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DIRECTIONS FOR THE DECADE

PLANNING FOR CHANGE

By the year 2001 we will be judging the results of this decade's changes in health service delivery, and their impact on the health status and longevity of the community.

Planning for 2001 and beyond is taking place now within the NSW health system, since there is a long lead-time needed for most changes in health services, especially to physical facilities such as hospitals, or to organisational culture issues such as consumerism.

The latest Corporate Plan for the NSW Health System to be published by the Health Department analyses long-term directions, influences and priorities. It focuses beyond today's operational imperatives on the broad goals and strategies, which in turn inform the other forms of planning and service delivery. The plan gives expression to the vision of the Government and its health managers for the future system.

THE BASIS OF THE PUBLIC SYSTEM

The NSW health system is focused on increasing the health status of the population, making provision for health care services and ensuring that the community gets value for money.

The public sector health organisations of NSW are part of one of the largest industries in Australia in terms of expenditure and staff employed. The annual budget for 1991-92 is $4.25 billion of public money and there are about 76,000 staff, of whom about 43 per cent are nurses.

Organisations within the public health system include community health centres, hospitals, ambulance stations, rural multi-purpose services, and behind-the-scenes groups such as scientific laboratories and health professional registration boards.

The services delivered by the public health system are complemented by those from the private sector, through facilities such as private hospitals, nursing homes, medical and day surgery centres, and through the services of general practitioners, pharmacists, dentists and other health professionals. More than 5000 Visiting Medical Officers hold appointments in public hospitals, and a number of private contractors supply public hospitals with linen, casual nursing staff and other services.

On an average day in NSW:

- 236 people are born
- 124 people die
- 2740 people are admitted to public hospitals
- 20,971 people are inpatients in public hospitals
- 4658 people attend Accident and Emergency services
- 17,371 people receive community-based services
- 11,550 people visit hospital outpatients
- 88,180 people visit a GP
- 30,320 visit a medical specialist.

HEALTH STATUS

The health of the people of NSW is very good by world standards and life

Continued on page 127 ►

Contents

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Directions for the decade

► Continued from page 126

expectancy for both males and females ranks with the highest internationally. The health of the Aboriginal community, however, remains a matter for concern and the health problems of some groups of women and migrants continue to require special attention.

Together with most developed countries, Australia's major health problems are increasingly associated with ageing and lifestyle-related conditions — and are potentially amenable to health education.

Technology

Demands for high technology services compete against the other areas of health care. Decisions about the allocation of resources are often choices between different levels of technology, and also choices between performing simpler services for many people (eg artificial hip joints), or complex services for a few (eg coronary bypass).

Despite the advent of new technologies, the bulk of the work of public hospitals over the next decade is expected to remain in treating commonplace conditions, especially those associated with ageing. The major differences will be the speed with which these conditions can be treated, the introduction of less invasive procedures, the reduction in the need for a lengthy inpatient stay for many conditions, and new treatments for formerly untreatable conditions.

Hospitals and beds

Average lengths of stay in acute hospitals are declining steadily both in Australia and overseas, as a consequence of improvements in medical technology and techniques. The role of principal and major referral hospitals is becoming more focused on the provision of high technology services. Many small rural hospitals are finding they need to provide a broader mix of services, especially long-term care facilities.

Continuation of these trends will result in fewer, larger hospitals in the future, with concentration of hospital care on those who are acutely ill. People will find more procedures available on a day-only admission basis, and community-based services will be available to support them at home during their treatment. As the population ages, there will be greater focus on the care of the aged through the provision of specialised community health services and appropriate residential care.

By the year 2001 the average length of stay in hospital is predicted to be 3.64 days (down from the current average of 5.34 days); and the need for acute beds predicted as a total of 23,000 for NSW (down from the present 27,000 public and private beds).

Distribution of resources

The distribution of major health facilities is no longer consistent with the spread of the population in NSW.

The Health Department uses a strategy for the redistribution of resources, known as the Resource Allocation Formula. It will result in more equitable distribution of resources by the year 2000. The formula is based on local population, weighted for a variety of factors such as health status, and is based on the principle that residents should have to travel outside their local area only for highly specialised services.

