more severe symptoms in those with the greatest exposure and the rapid disappearance of symptoms in all family members after they stopped drinking bore water support this conclusion.

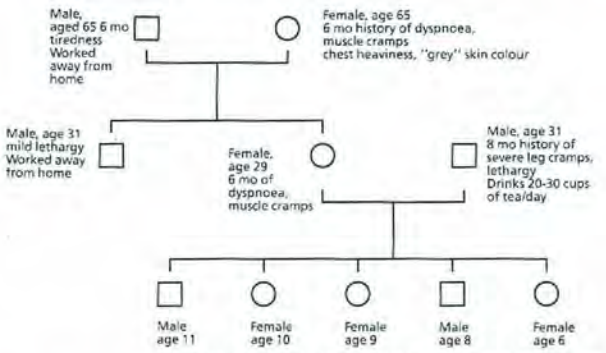
Reports of MHA in adults are rare. It causes symptoms of lethargy and breathlessness when it comprises 30-45 per cent of total Hb[2]. In adults, the dose of nitrates needed to produce these levels of MHA is unknown. The estimated total daily intake of nitrates (as nitrogen) in an average western diet is 75mg/person/day[3]. Water usually contributes only 3-5 per cent of this total. Assuming that the adults in this family consumed two litres of water daily, the average daily consumption of nitrates would have been about 150mg/day.

EDITORIAL NOTE

Nitrates are not essential for normal human function and are present in most diets and in drinking water. Some foods such as spinach, rhubarb, carrots, lettuce and preserved meats contain high levels of nitrates[4]. Surface water rarely contains high levels of nitrates as they are metabolised by plants. Ground water, however, may contain high levels. Nitrates can enter underground aquifers through seepage from surface water contaminated with human and animal waste (eg from feedlots, farmyards and septic tank systems); from the run-off of nitrogenous fertilisers applied to the land; from rubbish dumps; and from the natural leaching of nitrates from the soil. Nitrate levels in ground water may rise rapidly in shallow bores when a period of drought is followed by heavy rain. Identification of the source of nitrates in water is difficult, and once dissolved in ground water, nitrates are not easily removed.

FIGURE 4

HISTORY OF ILLNESS IN AN EXTENDED FAMILY DRINKING NITRATE CONTAMINATED UNDERGROUND WATER



All children had a 6 month history of irritability, lethargy and muscle cramps

Levels of nitrates higher than the NH&MRC recommended levels have been reported in many places throughout the State in bores tested by the Department of Water Resources (DWR)[5]. Of 14,000 samples tested over the past 20 to 30 years, only 287 (or 2 per cent) were above 10mg/L, with the highest level recorded of 56mg/L. The problem of nitrate contamination, although widespread, is not common. The number of domestic bores licensed by the DWR is 18,379. There are 523 bores supplying town water. The known 17,856 bores used for private, domestic, stock and general purposes probably underestimates the real number by a factor of three or four[6]. The estimated number of people in rural NSW who rely on either rainwater tanks or water from private bores is 350,000. Bores providing town supplies are tested regularly by local councils and the Health Department and water is used only if nitrate levels are below 10mg/L. Many private bores are not tested regularly.

Methaemoglobinaemia is a rare condition which may be inherited or acquired through exposure to nitrates and nitrites, aniline dyes, sulfonamides and other chemicals. Nitrites are a potent cause of MHA. Nitrates are converted to nitrites by micro-organisms in soil, water, sewage and the human stomach.

In the acquired condition, chemical changes occur within red blood cells which reduce the ability of these cells to carry oxygen to the body's organs. Normal Hb is oxidised to MetHb, which cannot combine reversibly with oxygen. MHA occurs when the percentage of this oxidised form of Hb exceeds 2 per cent of the total Hb.

At levels of 10 per cent MetHb, shortness of breath and cyanosis can occur. At a methaemoglobin level of about 35 per cent, the affected individual experiences headache, weakness and breathlessness, although symptoms may vary according to the other effects of the particular agent involved. Levels higher than 80 per cent are probably lethal.

MetHb is spontaneously reduced to normal Hb in the body, with about half reverting spontaneously within about 24 hours. Babies and infants less than three months old are more susceptible to MHA for several reasons. First, the fluid intake of infants per unit body weight is about three times that of an adult and second, foetal Hb — which is the predominant form at birth — is more suspectible to MetHb formation than adult Hb. Infants are more vulnerable to

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QUALITY VERSUS QUANTITY

Quality Adjusted Life Years — QALYs — have been in the news lately because they offer a rational approach to the allocation of resources in health care. Spending the limited health care dollars on the cheapest QALYs will maximise the health gains obtained from the health care budget. Therefore reviewing spending in terms of its cost per QALY has a lot of appeal to those now confronting health care rationing.

Quality Adjusted Life Years are life years weighted to reflect their quality. QALYs were developed as a measure of benefit for use in economic evaluation. Cost benefit analysis, historically the first type of economic evaluation, requires that both costs and benefits are measured in money terms. That presents obvious difficulties in its application to health care where the benefits are the extension of life, the relief of pain and the reduction of disability. In health care, cost effectiveness analysis has been more widely applied than cost benefit analysis. In cost effectiveness analysis, the benefits of health care are measured in their naturally occurring "units" — most generally number of life years saved.

The problem with number of life years gained is that they do not capture all the benefits of health care, such as improved mobility after hip replacement. Nor do they distinguish between lives of different quality such as a normally functioning child compared to a child with blindness or intellectual handicap — both of which could be the outcome of neonatal intensive care. Life years gained fail to encompass all the benefits of health care interventions, where quality of life is the important objective, or to make explicit tradeoffs between quality and quantity of life.

QALYs were developed in an attempt to overcome these problems in cost effectiveness analysis. They measure quality of life on the same scale as quantity of life, so multiple objectives, such as prolonging life and improving its quality, can be combined in a single measure. The weight applied to life years to adjust them for quality is also referred to as a utility; hence the term cost utility analysis is often used to describe the form of economic evaluation in which QALYs are used to measure benefits[1].

The difference that QALYs might make is illustrated in Figure 5. The number of life years gained from treatment X is shown on the X-axis; in this example it is 15. If quality is also taken into account, as shown on the Y-axis, then the relevant measure is the area under the curve; in this example it is 9 QALYs.

MEASUREMENT PROPERTIES OF QALYS

The need to combine quantity and quality in one scale gives rise to some special measurement properties required for QALYs. First, quality must be measured by a weight between 0 representing no life years, and 1 representing fully functional life years. So the measurement of quality of life must be anchored to death — 0 and full health — 1. Note this does not preclude health states worse than death.

Second, the scale must have interval properties. That means a movement from .3 to .5 must be the same as a movement from .7 to .9 and both must be twice the value of a movement from .9 to 1.0. This ensures that .3 x 5 life years is worth the same as .5 x 3 life years.

There are several hundred scales which attempt to measure health related quality of life or health status. Examples include the Sickness Impact Profile[2], the Index of Activities of Daily Living[3] and the Spitzer QL Index[4]. But very few of these have the measurement properties such as interval scaling anchored to death and full health required for QALYs. Many of the scales are objective in that they try to measure what individuals can do, rather than their feelings. The authors of the Sickness Impact Profile, for example, state quite clearly that this instrument is measuring the behavioural impact of sickness on individuals and not how those individuals feel about their health state. In contrast, the purpose of QALYs is to measure how individuals feel about health states, or the strength of their preferences for health outcomes. QALYs are inherently subjective.

