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CLINICAL APPLICATIONS OF EPIDEMIOLOGY

The contribution of epidemiology to the study and promotion of the health of populations is clear and time-honoured. Now other aspects of health care, including clinical practice, are calling for the application of quantitative problem-solving skills that are classically part of epidemiology. To demonstrate the benefits and consequences of new and existing therapies, many of which aim only to make marginal improvements in the treatment of chronic diseases, requires the assembly and analysis of data from large numbers of patients. To assess the utility of new diagnostic procedures, comparisons of their sensitivity, specificity, positive and negative predictive values — as well as their cost — are essential if they are to be employed to best effect in clinical practice, and these comparisons are essentially epidemiological.

As the technical basis of diagnosis and treatment becomes more sophisticated, and computers enable the collection and manipulation of large data sets with an ease that was only dreamt of two or three decades ago, the skills that have been employed in population-based epidemiology increasingly overlap with those that may reasonably be expected of the proficient clinician. This has led, especially in north America, to the growth of two new disciplines — clinical decision making and clinical epidemiology.

The first of these reflects a major contribution of mathematical and statistical science to clinical practice in which mathematical models are used to support therapeutic choice making. The second discipline — clinical epidemiology — has grown substantially in north America as a result of an increasing awareness of the need to study large groups of clinical patients in order to amass enough data to detect subtle differences in outcome among disparate groups. Clinical epidemiologists are rarely afforded the luxury of controlled experimental designs. Their subjects may be at varying stages in the natural histories of their illnesses and may be receiving a mix of treatment strategies.

In clinical epidemiology standard epidemiological concepts such as the importance of observer variation, the impact of bias, the influence of the prevalence of a condition on the performance of a diagnostic test, the critical importance of an accurate description of disease natural history, and concepts of risk, all find their place.

Concern with value-for-money in health care has increased in parallel with the cost of new technologies. But **cost** of health care represents only one side of the equation. Health outcomes are on the other side. Growing interest in the assessment of the outcomes of all forms of health care, from health promotion through to palliation, has been a further stimulus to the application of quantitative skills to the clinical setting. The construction of measures of outcome that include quality as well as duration of life has been led by health economists, although in some settings epidemiologists and clinicians have collaborated in these developments. One-well known example is Walter Spitzer's pioneering quality-of-life index which is useful

Continued on page 2 ►

Contents

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Clinical applications of epidemiology

► Continued from page 1

in assessing different modalities of treatment for patients terminally ill with cancer. Spitzer, now at McGill University in Quebec, is editor of the *Journal of Clinical Epidemiology*.

Epidemiological skills have also been applied recently in another clinically-related area — pharmacoepidemiology. For example, controversy about the use of fenoterol and other beta agonists in the management of asthma has depended to a large extent on case-control studies for data. While the picture is still incomplete, the studies support a more cautious approach to the use of beta agonists in asthma management. As therapy will presumably now move in the direction of a long-term usage of topical bronchial corticosteroids, we may presume that pharmacoepidemiological techniques will be applied to monitor the consequences — positive and negative — of this change in therapy.

In Australia the most visible presence of clinical epidemiology is at the University of Newcastle, where the Centre for Clinical Epidemiology and Biostatistics has been firmly established over the past 10 years. Richard Heller, Annette Dobson, Michael Hensley, David Henry, David Christie and others have made a major contribution to the training of clinicians, especially from the Asian and Pacific region, in the principles of both clinical epidemiology and biostatistics. In other places small groups of clinical epidemiologists, or clinicians with an epidemiological interest, are making contributions as well, and the discipline is growing. At the University of Sydney, Les Irwig, Robert Cumming and Paul Glasziou have recently introduced an ambitous, but well-received, strand of clinical epidemiology into years three and six of the undergraduate medical education program. Consideration is being given to ways in which formal postgraduate training in clinical epidemiology could develop at the University of Sydney.

It may be time for the Epidemiology and Health Services Evaluation Branch of the NSW Health Department to consider ways in which it can strengthen clinical epidemiological capabilities in the State. Having firmly established a system of infectious and environmental disease monitoring through the network of Public Health Units, the next step may be to consider where else epidemiological skills can make a contribution to the health-care system.

The Health Services Evaluation Section of the Branch is evaluating a variety of topics related to health services and their outcomes. In 1991 the Section completed descriptive epidemiologic analyses of surgical procedures. Topics included coronary artery bypass surgery as an example of the use of new technologies, a range of general surgical procedures in adults, and ENT and appendicectomy in children. The Section also analysed patterns of some diagnostic procedures, including gastrointestinal endoscopy and antenatal screening programs, and is working with representatives of clinical colleges (surgeons and anaesthetists) to assist them in their evaluation of outcomes of services.

With increasing emphasis in management in the NSW Health Department on health outcomes, and a growing capability to appraise economically aspects of health care through the affiliated Centre for Health Economics Research and Evaluation at Westmead Hospital, such a development would be welcome. The secondment of trainees to units actively applying clinical epidemiological methods in clinical practice, such as at Sydney's Royal North Shore Hospital, would be a good first step. Another worthwhile strategy would be consideration, during the design of statutory, administrative and financial health-care data collection systems, of the potential for adding clinical epidemiological "value" through data base linkage and other mechanisms.

These are exciting days in the development of epidemiology. Clinical application of epidemiological skills offers great scope for increasing our rational control and wise use of clinical care resources. It's time, in NSW, for us to put our epidemiology where our patients, as well as our populations, are.

Stephen Leeder, President of the Australasian Epidemiological Association and Director of Community Medicine at Westmead Hospital.
Ross Lazarus, Lecturer in Geriatrics, with an interest in the evaluation of geriatric services, based at Westmead Hospital.

PUBLIC HEALTH OFFICERS — TRAINING UPDATE

The 15 Public Health Officers (PHOs) training in public health practice in NSW are involved in a wide range of activities, projects and plans at Public Health Units or the Health Department's Epidemiology and Health Services Evaluation Branch. A 16th PHO is at the Epidemiological Intelligence Service of the Centers for Disease Control in the US.

Training activities include monthly sessions such as:

- A 'bug breakfast' — a tutorial on an infectious disease presented by a PHO. Recent topics have included typhoid fever, rabies and malaria.
- A biostatics/epidemiology seminar (for example, on the use of the Health Department's Inpatients Statistics Collection).
- A seminar on a topic from environmental health, chronic diseases, maternal and child health or health services (for example, on the principles of environmental health risk assessment and risk management).

At the first of a series of quarterly project review sessions, four PHOs gave presentations on their projects. These included a study of the health effects of the Newcastle earthquake, implementation of infectious diseases aspects of the new Public Health Act, preparation of an injury prevention strategy for NSW and a review of the medical screening program for refugees.