Private sector participation

The private health sector provides most of the primary care and long-term care services, but the public health system provides the majority of acute care beds for both secondary and tertiary services. Over the coming decade the market share for secondary services in the public health system is expected to decline, with the private sector increasing both the volume and size of its facilities.

The maintenance of existing hospital infrastructure continues to take up most funding for capital works. At least 70 per cent of available funds each year needs to be spent on upgrading existing facilities either to expand their capacity or to improve their efficiency and maintain their useful life. This restriction on the use of capital funds for new projects slows the application of the Resource Allocation Formula, and has encouraged negotiations with the private sector on infrastructure provision.

Costs of the public health system

The issue of increasing costs is a complex one. Overall the total *proportional* cost to the State for the health system has remained stable in recent years, although in *dollar* terms it has risen substantially. This increase is in line with the increase in GDP and the overall increase in the State's budget, and with the increase in the population.

The *demand* for increased health care continues to rise faster than the increase in the budget, as new technologies and techniques are developed. However, this rising demand for access (as measured through the waiting times for admission to a public hospital for elective surgery) has been met so far through increases in *performance* of the system, in terms of greater productivity. This improvement in efficiency is expected to continue over the coming decade.

Key result areas

The Department has identified a number of key result areas by which the system should be judged over the coming decade. These identify the results sought in relation to both the health status of the population and of the performance of the system. Performance indicators for the system are identified in the key result areas of capacity, productivity, activity, efficiency, workforce and financial performance. Even more importantly, targets are being set for health outcomes, especially in the four priority areas of:

- infectious diseases
- adverse pregnancy outcomes and child development
- injury
- asthma.

Other conditions targeted are cancers, cardiovascular diseases, malignant melanoma, hip fractures in the aged, diabetes and disabilities.

Strategic directions

The principal challenge facing NSW is to develop and implement strategies which will improve outcomes and contain the cost of services. The overall development of the future health system is based on the following key strategic themes:

- health outcomes improvement and management, leading the integrated development of the system;
- incorporation of the benefits of a national approach;
- major structural and technological changes to service delivery infrastructure;
- organisational structure and culture changes to improve efficiency and effectiveness of services;
- long-term financial strategies to facilitate change and service development; and
- advanced information technology to provide integrated systems for clinical operations and performance management.

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ARE CO-PAYMENTS A PUBLIC HEALTH ISSUE?

In the August Federal Budget[1] the Government announced a reduction in the rebate for general practitioner services. What raised more concern, though, was the proposal that this reduction could be passed on to patients, including those who were bulk-billed. The introduction of this co-payment stimulated strong professional and public reaction, almost all unfavourable. The ensuing outcry united the Public Health Association, the Australian Hospitals Association, the Australian Council of Social Services, Community Health Forum, the College of General Practitioners, the AMA — and much of the Labor Party.

In this article, I want to explain the issue of co-payments and explore its public health implications.

Even the terminology is confusing. Although the issue has been called one of co-payments, the Government insisted it was about rebate reduction. The Government planned to reduce the rebate on general practitioner services by $3.50 (after a Caucus review this was cut to $2.50); therefore, GPs would receive $3.50 less for each consultation. Should they choose to absorb that reduction in the rebate, they would incur a reduced fee; should they pass it on to patients, there would be a co-payment introduced.

A co-payment is where patients are asked to pay a contribution to the cost of their medical care. Patients visiting doctors who do not bulk-bill (or accept rebate only) already face a co-payment. Those covered by health care cards would be protected from any co-payment. The group affected are those without health care cards who visit bulk-billing general practitioners.

What problem is this rebate reduction designed to address? "The Government believes that price signals can act as a counter-balance to over-servicing"[1]. Certainly, there have been steady increases in health care expenditure and the use of medical services grew by 33 per cent over six years[2]. But the growth in health care expenditure has not exceeded the growth in Australia's GDP until the recession of this year. And the growth is associated with the increase in the doctor supply. Whatever the causes of these increases, they are not sudden; and are probably more related to the supply of medical services than the demands of patients.