DO QALYS MEASURE QUALITY OF LIFE?

Quality of life, as the phrase is generally used, includes health but goes beyond health status to encompass economic and material circumstances, personal relationships, the physical environment and more. Clearly QALYs do not purport to embrace all of this. But the term quality adjusted and the use of quality of life as a synonym for it, has led to some confusion.

Some researchers have suggested that an alternative phrase would reduce this. Mehrez and Gafni have coined the phrase healthy year equivalent, while others use the phrase disability-free life expectancy.

There are two approaches to measuring QALYs: use one of the measures of health related quality of life that has the appropriate scaling characteristics, or measure health state preferences directly.

Three measures of health related quality of life are appropriate: the Quality of Well Being Index of Kaplan and Bush[5], the Rosser scale[6], and the Multi-Attribute Utility model of Torrance[1]. The Rosser scale, as modified by Williams and his colleagues at York, has been widely used in cost utility work in the UK to the extent that QALYs and the Rosser-York scale have become synonymous. Using an existing measure requires the health outcomes under consideration to be described in terms of that measure. But a general measure may be insensitive to some aspect of quality of life that is specific to a certain condition. For example, patients with cancer often report feeling socially isolated and treated as though cancer were contagious. None of the instruments cited is sensitive to this.

The alternative approach is to measure directly preferences for specific health outcomes. There are a number of measurement techniques, the most common being the standard gamble and the time trade-off. Under the former, individuals are asked to choose between a gamble on good health versus death and a life spent in a chronic ill-health state. The time trade-off requires individuals to trade off years in a chronic ill-health state for a shorter time in good health. The direct measurement of preferences is associated most strongly with the work of Torrance and his colleagues at McMaster University in Canada.

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This approach can involve quite extensive survey work to elicit preferences from patients and/or a general sample of the community. A short-cut is to use professional judgment, as exemplified in the work of Weinstein from Harvard[7].

Whichever approach is taken to measuring QALYs, cost utility analysis requires far more extensive data on the outcomes of health care and their duration than exist generally at present.

Criticisms of QALYs

It is important to distinguish criticisms of the measurement methods themselves from criticisms of the concept of QALYs per se. The Rosser-York scale has been extensively criticised on the basis of the measurement technique and the smallness of the sample used to derive the initial weights, and the apparent lack of sensitivity in those weights to changes in health state. More recent empirical work from York has thrown doubt on the validity of the initial weights.

Of all the approaches, it is not clear which should be accepted as the "gold standard", yet different measurement techniques give different answers. This has led some commentators to question why anyone bothers. The answer to that is simple: there are significantly different values attached to different outcomes, whatever technique is used. It is obvious that health related quality of life does matter.

What of the concept of the QALY itself? QALYs have been criticised as being biased against the elderly, as they have far fewer QALYs to gain than the young. It is true that a life saved at age 60 will result in fewer life years gained than a life saved at age 30 — if both live their normal lifespan. It is important to remember that it is life years gained that are considered here, not total future life years. Quality adjusting those life years takes into account the relief of chronic non-fatal disease which is more likely to be experienced by the elderly. Comparisons on the basis of cost per QALY have shown that hip replacements and chiropody for over 75-year-olds are much more efficient than transplants or heart surgery.

QALYs are egalitarian in that a QALY gained is a QALY gained irrespective of who receives it. This egalitarian distribution rule may not reflect social attitudes of what is the desired distribution. Gains for the elderly may not be valued as highly as gains for the young; gains for the very young may not be valued as highly as gains for the adult with family responsibilities.

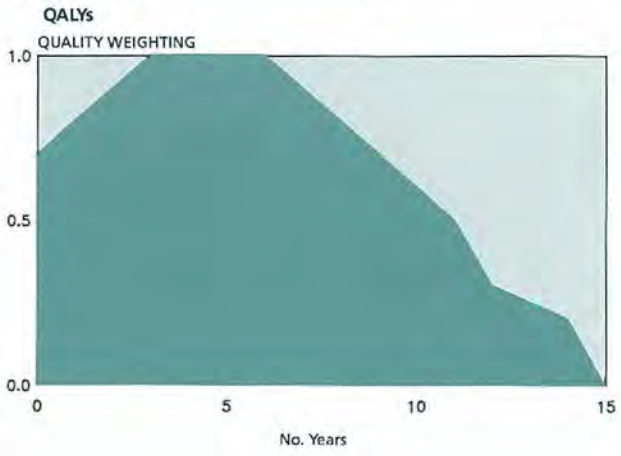
The distribution of QALY gains is not the only equity concern of health care systems. Most are concerned with providing access to health care services, and QALYs simply do not capture those other equity objectives. QALYs are a measure of health care efficiency and do not account for equity.

QALYs may not be the only output of health care. The provision of information itself may be important; how else do the "worried" determine whether they are sick or well. Other aspects of health care provision that can be thought of more as process than outcome are being treated as autonomous, with dignity and being cared for; and these are not captured by QALYs[8].

QALYs are an important advance in conceptualising and measuring the output of the health system. But they cannot yet be regarded as having progressed beyond the experimental stage and further developmental work is required. Far more extensive data collection is required on the outcomes, including their durations, of health care.

While QALYs may never encompass all the important and legitimate objectives of health services, notably those that pertain to equity and to care rather than cure, they do require a more explicit base for decision making. Economic evaluation is an aid to decision making. It is a major advance on resource allocation by shroud waving.

FIGURE 5



Jane Hall, Centre for Health Economics Research and Evaluation.

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PUBLIC HEALTH ABSTRACTS

Professor James S. Lawson, Head of the School of Health Services Management at the University of NSW, has prepared the following public health items from the literature.

COST EFFECTIVENESS OF LOWERING BLOOD CHOLESTEROL

Coronary heart disease is an important health problem in all industrialised countries except Japan. There is strong evidence that lowering serum cholesterol concentration will reduce the incidence of disease. There are three strategies available to reduce serum cholesterol concentrations: population-based promotion of better eating habits, individual dietary treatment and diet combined with drugs.

A large Norwegian study has demonstrated that the cost per life year gained over a 20-year population-based strategy was 12PS (English pound sterling). For an individual strategy based on dietary treatment, the cost was about 12,400PS per life year gain and more than 100,000PS if drugs were added for half the subjects with serum cholesterol concentrations at high levels.

The recommended conclusions are obvious — that population-based programs are very cheap and individual programs should be implemented with caution and with more selection than at present, and finally that drugs should be reserved for subjects with genetically-based high cholesterol or who are otherwise at very high risk of arteriosclerotic disease.

Kristiansen IS, Eggen AE and Thelle DS. Cost-effectiveness of incremental programs for lowering serum cholesterol concentration: is individual intervention worthwhile? *Brit Med J* 1991, 302:1119-22.

PREVALENCE OF ASTHMA RISES IN AUSTRALIAN SCHOOLCHILDREN

Australia has the second highest reported mortality from asthma in the world and over the past 10 years mortality in the under-19 age group has increased by 50 per cent. A study over the past 26 years in Melbourne has shown there is a real increase and that the changes are not due to diagnostic fashion or other statistical reasons. It is not possible with current knowledge to give accurate reasons for the increase.