The trainee PHOs attend a writing skills course, and there are plans for an epidemiology update and short courses on selected management topics, as well as a scientific conference in March for the presentation of research and project results.

Mark D Bek, Public Health Officer.

NEONATAL INTENSIVE CARE UNIT STUDY

REPORT OF THE FIRST COHORT (1986-87) OF INFANTS

The aims of the National Intensive Care Unit Study were to establish a data base for specific groups of high-risk infants who were admitted to a Level 3 neonatal intensive care unit during the neonatal period, and to determine their survival and major disability rates.

The study population included all babies with a birthweight of 1000-5000 grams, who received at least four hours' mechanical ventilation which began in the neonatal period, and all babies with a birthweight of 400-999 grams (extremely low birthweight), who were admitted to a Level 3 neonatal intensive care unit (NICU) in NSW between July 1, 1986 and December 31, 1987.

At the start of the study, there were seven Level 3 NICUs in NSW. An eighth unit was opened recently at Nepean Hospital in Sydney's west. Two of the original seven units are in children's hospitals and the others are in Level 6 obstetric hospitals. Six of these Level 3 NICUs are within the Sydney metropolitan Health Areas and the seventh is in a Level 6 obstetric hospital in the Hunter Area.

Information on extremely low birthweight (ELBW) infants born in Level 1-4 obstetric hospitals was obtained from the NSW Maternal and Perinatal Data Collection, death certificates, birth registrations and emergency newborn transport records. For ELBW infants born in Level 6 obstetric hospitals, information was also obtained from the labour ward birth registers. Other sources of data were the admission books and hospital medical records.

Maternal and perinatal data for infants born from January 1 to December 31, 1987 were obtained by manually matching the mothers' NSW Maternal and Perinatal Data Collection forms with the infants' NICU study forms.

Survival in relation to transfer status, level of hospital of birth, gender, plurality, gestational age, birthweight and congenital anomalies was reported at one week, four weeks and one year of age.

Follow-up assessment of ELBW infants, to document long-term survival and incidence of major disability at one and three years of age, corrected for prematurity, was arranged by the Level 3 NICU responsible for their neonatal care. Detailed physical, neurological, psychometric, ophthalmological and audiological examinations were performed by the relevant specialist. The National Acoustic Laboratory or equivalent audiology service assessed the hearing of 78 of 151 children (52 per cent).

Mechanically ventilated infants with birthweights 1000-5000 grams were followed up only in relation to survival to one year of age.

RESULTS

1. EXTREMELY LOW BIRTHWEIGHT INFANTS 400-999 GRAMS

A total of 776 infants with birthweights 400-999 grams were born to women resident in NSW during the study period. Of these, 298 (38 per cent) were stillborn, and 478 (62 per cent) were liveborn. Of the liveborn infants, 272 (57 per cent) were admitted to a Level 3 NICU. Sixty-five of the 776 infants (8 per cent) had a life-threatening congenital anomaly; 33 of those infants were stillborn, 28 died during the neonatal period, one died during the postneonatal period and three survived to one year. Slightly more male than female infants were born (399 or 51 per cent, compared with 377 or 49 per cent), and 646 of the infants (83 per cent) were singletons.

Survival to one year of age

Two hundred and sixty infants without life-threatening congenital anomalies were born alive in a Level 6 obstetric hospital. Of these, 211 (81 per cent) were admitted to a Level 3 NICU, and 131 (50 per cent) survived to one year, corrected for prematurity. Of the 13 born with a life-threatening congenital anomaly in a Level 6 obstetric hospital and admitted to a Level 3 NICU, only three survived.

In contrast, 47 (25 per cent) of the 186 infants without life-threatening congenital anomalies born alive in Level 1-4 obstetric hospitals were transferred to one of the seven Level 3 NICUs in NSW, and 17 (9 per cent) survived. One infant born with a life-threatening congenital anomaly who was transferred subsequently died.

All the infants born in a Level 1-4 obstetric hospital and not transferred to a Level 3 NICU died.

Thirty-six per cent (148 of 413) of the liveborn ELBW infants without a life-threatening congenital anomaly survived to one year. However, the one-year survival rate of all ELBW infants without life-threatening congenital anomalies admitted to a Level 3 NICU in NSW was lower for those who were born in a Level 1-4 obstetric hospital and transferred ex-utero to the NICU (17 of 47, or 36 per cent), than for those born in a Level 6 obstetric hospital and admitted to the NICU (131 of 211, or 62 per cent) ($P < 0.01$).

Infants without congenital anomalies were three times less likely to die when born in a Level 6 obstetric hospital, if their five-minute Apgar score was seven or more, or if they were singletons. Females were twice as likely to survive as males.

Major disability

Of the 151 children who reached a corrected age of one year, 13 (9 per cent) were lost to follow-up, 11 (7 per cent) were assessed at less than 10 months of age (corrected for prematurity), 109 (72 per cent) were assessed between 10 and 14 months, and 18 (12 per cent) were assessed at 15 months or older.

Continued on page 4 ►

Neonatal intensive care unit study

► Continued from page 3

One hundred and twenty-seven children (84 per cent) have had a full neurological assessment at 10 months or older, but only 82 (54 per cent) have had both a full neurological and a standardised psychometric assessment. Twenty-one (16.5 per cent of 127) of the children examined had one or more major disabilities, 9 (7 per cent) having cerebral palsy, 3 (2 per cent) being blind and 2 (1.6 per cent) deaf. Seven (8.5 per cent of 82) children had an isolated mental development delay on psychometric assessment while two children had cerebral palsy and mental developmental delay.

2. Mechanically ventilated infants weighing 1000-5000 grams at birth

Reasons for mechanical ventilation in this group of infants included respiratory failure, congenital anomalies, post surgery, perinatal asphyxia and sepsis. Of the 1293 infants, 318 (25 per cent) had congenital anomalies and they were analysed separately in relation to survival.

Overall, 89 per cent of the 975 infants without congenital anomalies survived to one year of age, with neonatal and postneonatal mortality rates of 10 and 1 per cent respectively.

The most important finding of the study was that a curvilinear relationship existed between birthweight and survival to one year of age with a peak in survival to one year of age (96 per cent) in infants with birthweights in the 2000-2499 gram range. Infants weighing 3000-3499 grams, 1750-1999 grams and 2000-2499 grams were respectively three, four and six times more likely to survive to one year than those weighing 3500-3999 grams. A similar relationship existed between gestational age and survival, with a peak (97 per cent) in survival for infants born at 33-34 weeks gestation. Infants of 35-36 weeks gestation were three times, and those of 33-34 weeks six times, more likely to survive to one year than those of 37-41 weeks gestation. Sixty-three per cent (202 of 318) of infants with congenital anomalies survived.