In all the debate about co-payments, and indeed in most of the debate about health care financing, there has been little or no discussion of the impact on health. Yet for those of us interested in public health this is very important.

Co-payments can be expected to reduce the use of general practitioner services, and those on low incomes will reduce their use of services proportionately more. A similar scheme of co-payments was introduced in Saskatchewan, Canada, in 1968 (and reversed in 1971 with a change of government)[3]. As here, welfare recipients were exempted from the co-payment. The poor reduced their use of health services by three times the average reduction for all families. But the co-payment did not alter the underlying rate of increase in the use of medical services. The National Health Strategy has released a paper of the effects of co-payments[4]; it concluded that "the importance of co-payments has been overstated in Australia. They are unlikely to play a significant role in solving any of the major problems facing the health sector."

This has been acknowledged by the Government[1]. It seems to be accepted that, while co-payments will reduce the services used by the poor, service use by other groups may increase, so there is little or no overall change. What will have happened is a shift in costs from public expenditure to private expenditure.

Studies of the effect of co-payments on utilisation generally point to a reduction in the use of services, both those judged medically as "necessary" and "unnecessary". The poor are less likely to seek medical attention for their children and less likely to seek ante-natal care.

The effects on health outcomes are more difficult to judge. Only one study has systematically investigated the relationship between co-payments and health outcomes. This is the randomised controlled trial of health insurance plans conducted by the Rand Corporation in the United States in the 1970s[5]. The Rand study used an impressive array of health status measures. Co-payments had no statistically significant effect on most measures of health status. The results were similar when analysed by income group but it may be that important differences in health outcomes were not detected in the sub-group analysis due to a lack of power. However, this study showed that low-income individuals with a high risk of dying (based on the risk factors of smoking status, cholesterol level and blood pressure) did reduce that risk under free care. On balance, I believe this suggests that barriers to the use of medical services can have deleterious effects on health.

Co-payments can be considered inequitable in that they impose barriers to the use of medical service with potentially negative health consequences for an already disadvantaged group. This is inconsistent with the move towards concerns with health outcomes as measures of health system performance and the goal of reducing differences in health status across social groups[6].

Herein lies the public aspect of co-payments. As Peter Baume has queried[7], what is the purpose of discussing the means of financing with no concern for the ends, ie for what the health system produces in health outcomes.

Jane Hall, Director, Centre for Health Economics Research and Evaluation.

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TRAVEL VACCINATION HEADACHES

The rising number of people travelling overseas in the past 20 years has led to a higher risk of exposure to diseases not commonly found in Australia. It has also led to a demand for country-specific travel health advice which has not always been found easily. The Western Sydney Public Health Unit has been responsible for dealing with public and professional inquiries about travel health since its inception. Demand on time and resources to satisfy this need has risen dramatically.

Between October 11 and December 14, 1990, all travel health inquiries were collated and analysed. One hundred and forty-four individual recommendations were made from 75 inquiries covering 44 countries, at an average of 3.2 individual recommendations each working day. The findings are presented below with the aim of assessing the impact and role of the travel inquiries on the functioning of the PHU. This report also highlights some of the problems encountered when providing advice to potential travellers.

METHODS

A travel health inquiry form (Form A) was designed by the PHU and used for all inquiries. The form required the name and address of the client, date of inquiry, date of birth, month of departure, countries to be visited and length of stay in those countries. All travel inquiries were received by phone and immediately directed to a relevant staff member. At no time was the information given over the phone anything more than a general recommendation, which needed to be discussed and tailored to the individual's needs by his/her medical practitioner. This was emphasised to every client, who was then mailed the completed form A and a copy of the Commonwealth Department of Community Services and Health booklet Fit To Travel And Return.