Robertson CF, Heycock E, Bishop J, Nolan T et al. Prevalence of asthma in Melbourne schoolchildren: changes over 26 years. *Brit Med J* 1991, 302:1116-1118.

MENTAL RETARDATION CAN BE PREVENTED IN CHILDREN AT RISK

In the early 1960s there was hope that intervention may reduce the incidence of mild mental retardation in children at risk. So began the Milwaukee Project. This project compared groups of black children, some of whom had mothers with low intelligence, others as controls. The project attracted international interest and controversy, not the least because the principals of the study seconded the grants and developed a lucrative horse stud, much to their own disgrace and that of the University of Wisconsin. In addition, publications from the project were not produced. Finally, the results are available in a 434-page book which has been reviewed by a range of commentators.

It appears there is an unambiguous affirmative answer to the question: 'Can intervention prevent the decline in intelligence of children who are at risk because of poor parental intelligence and social levels?' This is an important study and an important finding with policy implications for those involved in providing services for the intellectually handicapped.

Garber HL, Hodge JD, Rynders J, Dever R and Velu R. The Milwaukee Project: setting the record straight. *Am J Mental Retardation* 1991, 95:5:493-525.

HEPATITIS C VIRUS — A NEW STD

Hepatitis C virus has been recently identified. It probably causes inflammation of the liver in the same way as other viruses causing hepatitis, which in turn may lead — in the long term — to cancer of the liver. A British study has indicated that almost certainly hepatitis C virus can be transmitted during sexual intercourse, in addition to other blood-borne viral infections such as HIV and hepatitis B virus which may be transmitted during intercourse. The study found that the virus could be transmitted among homosexual and heterosexual subjects.

Tedder RS, Gilson RJC, Briggs M, Loveday C et al. Hepatitis C virus: evidence for sexual transmission. *Brit Med J* 1991, 302:1299-1302.

HEALTH AND SOCIAL STATUS — INTIMATE LINKS

Inequalities in health are not confined to differences between the rich and poor. The Whitehall Study of British civil servants — begun in 1967 — found that after 10 years of follow-up, the highest employment grade had about one-third the mortality of the lowest, despite all subjects being office workers in stable employment. None of those studied was in absolute poverty as usually understood. Differences in smoking, obesity, physical activity, blood pressure or plasma cholesterol level only partly explained the differences in mortality.

The follow-up study of sickness in this same group has confirmed that rates of sickness are similar to the rates of death. It was found also that higher-status civil servants were greater in height, had more control over their jobs and more satisfaction from their work. Reasons for these differences in health status remain unclear, but it is clear that some of the differences must have begun in early life.

Marmot MG, Smith GD, Stansfield S, Patel C et al. Health inequalities among British civil servants: the Whitehall II Study. *Lancet* 1991, 337:1387-1393.

INSTITUTES TOP OF THE RESEARCH PILE

Critical mass seems to be essential for internationally competitive research. But large research institutions may easily become bureaucratic and unproductive. Another dilemma is that most researchers insist that scientists work best when free to do whatever research they want, but those funding research want value for money and answers to problems with clinical and social importance. A review of medical research institutes in Australia by the executive editor of the British Medical Journal indicates that they seem to have found a middle way and also appear to be highly successful. These institutes are the Garvan in Sydney and the Walter and Eliza Hall, Florey, Baker Medical Research and Murdoch, all in Melbourne.

The key appears to be the granting of block financial grants from the National Health and Medical Research Council, supplemented by independent sources of funds. In this way the institutes appear to have avoided the problems outlined

above, and the National Health and Medical Research Council gets great value for its investment. Leadership and personalities are also important.

Smith R. Top of the pile: the institutes. *Brit Med J* 1991, 302:1006-1010.

SCREENING FOR CONGENITAL HIP DYSPLASIA

Screening for congenital hip dysplasia remains controversial because the diagnosis is not always easy and treatment carries some risks. The risks of treatment (which involves splinting of an unstable hip) are that the blood supply to the bones of the hip joint may be interrupted, causing serious problems.

In Australia screening is done soon after birth by clinical examinations conducted by medical staff. These are often followed up through the Early Childhood Health Services by nursing staff who routinely check hips at about four weeks and six months of age. In other countries, such as Germany, all infants are screened ultrasonically at birth and elsewhere a more selective screening policy has been pursued.

Editorial: Screening for congenital hip dysplasia. Lancet 1991, 337:947-948.

ULTRAVIOLET A RADIATION — STAYING WITHIN THE PALE

In simplistic terms, sunlight is composed of both ultraviolet A and ultraviolet B radiation. Ultraviolet A is particularly notable for its ability to tan before burning. Ultraviolet B radiation is the villain causing burning and is probably more associated with cancers of the skin. But both UVA and UVB cause the blotchy brown wrinkling of skin that accompanies ageing and adversely affects immunological resistance. Many sunscreens protect against the burn effects of UVB and thus allow constant sunbathing leading to tanning. But it has now been realised that a tan without burning still leads to long-term damage.

An obvious solution is to seek clothing and trees for shelter rather than sunscreen ointments. However new sunscreen ointments contain chemicals which reflect both ultraviolet A and B.

Hawk JLM. Ultraviolet A radiation: staying within the pale. *Brit Med J* 1991, 302:1036-1037.

PREVENT FALLS AND OSTEOPOROSIS

Hip fracture is the most serious consequence of osteoporosis, and more than 90 per cent of such fractures occur in people over 70 years old. A dramatic age-related increase in rates of hip fracture is widely believed to result primarily from post-menopausal and age-related osteoporosis. But preventive measures recommended to slow perimenopausal bone loss, including estrogen replacement therapy, may be less beneficial for elderly women whose bone mass may be inadequate to prevent fractures.

An American study has shown it is important to prevent falls as well as to prevent osteoporosis. Risk factors for falls include lower limb dysfunction, neurological conditions, sedative use and visual impairment.

Grisso JA, Kelsey JL, Strom BL, Chiu GY et al. Risk factors for falls as a cause of fracture in women. *New Eng J Med* 1991, 324:1326-1331.

Nitrates in bore water

► *Continued from page 114*

nitrate-contaminated water because of higher pH levels in their stomachs resulting in greater concentrations of nitrate-reducing bacteria.

MHA from drinking water with high nitrate levels was first reported in 1945. Cases of fatal and non-fatal MHA in infants due to bore water nitrates have been reported in the US, Canada, Belgium, England and Mexico[7,8]. Most cases were associated with water from private bores where nitrate levels were above 20mg/L and which were also contaminated with microorganisms. Microbial infections may exacerbate the effects of MHA.

PREVENTION OF BORE WATER MHA

Infant milk formula: Infants, particularly if bottle-fed, are at greatest risk of MHA and therefore steps taken to protect them should also protect other water users. Bore water should not be used to make up infant milk formula when nitrate levels exceed 10mg/L or nitrite levels exceed 0.1mg/L.

In towns supplied with bore water, where nitrate levels are just below 10mg/L, parents should be advised that excessive evaporation of water during boiling can concentrate nitrates and nitrites in the water. Lids or enclosed containers should be used to boil water.

Bore construction: The contamination of bore water by run-off and seepage from septic tanks is less likely in deeper bores. Bores should be sited uphill from obvious pollution sources, such as septic tanks, and properly sealed at the surface to avoid direct run-off contamination around the exposed bore casing. The DWR can advise on the best methods to locate and construct bores.