The aims of the Neonatal Intensive Care Unit Study data collection are being redefined: the study will audit patterns of usage of NICUs, patterns of diseases and mortality rates in NICUs, morbidity of infants at one, three, five and seven years of age, and the relationship of all these to maternal, perinatal and neonatal factors. The audit will serve as a quality assurance of neonatal resuscitation and transport, management of the infants in the NICUs and the follow-up assessment of these babies. It will also provide a comparison with the population-based data collected on all births in NSW.

Lee Sutton, Clinical Epidemiologist, NSW Neonatal Intensive Care Unit Audit.
Barbara Bajuk, Clinical Nurse Consultant/Coordinator, NSW Neonatal Intensive Care Unit Audit.

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.

Prostate problem numbers high

Benign hypertrophy of the prostate is a common reason for surgery in elderly men, but the incidence of this condition has not been known. A British-based study is of general interest as it has used modern techniques (rectal ultrasound) to asses the volume of prostates in more then 700 men between the ages of 40 and 79 years. The study found significant hypertrophy of the prostate in 138/1000 men aged 40 to 79 years rising to 430/1000 men aged 60 to 69 years. This shows the condition much more common than was previously thought to be the case.

Garraway WM, Collins GN and Lee RJ. High prevalence of benign prostatic hypertrophy in the community. *Lancet* 1991; 338:469-471.

Good news on alcohol and heart disease

The association between alcohol consumption and reduced risk of coronary heart disease has been well documented. However, despite these studies, some have argued that the association may be due, in part, to the use in studies of non-drinkers who may include heavy drinkers who have stopped drinking because of illness. A very large American study involving more than 50,000 male health professionals has been conducted to determine whether the relationship between alcohol and heart disease is confirmed.

After adjustment for the standard coronary heart disease risk factors, the study has shown it is probable that alcohol consumption does reduce heart disease. It should be noted that the alcohol consumption by the study group was relatively light and it should not be assumed that heavy drinking will reduce heart disease risk further.

Rimm EB, Giovannucci EL, Willett WC, Colditz GA et al. Prospective study of alcohol consumption and risk of coronary disease in men. *Lancet* 1991; 338:464-468.

The value of methadone

In the quarter-century since methadone was introduced as a treatment for heroin addiction, its effectiveness has been demonstrated throughout the world. Methadone has been found to be an attraction to a significant proportion of the addict population on a voluntary basis, with high retention rates and high cessation of heroin use.

Opposition to methadone programs almost universally attracts controversy and difficulty. Robert Newman, one of the key founders of methadone projects, has written about this rejection phenomenon. He has concluded that, in part, the problem is due to the widely-held perception that heroin addicts are incorrigible hedonists and therefore raise a good deal of intolerance in the community.

Newman RG. What's so special about methadone maintenance? *Drug Alcohol Rev* 1991; 10:225-232.

DEATH AND EROTIC ASPHYXIA

A new study has shown that the practice of erotic asphyxia is dangerous, particularly among men. More than 100 deaths have been recorded in two Canadian provinces since 1974. Autoerotic asphyxia is the practice of inducing cerebral anoxia, usually by means of self-applied ligatures or suffocating devices, while the individual seeks orgasm. This activity, which is found almost exclusively in men, sometimes results in death when the individual's self-rescue mechanism fails or he loses consciousness before he can employ it.

A general understanding of the practice, which might be helpful in treatment, is hampered by almost total lack of data and extraordinary variability in the circumstances of fatal cases. However, despite these variations, there are some patterns of behaviour. Some victims adopt transvestite behaviour, particularly in front of mirrors. The use of bondage, ropes, cords or chains is very common. In addition, a range of erotic objects and interests are commonly used, including pornographic magazines and vibrators.

Blanchard R and Hucker SJ. Age, transvestism, bondage and concurrent paraphilic activities in 117 fatal cases of autoerotic asphyxia. *Br J of Psychiatry* 1991; 159:371-377.

INPATIENT CARE ALWAYS NEEDED FOR SELECTED PATIENTS

It is now accepted that outpatient alternatives to inpatient psychiatric care can be valuable. A quasi-experimental study in Britain has shown that, however well developed community-based resources are for the care of patients with mental disorders, there appears to be a proportion of patients who are always best cared for in a psychiatric hospital.

Lawrence RE, Copas JB and Cooper PW. Community care: does it reduce the need for psychiatric beds? *Br J of Psychiatry* 1991; 159:334-340.

LOW HIV LEVELS IN AUSTRALIAN BLOOD DONORS

Since 1985 tests have been available to determine the presence of HIV antibodies in the serum of Australian blood donors. Up to the end of December 1990, more than five million donations had been tested for HIV antibodies and 46 were found to have the antibody. This is a very low level by international comparisons with, for example, the American levels being 10 to 20 times greater in the general population.

It would be anticipated that the levels would be low because blood donors are legally required to indicate whether they are among risk groups for HIV. Of the 46 donors with HIV antibodies, 11 reported male homosexual contact or injecting drug use. 10 could identify a heterosexual contact who was in a recognised HIV exposure category and two had received HIV infected blood transfusions. Four donors could not be followed up. The remaining 19 donors did not report any potential exposure to HIV other than heterosexual contact. The number of female donors with HIV infections whose only reported source of exposure was heterosexual contact has increased from nil in 1985-86 to four in 1989-90.

Kaldor J, Whyte B, Archer G, Hay J et al. Human Immunodeficiency Virus Antibodies in Sera of Australia Blood Donors: 1985-1990. *Med J Aust* 1991; 155:297-300.

HEPATITIS C AND TRANSPLANTED ORGANS

The Hepatitis C virus has now been shown to be transferable via the transplantation of organs. Hepatitis C virus is added to a growing list of viruses and other agents that can be transmitted by transplanted organs. These include the cytomegalovirus and herpes simplex virus as well as the human immunodeficiency virus, hepatitis A, hepatitis B and toxoplasmosis. HIV, cytomegalovirus and hepatitis C can be pretested and the organs not used for transplantation.

Periera BJG, Milford EL, Kirkman RL, Levey AS. Transmission of Hepatitis C Virus by Organ Transplantation. *New Eng J Med* 1991; 325:454-460.

EXERCISE BIKE INJURY RISK

A new source of injuries to children has been recognised — the exercise bike. At the Royal Children's Hospital in Victoria, 17 children have been treated for severe injuries to their fingers. These injuries occurred mainly when children put their fingers in unguarded spokes of the wheel or the exposed chain and sprocket wheel. Some of these injuries are major, resulting in amputation of fingers. Design modification and education of parents about the risks are warranted.

AGB Perks, Penny M, Mutimer KL. Finger Injuries to Children Involving Exercise Bicycles. *Med J Aust* 1991; 155:368-370.

EFFICIENCY OF NEO-NATAL INTENSIVE CARE UNITS

A new study at Westmead Hospital has shown that services with fewer than six ventilator cots were less cost-efficient than those with more cots, while those with 12 ventilator cots were the most efficient. It should be noted that the study did not include units that had more than 16 ventilator cots.