The travel inquiries were handled in three ways:

i) Standard inquiries — relevant recommended immunisation guidelines for travellers were taken directly from the Commonwealth Serum Laboratory's (CSL) 1989 Country by Country Guide to International Travel Immunisation. From December, the second edition of the guide was used. These inquiries were dealt with mainly by the Public Health Nurse.

ii) Complex inquiries — these often consisted of multiple African or South American countries, and reference would be made to MASTA — a computerised database of medical information for travellers. The client would be phoned back by the PHU nurse with information which was more detailed but still within the form A format.

iii) Doctor inquiries — these were dealt with by the medical staff and MASTA was used as necessary. Form A plus the relevant MASTA information was sent to the doctor.

RESULTS

There were 75 individual inquiries comprising 144 destination countries and encompassing 44 different countries. Fifty-seven per cent of the clients were males and 43 per cent females. Average age of the clients was 29 years for males and 32 years for females, with a range from less than 1 year to 73 years. There was an uneven distribution of age and gender, with more males than females in all age groups except for the 30-39 age group.

The mean duration of travel was 10 weeks. Most frequent length of stay overseas was three weeks (17.4 per cent), followed closely by four weeks and nine weeks (14.6 per cent and 13.2 per cent respectively).

Hornsby local government area had the most inquiries (15.4 per cent), followed by Blacktown (14.6 per cent) and Parramatta (11.9 per cent). Analysis of the point of inquiry revealed that 61.6 per cent came from residents within the area serviced by the Western Sector PHU, while 16.8 per cent and 14.7 per cent came from the bordering areas of Northern and South Western Area Health Services respectively.

Thailand was the most popular country, accounting for 11.1 per cent of inquiries, followed by India (6.9), and then Brazil, Argentina, Singapore and Malaysia (4.9). South-East Asia was the largest geographical area, with 34.7 per cent of country inquiries to that area.

There was almost total uniformity in the recommendations about the following vaccines: diphtheria, polio, tetanus, yellow fever and malaria prophylaxis. There was poor uniformity in the recommendations for rabies, hepatitis A, hepatitis B, typhoid, cholera, Japanese encephalitis and meningococcal meningitis.

DISCUSSION

A number of problems were identified on analysis of the data — principally the difficulty in giving relevant and consistent travel health recommendations over the phone.

The general recommendations we purported to give as they were written in the CSL guide were exactly what the name states: *recommendations only*, but the import of this was and is very difficult to convey to the travelling public. This was particularly the case with certain vaccine-preventable diseases such as rabies, cholera, meningococcal meningitis, hepatitis A and Japanese encephalitis, where the vaccines were often recommended although this was not always the most appropriate advice.

The inherent limitations of the service were best illustrated by the recommendations to travellers entering countries with endemic rabies. The rabies vaccine was recommended according to the protocol while what was really required was not a vaccination but education about the possible risk of rabies to the individual traveller. Travel health education must cover both precautions and the follow-up emergency actions and seeking of medical advice.

Preventive education for the traveller is also needed to minimise the risk of infection with hepatitis A, cholera, typhoid and other food-borne illnesses. This would include advice on handwashing, water quality and food selection and cooking. In many instances, effective education would obviate the need for vaccines.

Continued on page 130 ►

Travel vaccination headaches

► *Continued from page 129*

The seasonal variation of diseases and the increasing number of mainstream travellers going to remote and often disease-infested areas has led to special problems with giving advice about the meningococcal and Japanese encephalitis vaccines. CSL recommendations for the two diseases present problems as they do not take into account the type and duration of travel, standard of accommodation, individual itineraries and activities of the traveller. The latter needs to be addressed in a travel health consultation where the balance between the risk of infection and the efficacy, safety and cost of the vaccine can be judged effectively. Japanese encephalitis vaccine is further complicated because the Commonwealth Department of Community Services and Health in Canberra has to approve its use.

It is difficult to define the areas where meningococcal meningitis is present in epidemic proportions and thus provide a comprehensive service. The latter could be addressed by performing weekly updates on all the country inquiries but it would be both too expensive and difficult to implement as the information would require a medical interpretation dependent on a number of factors in the traveller's trip. This cannot be delivered over the telephone. Instead, the information was designed to inform the member of the public and give standard recommendations which could be used as a guide in consultation with the local doctor.