Regular testing of private bores used for drinking: Bore water should be tested twice yearly for its suitability for drinking purposes. Testing should also be conducted during periods of prolonged drought and after heavy rains following drought, especially in catchments with intensive fertiliser use and developments with numerous septic tanks and nearby rubbish tips.

Helen Moore, Public Health Officer,
Stephen Corbett, Manager, Environmental Health Section
NSW Health Department.

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INVESTIGATING A REPORTED SCARLET FEVER OUTBREAK

Children at a day care centre were involved in a suspected outbreak of scarlet fever investigated by the Illawarra Public Health Unit in June this year. The Shellharbour Council notified the Illawarra PHU on June 18 of a suspected outbreak of scarlet fever in a day care centre at Albion Park Rail. The director of the centre had contacted the council reporting four 'confirmed' cases and three 'suspected' cases of scarlet fever. The basis of this report for the centre director was verbal reports from the mothers of the children on the basis of clinical diagnoses by their doctors. The director responded by placing a notice to the parents on the front door of the centre, warning them of a scarlet fever outbreak.

The day care centre is a community child care centre, whose 72 attending children are between the ages of one and five (inclusive). Up to 40 children attend the centre each day. Staff at the centre comprises six full-time, two casual relief and two part-time workers.

Each day the children are put into two groups, one with about 15 children aged one to three and the other with about 25 children aged three to five. These two groups use separate rooms for part of the day, although there are times in the morning and afternoon when the children are together.

The index case was a four-year-old girl from Albion Park who became ill on June 2 with a sudden onset of fever and sore throat. The next day a rash appeared, which involved her chest, neck, abdomen and groin and lasted five days. The rash was described by her mother as like a 'heat rash'. Her general practitioner described an exudative pharyngitis and cervical lymphadenitis, however did not observe other characteristics which can occur with scarlet fever such as the white/red strawberry tongue, circumoral pallor or 'Pastia's lines'. She was started on oral penicillin 24 hours after the onset of the illness.

The other three 'confirmed' cases of scarlet fever initially reported to the Public Health Unit had had similar clinical syndromes to the index case, with sudden onset of fever and sore throat followed by a rash. The GP could describe the characteristic white/red tongue for two children (who were siblings). None of the cases had desquamation after the rash. All were treated promptly by antibiotics, with the exception of one case who was treated in convalescence (after the result of the throat swab was obtained).

At the time of the notification the centre director was aware of 12 children who had been ill over the previous three weeks. All the doctors who had seen these children were contacted and interviewed about the clinical diagnoses, investigations and treatment. The mothers of these children were interviewed using a structured questionnaire either by telephone or face-to-face. The questionnaire was also distributed to the parents of the other children.

Throat swabs were taken from all the staff and the four children who had had a clinical illness consistent with scarlet fever (fever, sore throat, followed by rash). Streptococcal antibody screens were taken from three of the children with an illness consistent with scarlet fever.

CASE DEFINITIONS

The following case definitions — for illnesses occurring in the day care centre children between June 1 and June 25 inclusive — have been adopted:

Case definition 1. Illness characterised by fever and sore throat followed by a rash. (Illness consistent with scarlet fever.)

Case definition 2. Illness characterised by a sore throat and fever. (Illness consistent with pharyngitis, bacterial and viral.) (Therefore case definition 2 includes case definition 1.)

Case definition 3. Illness characterised by one or more of the following: fever, sore throat, runny nose. (Illness consistent with an upper respiratory tract infection.) (Therefore case definition 3 includes case definitions 1 and 2.)

PREDOMINANT SYMPTOMS

Questionnaires for 48 out of the 72 children attending the centre (66.6 per cent) were finally returned. The rate of particular symptoms in these 48 children for whom information is available is shown in Table 3:

TABLE 3

Symptom	Rate per 100 in Group 1	Rate per 100 in Group 2	Rate per 100 in both groups combined
Rhinorrhoea	56.7	38.9	50.0
Sore ears	10.0	0.0	6.3
Sore throat	33.3	11.1	25.0
Vomiting	23.3	5.5	16.7
Rash	20.0	0.0	12.5
Fever	40.0	16.7	31.3
Headache	13.3	0.0	8.3
Cough	16.7	0.0	10.4
Abdominal pain	10.0	0.0	6.3

The most common symptoms in the 48 children about whom questionnaires were completed were: rhinorrhoea (50 per cent), fever (31.3 per cent) and sore throat (25 per cent). All symptoms were more common in group 1 children.

CASE RATES

The day care centre director was unaware of any other children — for whom questionnaires have not been returned — being ill since June 1. (For the purposes of this discussion we will assume none of these other children became ill. This is a reasonable assumption for case definition 1 and possibly case definition 2. The case rates for those with case definition 3 — and to a lesser extent case definition 2 — can only be underestimates.)

Out of 72 children who attend the day care centre, four (5.6 per cent) fulfilled the case definition of a clinical illness consistent with scarlet fever. All these children attended group 1; four of 45 (8.9 per cent) in group 1 therefore fulfilled case definition 1.

An additional 11.1 per cent (eight of 72) of the centre's children had had a clincial illness consistent with pharyngitis, and seven (87.5 per cent) had received antibiotics without throat swabs.

Therefore there were in total 16.7 per cent (12 of 72) fulfilling case definition 2. Of group 1 children, 22.2 per cent (10 of 45) fulfilled case definition 2. Children in group 1 were three times as likely as children in group 2 to develop this illness, however this association was not significant at the 5 per cent level (RR = 3.0; 95 per cent CI = 0.71 to 12.68; P = 0.10).

An additional 26.4 per cent (19 of 72) of the children had an illness consistent with an upper respiratory tract illness but without a sore throat. This was clearly the most common type of illness over this period.

The frequency distribution over time of these various cases is illustrated in Figure 6. For many of those children who had had an illness consistent with an upper respiratory tract infection but who did not fulfil case definitions 1 or 2, the parents did not complete the question referring to the onset of the symptom(s). The 'epidemic curve' therefore does not include these cases. (In addition, of the 11 staff members, 10 (90.9 per cent) had had a clinical illness consistent with an upper respiratory tract illness over this period.)

LABORATORY RESULTS

Throat swabs

Throat swabs were taken from the four children who had had a clinical illness consistent with scarlet fever, and all 11 staff on June 20. Group A beta-haemolytic streptococcus was isolated from two of these 15 throat swabs (13.3 per cent). These two positive swabs were from the two children who had not taken antibiotics beforehand.

Of the additional children fulfilling case definition 2, the only swab which was taken — from the only one of these children who had not had antibiotics beforehand — was negative.

Of the additional 60 children who attended the centre, and who were advised to have throat swabs by their GP, the director of the day care centre estimated that 45 did attend their GP within the next two weeks. Only three of these children were found to be asymptomatic carriers of group A beta-haemolytic streptococcus.

Streptococcal antibody screen

On June 25, streptococcal antibody screens were taken from three of the children with an illness consistent with scarlet fever, including the two who had taken antibiotics before throat culture, and one who had had a positive throat swab.

Results of the three screens were all negative. (The blood tests were taken 23 days after the onset of illness for the index case, and 10 and eight days after the onset of illness of the other two cases.)

PUBLIC HEALTH ACTION

A letter was sent to the parents of the day care centre children on June 21 explaining that we had to presume there had been a minor outbreak of scarlet fever and a bacterial throat infection and that the recommendation was that the children have throat swabs taken by their GPs and if positive that they be treated with penicillin. An accompanying letter for the GP was enclosed.