John E, Hind N, Roberts V and Roberts S. Cost-efficiency of neo-natal nurseries: the significance of unit size. *Aust J Public Health* 1991; 15:242-244.

BACK PAIN AND EXERCISE — NO CONCLUSIONS

Studies indicate that about 80 per cent of the population will suffer from back pain during their active lives. The complaints are usually self-limiting and in about 90 per cent of patients the complaints disappear within a few months, often with the help of some rest, analgesics and home exercises.

For patients with chronic back pain, many interventions are available but none seems to be clearly better than the others. Physiotherapy is probably most widely used for back complaints. The treatments they give include massage, heat, traction, ultrasound, or shortwave diathermy. But despite their widespread use the efficacy of these treatments remains questionable.

A review has been made of 23 randomised controlled trials. The outcome of these trials is mixed, although those studies reporting positive results of exercise therapy tended to have better methodology than others. However, no firm conclusions can be drawn about whether exercise therapy is better than other conservative treatments.

Koes BW, Bouter LM, Beckerman H et al. Physiotherapy Exercises and Back Pain: a blinded review. *Br Med J* 1991; 302:1572-1576.

PREVENTION OF LEGIONELLA IN HOSPITAL WATER

Cases of hospital-acquired legionnaires disease have been associated with infected water supply systems. Since the first environmental isolation of L. pneumophila was taken from a shower head[1], it has been widely assumed that shower aerosols might be a means for dissemination of the organism. The immunosuppressed nature of some patients in hospital increases the risk of legionnaires disease through contact with infected environmental sources.

In July 1991 a survey was undertaken by Environmental Health Officers of the South Western Sydney Public Health Unit, to ascertain the number of legionella organisms isolated in water samples collected from fixture outlets served by thermostatic mixing valves at Campbelltown Hospital.

As is the case in most hospitals, thermostatic mixing valves are used to supply tepid water (37-42 °C) to grouped fixtures in wards. In laboratory cultures, legionella will multiply actively between 20-45 °C[2].

Campbelltown Hospital was chosen for the survey as the hospital engineer had advised of problems with sediment from water supply mains. The sediment was being found in mixing valves during routine six-monthly maintenance.

It was assumed that the combination of sediment and optimum water temperatures in mixing valves and associated pipework leading to fixtures would provide an environment conducive to legionella multiplication.

METHOD

The survey was to represent a "worst case" scenario and was conducted just before six-monthly servicing of thermostatic mixing valves. Thirty water samples were collected from the first hot water fixture outlet serviced by a thermostatic mixing valve. Samples were collected from 7am and without any pre-flushing, so the sample would theoretically represent "first flush" water which had been stored in pipework between the mixing valve and hot water fixture outlet overnight. In most instances, fixture outlets had not been used by patients or staff before sampling was carried out. The water samples were submitted to the Division of Analytical Laboratories, Lidcombe, for microbiological analysis.

The 30 water samples submitted produced no legionella organism isolations.

DISCUSSIONS

Since legionella is chlorine-tolerant[3], the organism survives the standard reticulated water treatment process and passes into the water distribution system in small numbers[4,5].

Most literature recommends the use of fail-safe thermostatic mixing valves to mix hot water (>60 °C) and cold water (<20 °C) close to the point of end use, to control the multiplication of legionella organisms in tepid hot water required for bathing purposes in health care institutions. The section of the pipe containing the mixed water between the outlet fixture and mixing valve should be self-draining. In addition, the Hosplan Code of Practice for Thermostatic Mixing Valves in Health Care Facilities recommends:—

- Regular servicing and cleaning of thermostatic mixing valves, in accordance with manufacturer's recommendations, to remove sludge, slime and other sedimentary materials which may promote the growth of legionella.
- During routine servicing, the pasteurisation of the mixing valve and associated warm water lines with hot water at 70 °C for a period of not less than five minutes, to decontaminate the system.

The private contractor servicing the thermostatic mixing valves of Campbelltown Hospital was seen to pay particular attention to removing all sediment and slime from internal components of mixing valves AND pasteurisation of mixing valves and associated warm water lines, in accordance with the Hosplan Code, during routine six-monthly maintenance.

As the survey at Campbelltown Hospital was to represent a "worst case" scenario, and as the 30 water samples produced no legionella isolations, the results obtained are reassuring and reinforce the wisdom of using *regularly maintained* thermostatic mixing valves close to fixture outlets to control the multiplication of legionella organisms in hospital warm water systems.

Peter Cavagnino
Environmental Health Officer
South Western Sydney Area Health Service
Public Health Unit

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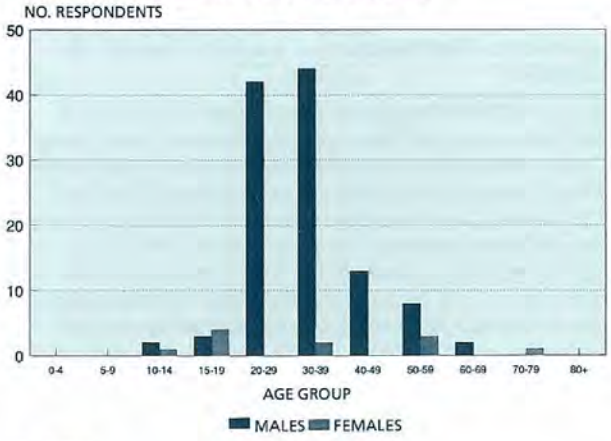
1. Tobin J, Beare J, Dunnill M et al. Legionnaires disease in a transplant unit: isolation of the causative agent from shower baths. *Lancet* 1980; 2:118-21.
2. National Occupational Health and Safety Commission. Legionnaires Disease and Related Illnesses — Worksafe Australia Guide 1989; page 4.
3. Kuchta JM, States SJ, McNamara AM et al. Susceptibility of Legionella pneumophila to chlorine in tap water. Appl Environ Microbial 1983; 46:1134-9.
4. Hsu SC, Martin R. Wentworth BB. Isolation of legionella species from drinking water. Appl Environ Microbial 1984; 48:830-2.
5. Witherell LE, Duncan R. Stone K et al. Investigation of L. pneumophila in drinking water. J Am Water Works Assoc. 1988; 80:87-93.