The dramatic rise in the number of people travelling overseas has resulted in an increase in the numbers receiving vaccines and thus the number of adverse side-effects, which can range from a mild flu-like illness to the more severe Steven Johnson syndrome. It is therefore important that only travellers 'at risk' receive appropriate vaccines. Specialised travel clinics and general practice training are needed so uniform advice is given and adverse reactions can be monitored and acted on.

Recommendations for malaria prophylaxis resulted in a number of problems: with standard inquiries, travellers often requested specific information on drugs and dosages. This was most probably because general practitioners were unsure of which antimalarial drugs to prescribe, as was confirmed by the large number who contacted us about appropriate drugs. It was found that few had a copy of the National Health & Medical Research Council's Malaria Guidelines for General Practitioners. Recommendations for antimalarial prophylaxis were also complicated by the MASTA reference not being as comprehensive and up-to-date as had been expected.

The major difficulty with yellow fever vaccine was the poor publicity about its availability. Neither members of the public, travel agents nor local doctors knew where to get it. This reflects the lack of information travellers are given by their travel agencies about overseas health risks and vaccine requirements. Travellers are unaware of the time, cost and need for vaccinations and antimalarial tablets so there is no planning of the latter to ensure the optimal time interval is available in the delivery of the vaccinations.

Travel vaccination record books are used by some of the travel medicine practices but travellers, travel agents and general practitioners are confused about the need to have one and have it stamped for overseas travel. This strengthens the argument for some consultation with the travel industry and the College of General Practitioners over the development of a basic overseas travel kit aimed at alleviating these problems.

The last area for discussion is how the existing PHU travel information services are going to develop and change. We need policy guidelines on what type of common service all the PHUs will be required to provide. This would identify the target population and the detail of information required and give an indication of what level of resources the PHUs should expend on the service. It is important that all PHUs be required to provide a specified minimal service so one unit does not inherit all the inquiries and so a critical level of expertise in travel health develops. It is interesting to note that the Hornsby local government area in the Northern Sydney Area Health Service was where most of our inquiries originated.

CONCLUSION

A service answering travel health inquiries is both time-consuming and limited in the information it can provide. General recommendations can be given over the telephone, followed by a letter confirming the details but this cannot replace a travel health consultation where the traveller should be given both the required immunisations and — more importantly — be educated about the possible health risks of the overseas travel. The latter is not happening and this means people ring the PHU to get information which cannot safely and effectively be delivered over the phone.

Issues that must be addressed are:

- the level of service to be provided to the public and local GPs
- the need to define what a general practitioner travel health consultation should entail
- what information they and the travel agencies should provide to minimise adverse health outcomes to the public.

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APPARENT OUTBREAK OF GASTROINTESTINAL DISEASE

A report in the Tamworth Newspaper the *Northern Daily Leader*, on May 16 alleged there was an outbreak of gastrointestinal disease at Farrer Agricultural High School, just outside Tamworth. The paper said 260 students had suffered symptoms including "gastric problems and constant vomiting" over the previous seven weeks (this period corresponded to the return from the Easter holiday). This was revised to 272 on May 17 in a follow-up report indicating the problem was continuing.

Farrer is a boys high school with a student intake locally and from a wide area of NSW. There are 468 students, about 300 of whom are boarders, and 90 staff. Students from year 7 to year 12 are enrolled (ie ages 12 to 18). As an agricultural school it has a farm section which includes dairy and beef cattle, pigs, chickens and one horse. A vegetable garden tended by students provides some vegetables for consumption at the school.

INVESTIGATION

Senior staff at Farrer Agricultural High School expressed concern about an apparent excess of gastrointestinal illness at the school, so a decision was made to undertake a formal investigation. New England Region Public Health Unit (NER PHU) requested assistance from the Health Department's Epidemiology and Health Services Evaluation Branch with the epidemiologic aspects of the investigation.

Initial inquiries by NER PHU staff were directed at clarification of the media reports, which had implicated the school water supply. An assessment of school water was begun by the senior Environmental Health Officer in co-operation with Public Works Department staff.