DISCUSSION AND CONCLUSIONS

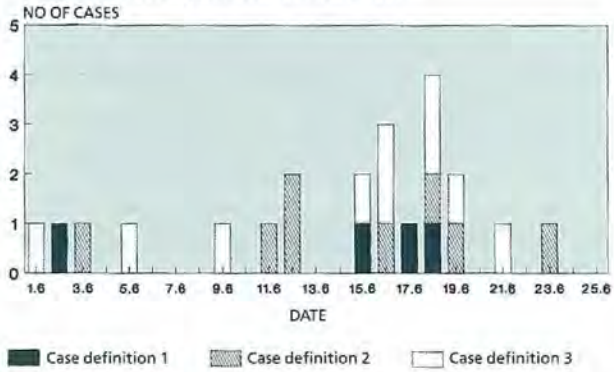
From a clinical viewpoint there are four reasons for diagnosing and treating group A streptococcal infections/pharyngitis: the illness is shortened with early treatment; the organism is eradicated from the pharynx and cannot be spread to other individuals; suppurative complications can probably be prevented; and rheumatic fever and possibly acute glomerulonephritis are prevented[1].

From a public health perspective, it has been recommended that carriers be searched for and treated in 'well-documented' outbreaks of streptococcal infection and that in outbreaks where individuals have close contact 'it may be necessary to administer penicillin to terminate spread'[2].

However, whether an outbreak of scarlet fever and/or streptococcal infection occurred in the day care centre is still unclear. Streptococcal infections are notoriously difficult to diagnose — in particular to differentiate from a number of upper respiratory tract viral illnesses — even with the benefit of adequate microbiology and serology[3]. In any case, serology is unlikely to be helpful in determining early whether a 'well-documented' outbreak is occurring as convalscent sera are usually necessary. In addition,

FIGURE 6

FREQUENCY DISTRIBUTION OVER TIME OF ILLNESS IN A DAY CARE CENTRE: JUNE 1991



For case definition see report

the utility of microbiological examinations is clearly diminished when suspected cases have already begun antibiotic therapy, which is often the case.

The symptomatic case definitions which were adopted in this investigation are clearly very broad, being consistent with diagnoses of scarlet fever and streptococcal pharyngitis; however the criteria used for these case definitions are far from diagnostic.

Prevalence rates of group A streptococci as normal asymptomatic inhabitants of the nasopharynx can vary from 15-20 per cent[4]. The two positive throat swabs from the two children with the clinical syndrome consistent with scarlet fever — who had not been started on antibiotics — could easily have occurred by chance. Similarly, the three positive swabs from asymptomatic children lies within the bounds of what would be expected in a normal population.

Prompt treatment by antibiotics is known to inhibit the antibody response[4]. In addition, the degree of inhibition appears to be related to the successful elimination of the organism by therapy[4]; all three had negative throat swabs after antibiotics. Therefore the negativity of these three antibody tests is also an inconclusive result.

Most ill children over this period had a respiratory tract illness but without the sore throat and fever (and rash). The two possibilities remain that:

- All or almost all the 'outbreak' cases had another illness, most likely viral, which was difficult to distinguish clinically from both bacterial pharyngitis and scarlet fever; or
- There was indeed a small 'outbreak' of scarlet fever/group A beta-haemolytic streptococcus, superimposed on an 'outbreak' of a viral illness.

Although more extensive microbiology and/or serology may have provided firmer answers, this was not indicated given the nature, severity and prompt resolution of the 'outbreak', as a result of — or despite — the public health measures taken.

Victoria Westley-Wise, Public Health Officer
Illawarra Public Health Unit

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HEPATITIS ANNUAL REPORT

Analysis of trends of reported cases of hepatitis A and hepatitis B between 1982 and 1990 reflects evolving reporting mechanisms over this period, with the advent of Public Health Units (PHUs) and the transference of data collection from a centralised system (Health Department — Epidemiology Branch) to a decentralised system (PHUs). Viral hepatitis is notifiable by all medical officers as hepatitis A, hepatitis B and hepatitis — unspecified. The introduction of the revised list of notifiable diseases requires the reporting of cases of acute viral hepatitis by all doctors, and laboratories will report cases of hepatitis A, hepatitis B, hepatitis C, hepatitis D (Delta hepatitis) and hepatitis E.

HEPATITIS A

The number of reported cases of hepatitis A for the period 1982 to 1990 ranged from 280 cases (4.9/100,000) in 1986 to 32 cases (0.6/100,000) in 1990.

During 1990, six cases were reported for November and five for December, with fewer cases reported for the remaining months. Hepatitis A notifications were received from 10 areas and Regions, with the rate of notification ranging from 0.2/100,000 and in the Hunter Area to 2.2/100,000 in the Wentworth Area.

The rate of hepatitis A notifications by sex was 0.6/100,000 female and 0.7/100,000 male. Most cases were in the 15-19 and 30-39 age groups for males and the 40-49 age group for females.

HEPATITIS B

The number of reported cases of hepatitis B for the period 1982 to 1990 ranged from 174 (3.1/100,000) in 1982 to 548 (9.6/100,000) in 1985.

For 1990, 444 (7.8/100,000) cases of hepatitis B were reported. By month of onset, the number of reports ranged from 28 cases in December to 49 in May.

All Areas and Regions reported cases of hepatitis B, ranging from 46.0/100,000 for the Orana and Far Western Region to 1.5/100,000 for the Hunter Area. There was no seasonal variation in the reporting of hepatitis B during 1990.

Hepatitis B was reported for all age groups, with a peak in the 20-39 age group for both males and females. Cases reported by sex were 186 (6.5/100,000) for females and 162 (5.7/100,000) for males. For the 20-39 age group 58 per cent of cases were female and 42 per cent male.

HEPATITIS C

The total number of cases of hepatitis C for 1990 was 45 (0.8/100,000). The number of cases reported by month of onset ranged from one in June and September to 10 in October.

Of the 45 cases of hepatitis C reported, 11 were female, 32 male and two unknown. For the 20-39 age group there were 24 males (2.5/100,000) and seven females (0.8/100,000).

HEPATITIS D

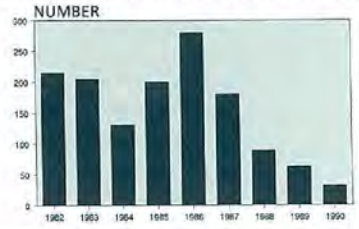
No cases of hepatitis D were reported during 1990.

HEPATITIS E

No cases of hepatitis E were reported during 1990.

FIGURE 7

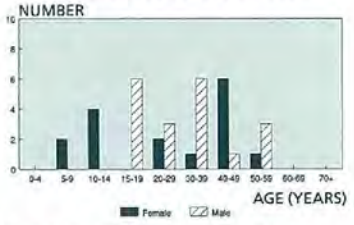
HEPATITIS A NOTIFICATIONS NSW 1982-1990



Source: NSW Infectious Disease Database.