FIGURE 1

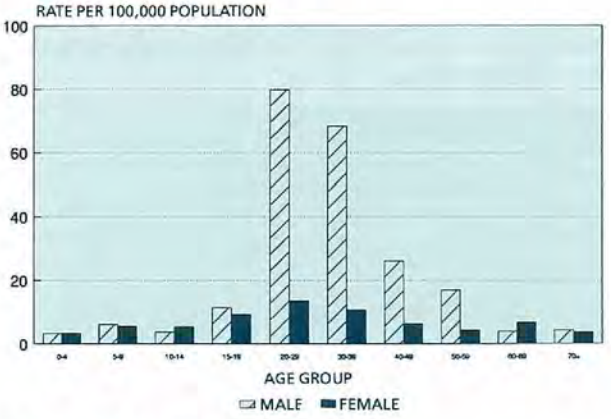
HEPATITIS A SURVEY
AGE AND SEX DISTRIBUTION OF RESPONDENTS



SOURCE: PHUs

FIGURE 2

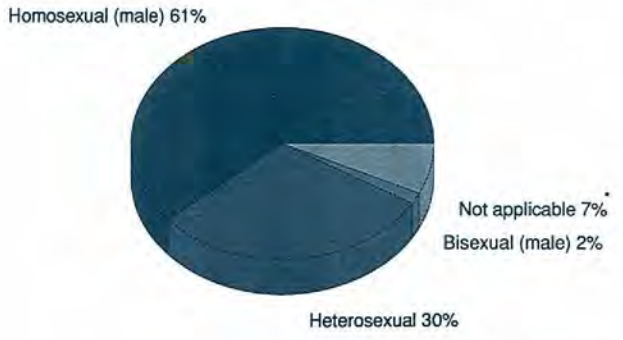
HEPATITIS A NOTIFICATION RATE
BY AGE AND SEX, NSW 1991



SOURCE: PHUs (1,106 cases — 31/12/91)

FIGURE 3

HEPATITIS A SURVEY
SEXUAL PREFERENCE OF RESPONDENTS (n = 127)



* e.g. children, not sexually active

SOURCE: PHUs

HEPATITIS A SURVEY RESULTS

In July 1991, as part of the public health response to the current hepatitis A outbreak, the NSW Public Health Network conducted a three-month survey of people recently infected with hepatitis A. The aim of the survey was to collect baseline information on epidemic variables (person, place, time) and potential risk factors for hepatitis A. The outcome of this exercise was the identification of the main risk group for the epidemic in NSW: young males aged 20-24 years, mainly homosexual and living in the inner suburbs of Sydney. Outbreaks in male homosexuals have been reported recently from London[1], New York, Dallas, Denver, San Francisco, Toronto and Montreal[2].

THE SURVEY

Hepatitis A cases were identified from routine laboratory and doctor notifications. The Public Health Units approached the attending medical practitioners and asked if they would distribute a questionnaire to any patient with recent hepatitis A. A total of 279 self-administered questionnaires were distributed.

The questionnaires were returned to the Eastern Sydney Public Health Unit and the data were analysed using Epi Info Version 5.0.

RESULTS AND DISCUSSION

1. Response rate

One hundred and twenty-seven questionnaires were returned from 12 Public Health Units. The overall response rate was 45.5 per cent. The low response rate signals the potential for selection bias: there may be significant differences between the characteristics of respondents and non-respondents. Another source of bias is the incomplete case notification which results from a combination of subclinical cases and under-reporting. Nevertheless, the age, sex and geographic distribution of survey respondents is similar to the total number of cases in NSW so the survey respondents appear to be representative.

2. Demographic characteristics

The age-sex distribution of respondents is shown in Figure 1. Most of the respondents (68.5 per cent) were males aged 20-40 years. This corresponds to the NSW total data set for 1991 (see Figure 2). The male:female ratio of respondents was 10:1.

The majority of respondents (61.4 per cent) were homosexual men (see Figure 3) and the geographic distribution of respondents (see Figure 4) indicates that most lived in the inner and eastern suburbs of Sydney. This pattern is consistent with the overall picture in NSW.

The occupational group of respondents is shown in Figure 5. More than half the respondents work in occupations associated with higher socio-economic status. This finding is unusual for hepatitis A infection, which usually occurs in depressed socio-economic conditions where overcrowding and poor hygiene promote the spread of the disease[3,4,5,6].

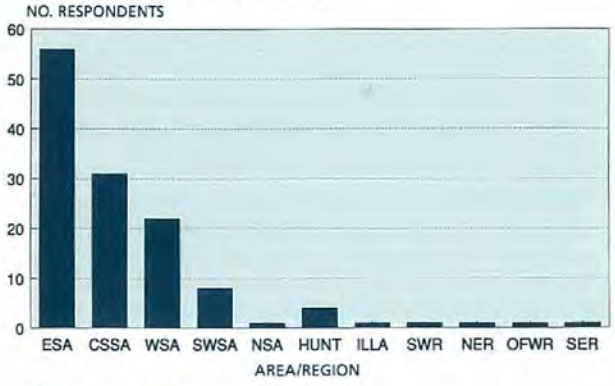
Continued on page 8►

Hepatitis A survey results

► Continued from page 7

FIGURE 4

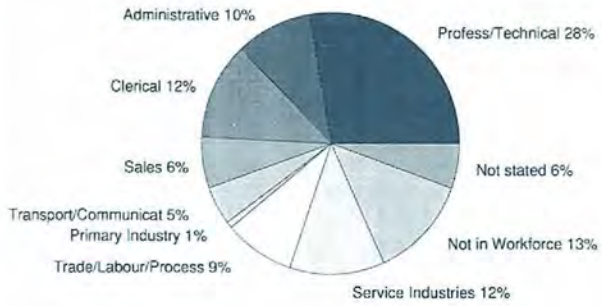
HEPATITIS A SURVEY
GEOGRAPHICAL DISTRIBUTION
OF RESPONDENTS (AREA/REGION)



SOURCE: PHUs

FIGURE 5

HEPATITIS A SURVEY
OCCUPATIONAL GROUP* OF RESPONDENTS (n = 127)



SOURCE: PHUs
*Australian Bureau of Statistics

3. Clinical symptoms

The most commonly reported symptoms are set out in Table 1.

TABLE 1

FREQUENCY OF SYMPTOMS
REPORTED BY RESPONDENTS

Symptom	Number	Per cent
Dark urine	117	92.1
Lethargy	113	89.0
Jaundice	109	85.8
Loss of appetite	103	81.1
Malaise	89	70.1
Nausea	84	66.1
Fever	83	65.4
Abdominal discomfort	75	59.1
Pale stools	66	52.0
Vomiting	62	48.8
Diarrhoea	38	29.9
Upper respiratory	29	22.8

4. Risk factors (Tables 2 and 3)

The majority of respondents (61.4 per cent) were male homosexuals. However, only 9.5 per cent of respondents said they had travelled to a high risk area before their illness and only 18.8 per cent had direct contact with another person with hepatitis A infection (see Table 2). For the majority of respondents, there was no identifiable source of infection. This finding is not unusual in hepatitis A infection[7,8].