Records of attendance at Farrer's sickbay were examined for the school year to date in an attempt to define recent illness patterns at the school. Class rolls indicated that a rise in school absences did occur during the fortnight from April 29 (Figure 1). We then examined the sickbay records for 1991 and determined that the increase in absences corresponded with a rise in sick-bay attendance. This change in the pattern of illness included elevations in the number of students presenting with upper respiratory tract and gastrointestinal symptoms (Figure 2). On this basis a preliminary case definition specified reporting of symptoms of diarrhoea, nausea, and/or vomiting and respiratory tract symptoms.

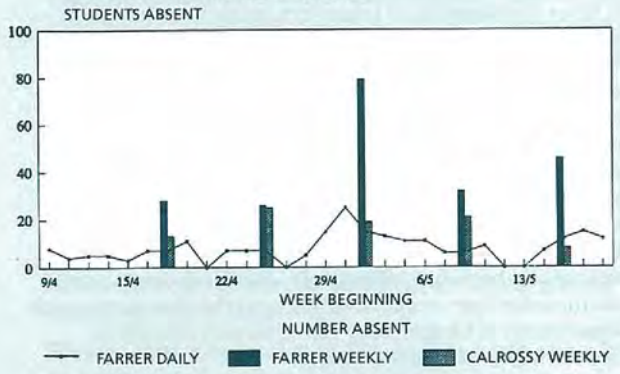
Having confirmed the impression of excess illness, and finding some evidence for recent change in the pattern of illness, we had to determine if the Farrer experience differed from local background rates of these illnesses. To obtain comparable information from a control group a similar examination of records was made at Calrossy Girls School where sickbay records and class rolls were examined for the current term (at Calrossy, beginning April 15). Calrossy Girls High School is in Tamworth and has a similar mixture of day and boarding students (156 and 200 respectively), of comparable age range to those at Farrer.

A questionnaire was designed to obtain information on rates of certain health problems (throat infection, diarrhoea, vomiting, nausea, headache and skin infections). Symptoms were defined on the basis of the subjective report of affected individuals.

A cohort study was thus carried out, with exposure defined as attendance at Farrer between April 10 (return from the Easter holiday) and May 17 (the end of the week in which the problem came to public attention). Controls were

FIGURE 1

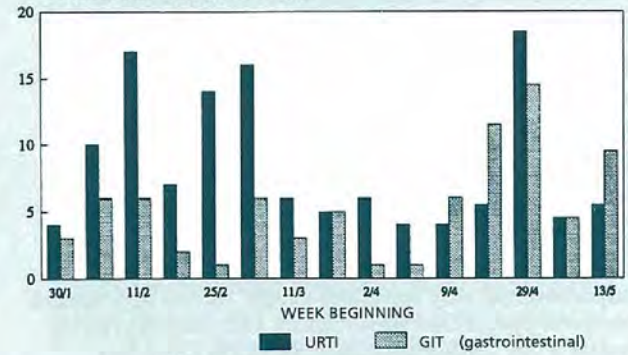
FARRER SCHOOL OUTBREAK INVESTIGATION
STUDENTS ABSENT FROM SCHOOL



SOURCE: FARRER CLASS ROLLS

FIGURE 2

FARRER SCHOOL OUTBREAK INVESTIGATION
RESPIRATORY AND GASTROINTESTINAL ILLNESS



NOTE: Non-specific symptoms which included nausea were categorised as GIT. GIT may, therefore, be overestimated.

SOURCE: FARRER SICKBAY RECORDS

defined as having attended Calrossy during the same period. Identical questionnaires were given to the control school students and staff on the same morning.

Variables examined included water (being a student or staff member at Farrer was taken as a proxy for exposure to Farrer's water supply), food prepared at Farrer, working in certain areas at Farrer (the vegetable garden, the dairy and work involving contact with cattle, pigs or chickens).

Investigations by the NER PHU Environmental Health Officer included sampling of water at Farrer to determine any contamination. Staff of the Department of Public Works were involved in this process. The Regional food inspector examined food preparation and processing and collected 13 specimens for microbiological examination. Stool samples were collected from students presenting at Farrer's sickbay with gastrointestinal symptoms.