FIGURE 8

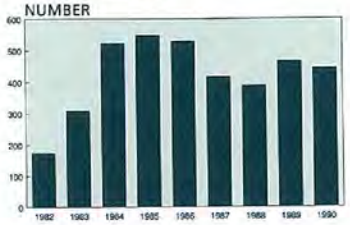
HEPATITIS A — NSW 1990 NOTIFICATIONS BY AGE AND SEX



Source: NSW Infectious Disease Database

FIGURE 9

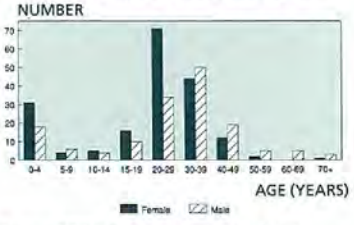
HEPATITIS B NOTIFICATIONS NSW 1982-1990



Source: NSW Infectious Disease Database.

FIGURE 10

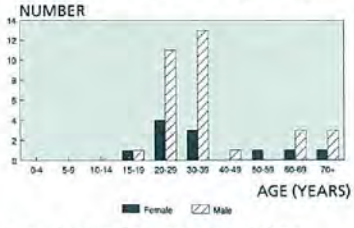
HEPATITIS B — NSW 1990 NOTIFICATIONS BY AGE AND SEX



Source: NSW Infectious Disease Database

FIGURE 11

HEPATITIS C — NSW 1990 NOTIFICATIONS BY AGE AND SEX



Source: NSW Infectious Disease Database

INFECTIOUS DISEASES

TABLE 4

INFECTIOUS DISEASE NOTIFICATIONS, NSW
Notifications to the end of October, 1991

CONDITION	Number of Cases Notified			
	Period		Cumulative	
	October 1990	October 1991	October 1990	October 1991
AIDS	*40	*14	*285	*214
Arboviral Infection	3	2	253	525
Brucellosis	–	–	5	2
Cholera	–	–	–	–
Diphtheria	–	–	–	–
Foodborne illness (NOS)	291	61	2240	2507
Gaestroenteritis (instit.)	N/A	–	N/A	35
Gonorrhoea	29	12	314	311
H influenzae epiglottitis	N/A	–	N/A	13
H influenzae infection (NOS)	–	4	10	104
H influenzae B — meningitis	–	8	10	44
H influenzae B — septicaemia	–	1	2	8
Hepatitis, acute viral (NOS)	–	–	2	262
Hepatitis A	3	59	25	800
Hepatitis B — acute	–	–	6	17
Hepatitis B — carrier	–	–	–	22
Hepatitis B — unspecified	38	15	356	886
Hepatitis C	9	18	29	340
HIV infection	89	15	662	605
Hydatid disease	–	–	2	7
Legionnaires' disease	–	1	23	24
Leprosy	–	–	7	–
Leptospirosis	5	–	37	29
Listeriosis	N/A	–	N/A	6
Malaria	24	2	155	105
Measles	63	–	239	268
Meningococcal infection (NOS)	6	1	57	39
Meningococcal meningitis	–	2	17	37
Meningococcal septicaemia	–	–	5	11
Mumps	N/A	–	N/A	4
Mycobacterial infection (NOS)	34	–	440	120
Mycobacterial tuberculosis	–	4	–	175
Mycobacterial — atypical	–	–	14	48
Pertussis	3	–	129	35
Plague	–	–	–	–
Poliomyelitis	–	–	–	–
Q Fever	14	4	113	173
Rubella	N/A	1	N/A	35
Salmonella infection (NOS)	75	17	1192	972
Syphilis	20	19	291	430
Tetanus	–	–	–	2
Typhoid & paratyphoid	2	2	31	42
Typhus	–	–	–	–
Viral haemorrhagic fevers	–	–	–	–
Yellow fever	–	–	–	–

* Data January-September only
(NOS) Not otherwise specified

NOTIFICATIONS

HUMAN IMMUNODEFICIENCY VIRUS INFECTION

The 8.6 per cent reduction in HIV notifications for the period January to October 1991 compared with the corresponding period in 1990 reflects better matching of duplicate tests by the reference laboratories. In addition, no notifications were received from Royal Prince Alfred Hospital for October.

TABLE 5

NSW HIV ALL POSITIVE TESTS TO OCTOBER 31, 1991

TABLE OF RISK BY GENDER

RISK Frequency	GENDER F	M	T	U	Total
Drug injector	42	145	0	15	202
Haemophilia	0	61	0	0	61
Heterosexual	69	117	1	3	190
Heterosexual + IDU	14	15	0	1	30
Homo/bisexual + IDU	–	72	0	4	76
Homo/bisexual	–	3787	1	130	3918
Homosexual + trans	–	2	0	0	2
Other	0	1	0	0	1
Specified NEC	10	33	0	17	60
Transfusion	37	45	0	1	83
Transfusion + IDU	1	1	1	0	3
Unknown	222	3606	1	1807	5636
Vertical	7	8	0	4	19
Total	402	7893	4	1982	10,281

TABLE 6

NSW HIV ALL POSITIVE TESTS TO OCTOBER 31, 1991

TABLE OF AGE GROUP BY GENDER

AGE GROUP Frequency	GENDER F	M	T	U	Total
01 (less than)	5	19	0	1	25
01-04	2	1	0	1	4
05-14	3	31	0	1	35
15-24	74	1045	2	34	1155
25-34	113	2609	0	97	2819
35-44	46	1782	2	60	1890
45-54	16	544	0	14	574
55-64	15	134	0	3	152
65 & over	8	35	0	0	43
Error	1	3	0	0	4
Missing	119	1690	0	1771	3580
Total	402	7893	4	1982	10,281

MENINGOCOCCAL INFECTIONS

Although total notifications for meningococcal infections have increased 14 per cent in the period January to October 1991 over the same period for 1990, notifications for meningococcal meningitis have increased 118 per cent. This is primarily due to change in the classification of cases; many cases which previously would have been reported as meningococcal infection are now classified as meningococcal meningitis. Six PHUs reported cases of meningococcal meningitis in October. No clusters were identified. Active surveillance has been undertaken statewide, similar to the survey undertaken in 1990 *(Public Health Bulletin 1991; 2:8-10)* and will continue in the Central Coast Area.

TETANUS

Two cases of tetanus have been reported in NSW in 1991 *(Public Health Bulletin 1991; 2:3, 13)*. They were a 74-year-old female and 49-year-old male.

The 74-year-old woman presented to a local hospital on January 21 with dysphagia, dyspnoea, cyanosis and mild trismus. A provisional diagnosis of tetanus was made, the differential diagnosis being a dystonic reaction to phenothiazines. The source of exposure was not known but thought to be via chronic leg ulcers. A single dose of tetanus toxoid had been given 15 years earlier. The woman was intubated immediately and transferred by air ambulance to a teaching hospital. She was admitted to ICU where she remained for eight weeks and then spent a further nine days in a general ward. She was then transferred to a private hospital where she has remained for nine months' rehabilitation.

The 49-year-old man presented to hospital on May 8 with dysphagia, dyspnoea, bronchospasm and mild trismus. A provisional diagnosis of tetanus was made. There was a history of a dog scratch one week before the date of onset. Previous tetanus immunisation status was unknown. After three days in ICU, ventilation via a tracheostomy was required. He was extubated after five weeks and discharged nine days later (a total of 50 days in hospital). Eight weeks later, at outpatient follow-up, residual mild bilateral arm and leg weakness were noted.