In the UK, data from a nine-year review of hepatitis A notifications to the Communicable Diseases Surveillance Centre indicate that 14.5 per cent of patients had travelled abroad in the two months before the onset of illness and 15.3 per cent had been in contact with hepatitis A (family/intimate contact accounting for most of the exposures)[7]. The apparently low rate of travel-acquired infection in NSW is consistent with a large, community-based outbreak in which, predictably, most cases arise within the community.

Sexual contact (see Table 3) was the most commonly reported type of contact, especially in male homosexuals: 16.7 per cent of all cases in male homosexuals (n=78) reported a sexual contact with someone with hepatitis A; there were no reports of sexual contact in the non-homosexual group.

Very few respondents (3.1 per cent) had contact with children in day-care. This is unlike the pattern in the United States where, in 1982, 18 per cent of reported cases of hepatitis A occurred in day-care children, employees, or household contacts[8].

TABLE 2

PREVALENCE OF RISK FACTORS FOR HEPATITIS A
AMONG QUESTIONNAIRE RESPONDENTS (n = 127)

Risk factor	Number (per cent)
Recent travel to a high risk area	12 (9.5)
Contact with children in day-care	4 (3.1)
Contact with a person with hepatitis A	24 (18.8)
Male homosexual	78 (61.4)

TABLE 3

TYPE OF CONTACT REPORTED BY RESPONDENTS WITH A HISTORY
OF EXPOSURE TO SOMEONE WITH HEPATITIS (n = 24)

Type of contact	Sexual preference		Total
	Homosexual	Heterosexual	(Per cent)
Household	3	1	4 (16.7)
Sexual	8	–	8 (33.3)
Household and sexual	4	–	4 (16.7)
Shared food/food utensils	1	3	4 (16.7)
Social	–	1	1 (4.2)
Workplace	3	–	3 (12.5)
TOTAL	19	5	24 (100)

5. Use of medical services and immunoglobulin

Most respondents were seen by a general practitioner (89.8 per cent) and the remainder were seen by a hospital or clinic doctor. Fourteen respondents (11.0 per cent) stated that they were admitted to hospital for treatment. Eleven (8.7 per cent) reported that they had received an immunoglobulin injection in the two months before their illness.

Continued on page 12 ►

INFECTIOUS DISEASES

TABLE 4

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

CONDITION	Number of Cases Notified			
	Period		Cumulative	
	December 1990	December 1991	December 1990	December 1991
Adverse Reaction	N/A	1	N/A	1
AIDS	*25	*8	*360	*262
Arboviral Infection	37	1	292	561
Brucellosis	–	–	5	2
Cholera	–	–	–	–
Diphtheria	–	–	–	–
Foodborne illness (NOS)	230	32	3040	2849
Gastroenteritis (instit.)	N/A	54	N/A	137
Gonorrhoea	20	9	407	393
H influenzae epiglottitis	1	2	6	22
H influenzae B — meningitis	2	2	27	59
H influenzae B — septicaemia	1	–	4	9
H influenzae infection (NOS)	2	5	38	128
Hepatitis A	5	13	32	1121
Hepatitis B — acute	2	–	13	20
Hepatitis B — carrier	–	1	–	24
Hepatitis B — unspecified	17	11	414	1116
Hepatitis C	6	13	45	553
Hepatitis, acute viral (NOS)	–	1	–	268
HIV infection	59	14	785	771
Hydatid disease	–	–	2	7
Legionnaires' disease	2	1	31	26
Leprosy	–	–	7	–
Leptospirosis	3	1	48	34
Listeriosis	N/A	–	N/A	8
Malaria	11	–	194	135
Measles	36	8	375	380
Meningococcal meningitis	4	1	48	46
Meningococcal septicaemia	–	1	12	15
Meningococcal infection (NOS)	1	1	28	47
Mumps	N/A	–	N/A	4
Mycobacterial tuberculosis	–	1	–	323
Mycobacterial — atypical	–	4	24	204
Mycobacterial infection (NOS)	2	4	438	36
Pertussis	10	2	152	48
Plague	–	–	–	–
Poliomyelitis	–	–	–	–
Q Fever	13	4	159	204
Rubella	N/A	1	N/A	54
Salmonella infection (NOS)	125	13	1390	1151
Syphilis	11	12	329	582
Tetanus	1	1	2	3
Typhoid & paratyphoid	7	1	40	55
Typhus	–	–	–	–
Viral haemorrhagic fevers	–	–	–	–
Yellow fever	–	–	–	–

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

NOTIFICATIONS

MENINGOCOCCAL DISEASE

The number of reported cases of meningococcal disease for the period 1982 to 1990 ranged from 12 (1982) to 86 cases. Notifications for meningococcal disease have increased by a factor of 3.2 between 1988 and 1989, and by 4.8 between 1988 and 1990. This increase is due partly to improved surveillance and partly to an increased incidence of meningococcal disease. The latter has been reported internationally and in other Australian states. Refer to Public Health Bulletin 1990; 2:8-10.

The reporting rate for 1990 was 1.5/100,000 total population. By month of onset, the number of notifications ranged from 17 in August to three in February and November.

All Areas/Regions reported cases of meningococcal disease except Illawarra Area, South Eastern Region and South West Region. The number of cases ranged from 5.2/100,000 for the New England Region to 0.3/100,000 for the Eastern Sydney Area.

Meningococcal disease was reported for all age groups. The highest number of notifications was 25 males (13.0/100,000) and 16 females (7.7/100,000) in the 0 to 4 age group and 11 males (4.5/100,000) in the 15 to 19 age group.

Under the 1991 Public Health Act, meningococcal disease is reportable by doctors and hospital chief executive officers as meningococcal meningitis and meningococcal septicaema, and by laboratories as meningococcal infection if identified in blood or cerebrospinal fluid.

ARBOVIRAL DISEASE

The number of reported cases of arboviral disease for the period 1982 to 1990 ranged from 805 cases in 1984 to 22 in 1982 and 1983. A severe epidemic of Ross River virus occurred in 1984.

The reporting rate for 1990 was 5.0/100,000 total population. By month of onset, the number of notifications ranged from 66 cases in April and May to fewer than 10 for September, October and November.

All Areas/Regions reported cases of arboviral disease except Western Sydney Area and South Eastern Region. The number of cases ranged from 28.7/100,000 for the North Coast Region to fewer than 5/100,000 for metropolitan Sydney, Central Coast and Illawarra Area.

Arboviral disease was reported for all age groups. In the 30 to 39 age group 44 females (12.6/100,000) and 34 males (7.5/100,000) were notified, followed by 34 females (9.7/100,000) and 27 males (7.3/100,000) in the 40 to 49 year group.

Under the 1991 Public Health Act, laboratories are to report causes of arboviral infection.