MEASLES

No notifications of measles have been received for the month of October 1991. Cases of measles were reported to the Central & Southern Sydney Public Health Unit in September. The infection was imported from New Zealand. Following the notification of measles in a boy aged 13 years, investigation revealed contact with a 15-year-old male and his 12-year-old sister attending the same school, who had been diagnosed with measles two weeks previously. The index case was identified as the 11-year-old male cousin of these siblings, who had been visiting from New Zealand. New Zealand is currently experiencing a major measles outbreak. Children planning to travel to New Zealand are advised to have their measles immunisation status reviewed.

Three cases of SSPE have been identified at Prince of Wales Hospital in the past two months, in males respectively aged 29 years, 11 years and 8 years. As mentioned in the *Public Health Bulletin 2;1991:108*, SSPE is a late complication of measles.

SYPHILIS

The Orana & Far West Region continues to report the highest notification rate for syphilis in NSW. Compared with the overall 1991 NSW rate of 9.1/100,000/year (a 47.7 per cent increase over 1990), the Orana & Far West Region reports a rate of 133.4/100,000/year. It is expected that reporting of STDs from Orana & Far West will improve further with the commencement of diagnostic and treatment services being offered to regional communities by the Sexual Health Service based in Dubbo on an outreach basis, the likely recruitment of extra staff for STD services, and the start of a STD risk factor prevalence study in the new year.

ARBOVIRAL INFECTION

For the period January to October 1991, 525 notifications of arboviral disease were received. Ross River disease (epidemic polyarthritis) accounted for 379 (72 per cent) of these; 240 Ross River notifications were laboratory confirmed. One Dengue and three Barmah Forest cases were also confirmed. The remaining 142 notified arboviral disease cases were unspecified.

The two notifications of arboviral infection in October 1991 were late notifications from the Orana & Far West Region. At the time of writing, no notifications had been received for the 1991-92 arboviral season.

LEGIONNAIRES' DISEASE

Two Public Health Units have been involved in investigations of legionnaires' disease. Inquiries of different cases have implicated cruise ship travel *(l pneumophila* type 4) and potting mix *(l longbeachae)*. Neither investigation was conclusive, but PHUs are requested to ask specifically about these environmental exposures when investigating cases of legionnaires' disease.

INFECTIOUS DISEASES NOTIFICATIONS 1985-1990

Summary data on 22 notifiable conditions for the years 1985-90 are given in Table 7. Notification processes have changed markedly since 1989, and apparent trends revealed by the data must be interpreted with great caution.

TABLE 7

INFECTIOUS DISEASES IN NSW
NUMBER OF CASES NOTIFIED 1985 TO 1990

Disease	1985	1986	1987	1988	1989	1990
AIDS	81	157	245	289	265	318
Arboviral infection	76	231	84	136	389	289
Cholera	–	–	1	1	–	1
Gonorrhoea	1855	1399	875	746	603	403
Hepatitis A	200	280	180	89	63	36
Hepatitis B	548	529	417	388	465	426
Hepatitis C	N/A	N/A	N/A	N/A	N/A	41
Hepatitis unspecified	68	74	43	15	21	13
HIV infection	2417	1855	2001	1108	848	659
Legionnaires' disease	16	25	82	26	52	27
Leprosy	16	13	10	7	12	7
Leptospirosis	43	23	19	36	58	49
Malaria	132	179	89	84	91	193
Measles	46	140	246	43	76	388
Meningococcal infection	21	12	23	18	58	84
Pertussis	303	227	43	25	202	149
Poliomyelitis	–	–	–	–	–	–
Q. Fever	33	95	150	232	138	156
Salmonella infection	1002	831	835	1048	1333	1486
Syphilis	1560	1450	1271	1158	315	333
Tuberculosis	387	360	402	406	515	584
Typhoid & paratyphoid	23	26	38	25	19	44

TABLE 8

INFECTIOUS DISEASE NOTIFICATIONS BY HEALTH AREA AND REGION
For October, 1991

CONDITION	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	NCR	NER	OFR	CWR	SWR	SER	U/K	TOTAL
Arboviral infection (NOS)	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2
Foodborne illness (NOS)	–	8	9	3	4	8	–	2	–	3	5	7	–	12	–	–	61
Gonorrhoea	2	1	5	–	2	–	–	–	–	–	2	–	–	–	–	–	12
H. influenzae meningitis	–	–	–	1	–	–	1	–	1	–	2	–	2	–	1	–	8
H. influenzae septicaemia	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
H. influenzae infection (NOS)	1	–	2	–	–	–	–	–	–	–	–	–	–	1	–	–	4
Hepatitis A	8	2	24	–	6	–	11	6	–	–	1	–	–	–	1	–	59
Hepatitis B — Unspecified	1	–	1	1	7	2	2	–	–	–	1	–	–	–	–	–	15
Hepatitis C	2	–	–	6	1	–	5	4	–	–	–	–	–	–	–	–	18
HIV infection	–	–	3	1	–	–	1	–	–	–	–	–	–	–	–	10	15
Legionnaires' disease	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1
Malaria	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	2
Meningococcal meningitis	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	2
Meningoccocal infection (NOS)	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1
Mycobacterial tuberculosis	–	–	1	2	1	–	–	–	–	–	–	–	–	–	–	–	4
Q fever	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–	4
Rubella	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Salmonella infection (NOS)	2	–	1	–	10	2	1	–	1	–	–	–	–	–	–	–	17
Syphilis	3	3	–	–	5	1	1	–	–	–	3	3	–	–	–	–	19
Typhoid & paratyphoid	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2

TABLE 9

INFECTIOUS DISEASE NOTIFICATIONS BY HEALTH AREA AND REGION
For January 1 to October 31, 1991

CONDITION	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	OTH	U/K	TOTAL
AIDS	33	8	97	4	17	9	19	6	3	6	9	–	–	1	–	–	–	2	214
Arboviral infection (NOS)	1	–	9	–	1	–	4	–	1	10	27	212	209	4	35	5	7	–	525
Brucellosis	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Foodborne illness (NOS)	187	346	592	157	234	147	1	37	17	99	302	138	96	25	110	2	17	–	2507
Gastroenteritis (instit.)	–	–	–	5	10	6	4	2	–	–	–	7	1	–	–	–	–	–	35
Gonorrhoea	28	8	128	32	19	1	6	1	11	4	16	6	37	3	8	2	1	–	311
H. influenzae epiglottitis	1	–	–	3	3	1	2	–	–	–	–	–	–	1	–	2	–	–	13
H. influenzae meningitis	2	3	–	9	2	1	8	–	2	9	–	2	–	2	2	2	–	–	44
H. influenzae septicaemia	–	2	–	1	–	1	3	–	–	1	–	–	–	–	–	–	–	–	8
H. influenzae infection (NOS)	13	19	11	5	11	11	1	3	9	2	–	1	5	2	10	1	–	–	104
Hepatitis A	96	40	421	29	26	1	115	10	4	17	10	12	5	–	2	11	1	–	800
Hepatitis B — Acute	11	4	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	17
Hepatitis B — Carrier	9	11	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	22
Hepatitis B — Unspecified	119	74	77	194	114	12	97	–	5	34	40	41	46	1	3	28	2	–	887
Hepatitis C	100	45	1	24	24	3	52	6	4	29	30	16	–	2	2	1	1	–	340
Hepatitis, acute viral (NOS)	–	–	–	5	192	11	1	3	8	2	–	1	26	–	6	7	–	–	262
HIV infection	36	14	139	17	22	10	34	5	2	14	8	1	2	2	1	2	6	290	605
Hydatid disease	3	1	1	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	7
Legionnaires' disease	–	–	–	5	7	3	4	–	–	2	1	–	–	–	1	–	1	–	24
Leptospirosis	1	–	–	–	–	–	–	–	–	9	3	4	5	–	4	–	3	–	29
Listeria	2	1	–	–	–	–	2	–	–	1	–	–	–	–	–	–	–	–	6
Malaria	7	5	6	4	10	3	44	3	4	5	3	3	–	–	4	3	1	–	105
Measles	66	6	12	14	20	5	31	9	10	62	17	2	4	–	1	9	–	–	268
Meningococcal meningitis	2	3	–	11	1	–	1	1	1	7	1	4	2	2	–	1	–	–	37
Meningococcal septicaemia	1	1	–	–	1	–	–	1	–	–	4	2	–	–	–	1	–	–	11
Meningococcal infection (NOS)	–	–	6	3	3	1	4	4	5	–	2	6	1	1	2	1	–	–	39
Mumps	–	–	–	–	2	–	1	–	–	–	–	–	–	–	1	–	–	–	4
Mycobacterial atypical	23	22	–	–	1	–	–	–	–	–	–	–	–	–	–	2	–	–	48
Mycobacterial tuberculosis	26	19	46	30	12	1	7	2	8	15	6	–	1	–	1	1	–	–	175
Mycobacterial infection (NOS)	–	–	–	1	29	8	47	1	14	–	3	6	1	4	3	3	–	–	120
Pertussis	–	2	5	4	4	1	1	–	–	1	3	2	8	–	3	1	–	–	35
Q Fever	–	1	–	1	1	–	–	–	–	5	19	52	87	3	3	1	–	–	173
Rubella	1	2	10	–	8	1	6	1	1	1	2	–	–	–	2	–	–	–	35
Salmonella infection (NOS)	71	102	80	129	137	65	73	1	42	17	63	62	60	19	22	11	18	–	972
Syphilis	41	16	38	55	35	8	28	–	6	16	64	21	80	3	15	1	3	–	430
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	2
Typhoid & paratyphoid	10	6	12	–	2	–	2	–	1	3	–	5	–	–	–	–	1	–	42

Abbreviations used in this Bulletin:
CSA Central Sydney Health Area, SSA Southern Sydney Health Area, ESA Eastern Sydney Health Area, SWS South Western Sydney Health Area, WSA Western Sydney Health Area, WEN Wentworth Health Area, NSA Northern Sydney Health Area, CCA Central Coast Health Area, ILL Illawarra Health Area, HUN Hunter Health Area, NCR North Coast Health Region, NER New England Health Region, OFR Orana & Far West Health Region, CWR Central West Health Region, SWR South West Health Region, SER South East Health Region, OTH Interstate/Overseas, U/K Unknown, NOS Not Otherwise Stated

Please note that the data contained in this Bulletin are provisional and subject to change because of late reports or changes in case classification. Data are tabulated where possible by area of residence and by the disease onset date and not simply the date of notification or receipt of such notification.

Quality of notification data

An assessment of the completeness of notification has been undertaken. Four data fields were examined: age, sex, disease name and occupation/school attended. These variables were chosen for the following reasons: age and sex are basic epidemiological variables; disease name is obviously essential, and only the nominated notifiable diseases were included in the assessment; and occupation (or school attended) is the only risk factor presently requested in routine notifications. The completeness of notification varies considerably among Areas and Regions (Table 10). Notifiers are urged to improve the completeness of the data supplied to Public Health Units, and PHUs are encouraged to seek missing data.

Efforts are being made to increase the quality of data entered onto the Infectious Diseases Database System.

TABLE 10

PERCENTAGE OF DATA ENTERED IN A SAMPLE OF FIELDS ON THE INFECTIOUS DISEASES DATABASE, BY AREA/REGION, OCTOBER 1991.

	Age	Sex	Disease name	Occupation School attended
Central Sydney	93.4	96.1	86.8	0
Southern Sydney	93.3	97.3	89.5	0
Eastern Sydney	82.8	88.8	73.8	8.8
South Western Sydney	89.3	93.6	88.3	74.6
Western Sydney	85.7	89.4	98.1	0.4
Wentworth	94.8	97.3	97.3	0.3
Northern Sydney	86.6	96.3	100	4.2
Central Coast	94.2	95.8	87.4	15.7
Illawarra	86.8	98.1	48.6	8.2
Hunter	95.6	98.9	79.3	13.4
North Coast	94.5	92.1	90.1	25.6
New England	95.7	92.1	90.1	25.6
Orana & Far West	92.5	98.8	88.2	17.1
Central West	52	56	96	13.3
South West	97.5	99.3	84.5	0.4
South East	96.1	99.0	98.1	63.1

Hepatitis B vaccine

Hepatitis B vaccine is available free of charge to neonates at high risk of hepatitis B acquisition as defined in NSW Health Department Circular 91/105; siblings (up to the age of five years) of neonates at high risk of acquiring hepatitis B; and household contacts of a hepatitis B carrier.

Long-term immunity will occur in about 95 per cent of hepatitis B vaccine recipients but only if the vaccination course is completed. The second dose should be given at 1-2 months and the third dose at 6 months.

Hospitals, local government council clinics, medical practitioners and community health centres may order hepatitis B vaccine from the State Vaccine Centre, Canterbury Hospital (ph: (02) 718 4171)

Infectious disease datasets available

The infectious diseases datasets for 1989 and 1990 are available for analysis. Any researchers interested in obtaining access to the data should submit a detailed study protocol to the Chief Health Officer.

Changing susceptibility to penicillins of N. gonorrhoeae

The antibiotic susceptibility of gonococci in Sydney (and other parts of Australia) has been continuously monitored for more than a decade and many changes in the prevailing patterns of gonococcal sensitivity to antibiotics have been noted. Dr J.W. Tapsall, of the Microbiology Department, Prince of Wales Hospital, says that recently there has been a significant decline in the number of penicillinase-producing *N. gonorrhoeae* (PPNG) isolated in Sydney. The current pattern (see Table 11) shows that PPNG now represent 6 per cent of isolates in Sydney, whereas they accounted for more than 40 per cent of local strains several years ago. Also of interest is the increasing proportion of strains fully sensitive to the penicillins. However, strains relatively resistant to penicillin by mechanisms other than penicillinase production are also numerous.

The reasons for the change in antibiotic sensitivity in gonococci are complex, and are by no means solely influenced by antibiotic usage. Other factors include changes in outer membrane porin proteins as part of the organism's response to developing host resistance and changes in plasmid distribution and type. Other extrinsic factors would also appear to be operating, including a decreased number of imported PPNG infections and administrative removal of foci of transmission. (These data are gathered through the cooperation of many private and public sector pathology laboratories who submit isolates of gonococci for examination.)

TABLE 11

PENICILLIN SENSITIVITY OF SYDNEY ISOLATES TO JUNE 30, 1991

		Category %			
Period	No.	Sensitive	Less Sensitive	Rel Resistant	PPNG
January-March	155	17.5	56	15.5	11
April-June	115	22.6	62.7	8.7	6

Sensitive MIC <, = 0.03mg/L
Less sensitive MIC 0.06-0.5mg/L
Relatively resistant MIC >, = 1.0mg/L
PPNG, penicillinase-producing *N. gonorrhoeae*