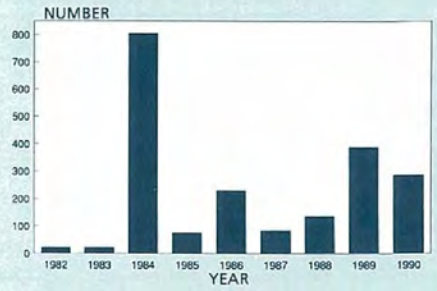
TETANUS

The third tetanus case for 1991 was notified from the South-Eastern Region on December 11. The patient is a 48-year-old male who was injured on his left hand while gardening on December 6. The infected wound was treated by a local medical officer and tetanus toxoid was administered immediately after the injury. After nine days the patient presented to Queanbeyan Hospital with an infected wound and mild trismus. He remains intubated after three weeks in intensive care.

Continued on page 12 ►

FIGURE 6

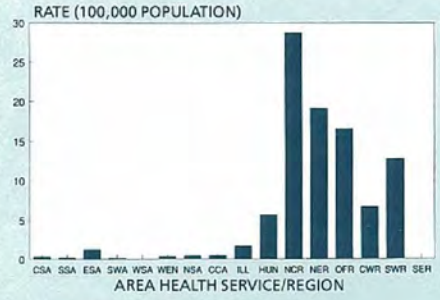
ARBOVIRAL DISEASE NOTIFICATIONS NSW 1982-1990



SOURCE: NSW Infectious Disease Database

FIGURE 7

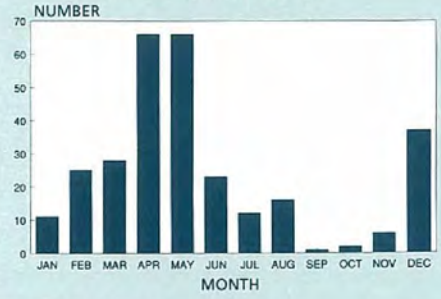
ARBOVIRAL DISEASE NOTIFICATION RATE BY AREA/REGION, NSW 1990



SOURCE: NSW Infectious Disease Database

FIGURE 8

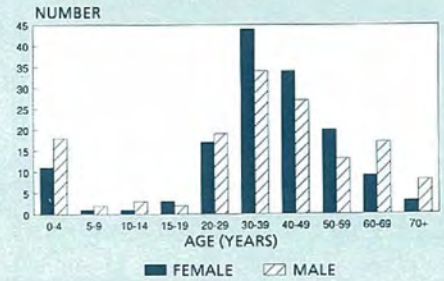
ARBOVIRAL DISEASE NOTIFICATIONS BY MONTH OF ONSET, NSW 1990



SOURCE: NSW Infectious Disease Database

FIGURE 9

ARBOVIRAL DISEASE NOTIFICATIONS BY AGE AND SEX, NSW 1990



SOURCE: NSW Infectious Disease Database

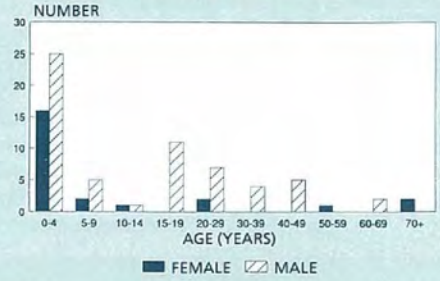
FIGURE 10

MENINGOCOCCAL INFECTION NOTIFICATIONS BY MONTH OF ONSET, NSW 1990

SOURCE: NSW Infectious Disease Database

FIGURE 11

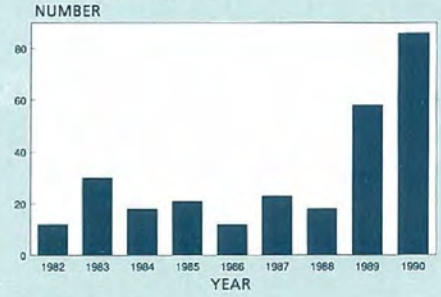
MENINGOCOCCAL INFECTION NOTIFICATIONS BY AGE AND SEX, NSW 1990



SOURCE: NSW Infectious Disease Database

FIGURE 12

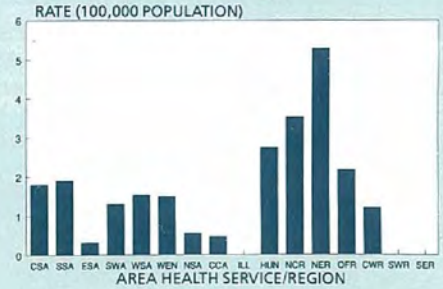
MENINGOCOCCAL DISEASE NOTIFICATIONS NSW 1982-1990



SOURCE: NSW Infectious Disease Database

FIGURE 13

MENINGOCOCCAL DISEASE NOTIFICATION RATE BY AREA/REGION, NSW 1990



SOURCE: NSW Infectious Disease Database

TABLE 5

INFECTIOUS DISEASE NOTIFICATIONS BY HEALTH AREA AND REGION
December, 1991

CONDITION	CSA	SSA	ESA	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	SWR	SER	U/K	TOTAL
Adverse event after immunisation	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Arboviral infection	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1
Foodborne illness (NOS)	2	–	10	5	5	–	–	–	7	3	–	–	–	–	–	32
Gastroenteritis (instit)	–	–	–	–	–	–	–	–	54	–	–	–	–	–	–	54
Gonorrhoea	–	–	4	2	–	–	–	–	–	–	–	3	–	–	–	9
H. influenzae epiglottitis	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	2
H. influenzae meningitis	–	–	–	–	–	1	–	–	1	–	–	–	–	–	–	2
H. influenzae infection (NOS)	–	–	–	1	–	–	–	–	–	–	1	2	–	1	–	5
Hepatitis A	–	2	7	1	–	2	–	–	–	1	–	–	–	–	–	13
Hepatitis B — Carrier	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Hepatitis B — Unspecified	–	–	–	4	–	1	–	–	–	1	1	1	–	3	–	11
Hepatitis C	–	–	–	–	1	3	1	–	–	5	3	–	–	–	–	13
Hepatitis, acute viral (NOS)	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
HIV infection	–	–	4	–	1	–	–	–	–	–	–	–	–	–	9	14
Legionnaires' disease	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1
Leptospirosis	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
Measles	1	4	–	1	1	1	1	1	4	1	–	2	–	1	–	18
Meningococcal meningitis	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1
Meningococcal septicaemia	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1
Meningococcal infection (NOS)	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1
Mycobacterial atypical	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Mycobacterial tuberculosis	–	–	1	1	–	1	–	–	–	–	1	–	–	–	–	4
Mycobacterial infection (NOS)	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1
Pertussis	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	2
Q fever	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	4
Rubella	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Salmonella infection (NOS)	1	2	–	4	3	3	–	–	2	–	–	–	–	–	–	13
Syphilis	1	1	1	–	1	3	–	–	–	2	3	–	–	–	–	12
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Typhoid & paratyphoid	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1

TABLE 6

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

CONDITION	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	OTH	U/K	TOTAL
Adverse event after immunisation	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
AIDS*	47	16	118	9	19	15	25	8	4	12	12	–	1	1	–	–	–	8	262
Arboviral infection	5	–	8	–	1	–	5	–	1	8	33	214	233	5	36	5	7	–	561
Brucellosis	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Foodborne illness (NOS)	229	389	640	168	284	169	1	39	19	103	328	151	164	25	121	2	17	–	2849
Gastroenteritis (instit.)	–	–	–	5	12	6	4	2	2	81	1	10	9	5	–	–	–	–	137
Gonorrhoea	46	13	144	33	28	1	11	1	12	6	16	8	57	5	8	2	2	–	393
H. influenzae epiglottitis	1	3	–	3	3	1	5	–	1	1	–	–	–	1	–	3	–	–	22
H. influenzae meningitis	2	4	–	11	2	1	12	–	2	11	–	2	2	5	2	3	–	–	59
H. influenzae septicaemia	–	2	–	1	–	1	3	–	–	2	–	–	–	–	–	–	–	–	9
H. influenzae infection (NOS)	13	20	17	5	15	11	1	5	11	3	1	2	9	2	10	3	–	–	128
Hepatitis A	154	53	538	37	40	8	174	18	5	20	22	18	13	2	3	15	1	–	1121
Hepatitis B — Acute	14	4	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	20
Hepatitis B — Carrier	10	12	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	24
Hepatitis B — Unspecified	145	87	84	212	178	23	118	1	6	46	51	43	71	7	3	37	4	–	1116
Hepatitis C	125	61	2	31	53	31	80	15	7	54	54	24	4	6	3	1	2	–	553
Hepatitis, acute viral (NOS)	–	–	–	5	191	11	1	4	8	2	1	2	25	–	10	8	–	–	268
HIV infection	63	15	184	19	28	16	39	6	3	17	16	1	2	5	1	2	6	344	771
Hydatid disease	3	1	1	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	7
Legionnaires' disease	–	–	–	5	7	3	5	–	–	2	2	–	–	–	1	–	1	–	26
Leptospirosis	1	–	–	–	–	–	–	–	–	9	6	5	4	–	5	1	3	–	34
Listeria	2	1	1	–	–	–	2	–	1	1	–	–	–	–	–	–	–	–	8
Malaria	7	7	11	4	14	3	53	3	5	11	3	3	1	–	5	4	1	–	135
Measles	80	14	13	14	26	6	36	11	15	109	25	4	11	–	2	14	–	–	380
Meningococcal meningitis	4	5	–	11	2	–	2	1	1	9	2	4	1	2	–	2	–	–	46
Meningococcal septicaemia	1	1	–	–	1	–	–	1	1	1	4	2	–	2	–	1	–	–	15
Meningococcal infection (NOS)	–	1	6	3	4	1	4	4	8	–	3	7	2	1	2	1	–	–	47
Mumps	–	–	–	–	2	–	1	–	–	–	–	–	–	–	1	–	–	–	4
Mycobacterial atypical	34	37	38	9	13	1	27	2	4	25	–	5	4	–	2	1	2	–	204
Mycobacterial tuberculosis	41	35	30	72	46	3	32	8	16	18	6	3	2	4	4	2	1	–	323
Mycobacterial infection (NOS)	–	–	–	–	–	8	14	–	3	–	3	–	–	4	–	4	–	–	36
Pertussis	–	2	6	4	12	1	1	–	–	2	3	2	10	1	3	1	–	–	48
Q Fever	–	1	–	1	1	–	–	–	–	5	31	58	99	4	3	1	–	–	204
Rubella	1	4	13	–	11	1	10	1	1	4	3	1	–	–	2	2	–	–	54
Salmonella infection (NOS)	79	135	88	136	162	75	100	2	44	24	81	68	73	23	28	16	18	–	1151
Syphilis	48	23	45	62	46	10	35	1	7	17	85	25	151	8	15	1	3	–	582
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	3
Typhoid & paratyphoid	10	10	18	–	4	–	3	–	1	3	–	5	–	–	–	–	1	–	55

* Data from January to November only

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.

Notifications

► Continued from page 9

The man was uncertain if he received tetanus toxoid 10 years ago.

This year the NSW Health Department will join vaccine manufacturers and medical practitioners to promote adult immunisation.

Hepatitis A

More than 1,100 notifications of hepatitis A were reported to PHUs for 1991. The number of reported cases for the period 1982 to 1990 ranged from 36 in 1990 to 280 in 1986. Notification rates range from 167/100,000 population in Eastern Sydney, 46/100,000 in Central Sydney, 24/100,000 in Northern Sydney to fewer than 10/100,000 in other Areas and Regions. Males comprised 80 per cent of the reported cases. Of the total number of males 76 per cent (676/889) were aged 20 to 39.

Pertussis

In 1991 NSW did not experience an increase in pertussis notifications. Pertussis is usually a spring-summer epidemic disease. The last epidemic experienced in NSW was in 1989/90[1]. An epidemic of pertussis, which tends to occur each two to five years, is occurring in New Zealand.

In 1992 the National Health and Medical Research Council will consider recommending the introduction of a pre-school pertussis booster. The current schedule recommends pertussis immunisation (triple antigen) at ages 2, 4, 6 and 18 months.

Gastroenteritis

The Hunter Area Public Health Unit reported 54 cases of gastroenteritis (in an institution). The notifications relate to children from Singleton who went on a school excursion to Hawkes Nest. Symptoms of nausea and vomiting developed within three days. Epidemiology and Health Services Evaluation Branch, in association with staff of the Hunter and Illawarra Public Health Units, investigated the outbreak. Preliminary results implicate a gastrointestinal illness of short incubation period which was contracted before leaving home, rather than food or water consumed on the excursion. The report of this investigation will be published in a future issue of the *Public Health Bulletin*.

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1. Infectious diseases. NSW Public Health Bulletin 1991; 2:56-58.

Hepatitis A survey results

► Continued from page 8

Conclusions

The survey highlighted a number of important aspects of the current hepatitis A outbreak:

- homosexual males aged 20-40 years are affected much more than any other group. There appears to be a worldwide pattern of hepatitis A outbreaks mainly affecting homosexual men.
- sexual contact is the most commonly reported source of infection although most people have no identifiable source of infection.
- this outbreak has involved large numbers of people. The high infection rates probably result from the large pool of susceptible people in the community, the widespread distribution of cases and the predominance of person-to-person transmission.
- the hospital admission rate was estimated to be around 10 per cent.

Marie-Louise Stokes, Public Health Officer
Eastern Sydney Public Health Unit

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