RESULTS

A total of 923 questionnaires was completed — 539 from Farrer and 384 from Calrossy. This represents a response

Continued on page 132 ►

► Continued from page 131

rate of 97 per cent at Farrer and 88 per cent at Calrossy.

Results of sampling undertaken as part of the investigation were available during the following week. Rotavirus was isolated from one of the four stool samples collected from Farrer students attending the sickbay with gastrointestinal symptoms (diarrhoea with or without vomiting).

The Department of Public Works confirmed admixture of untreated water in the Farrer water supply. Four samples were collected from taps at Farrer on May 15. Two showed elevated levels of total coliforms but no faecal coliforms were isolated.

The Tamworth water supply is largely obtained from the Dungowan Dam. Farrer's water is supplied via a branch pipe. This water is chlorinated but has not passed through the townwater treatment works. Seventy-six other users receive water from this branch pipe proximally to Farrer and one distally. There were no NER PHU reports of similar illness from these sites. These investigations also revealed that some, at least, of the water available for drinking came directly (ie untreated) from the Peel River.

We entered data from the cohort study into an Epi-info 5.0 data base and used Epi-info for analysis, calculating frequencies of and relative risk for reported symptoms. The study demonstrated elevated rates of diarrhoea (RR 3.53, 95 per cent CI 2.37-5.28) and vomiting (RR 1.58, 95 per cent CI 1.02-2.45) associated with attendance at Farrer School. This involved boarder students especially but also day students and staff. Local community risk was determined by calculating relative risk for those recording the postcode of residence as 2340 (Tamworth). This was 0.53 (95 per cent CI 0.38, 0.75) for diarrhoeal symptoms.

We examined the potential relationship between consumption of food prepared at school and reports of illness. A significant trend towards reporting diarrhoea at Farrer with increasing consumption of meals prepared there (Chi-square for trend — 20.44, df=6, $p < 0.001$) was demonstrated. When we stratified according to day/boarder status, however, this trend was not significant (Chi-square for trend = 0.0043, df = 6, $p = 0.84$). Eating more meals at Farrer was associated with being a boarder rather than illness as such.

Discussion

We demonstrated an elevated risk of mild gastrointestinal symptoms among students and staff at Farrer High School (compared with Calrossy Girls School) during the period April 9 to May 17. The explanation for this excess was not clear from this study. Water sampling, though confirming admixture of treated and untreated (river) water at Farrer, did not implicate the water supply as a cause of illness.

The systematic investigation of an acute disease outbreak compromises: (i) preliminary inquiry; (ii) identification of cases; (iii) collection of data; (iv) analysis of data; (v) control; (vi) communication, and (vii) further epidemiological and laboratory investigations. The preliminary inquiry was able to confirm that a problem existed (ie, community concern) although the existence of the reported episode of disease was less certain. Confirming a diagnosis was difficult in the absence of local laboratory surveillance, samples from affected students and continuing acute presentations. No immediate control measures were felt necessary given the lack of evidence for a continuing problem, the mild nature of symptoms described and the uncertainty about a real excess of illness above local background rates.

Case identification involved reviewing sickbay and class records and contact with the local GPs. We developed a case definition on the basis of this information, and the initial media reports, which we took as a barometer of community concern. A clear case definition is an essential prerequisite to an epidemiological investigation. Initially it should be broad enough to allow for uncertainty but will ideally be narrowed with additional information. Our initial definition was maintained, in the absence of specific diagnostic information, as being appropriate to dealing with the problem as it existed.

A special study was needed to enable a more accurate description of the disease and determination of risk. We hypothesised that some excess risk existed at Farrer, perhaps due to exposure to untreated drinking water. Data was therefore collected from those exposed to the water supply, to food prepared and any viral respiratory infections at Farrer and from a comparable group not exposed to these factors (Calrossy Girls High School). A major potential inadequacy of the study concerned measurement bias. This includes recall bias and the subjectivity of a report of 'diarrhoea' with no quantification of motions per day. We assumed that the bias in recalling symptoms over two months would be equal at the two schools, however, the publicity surrounding the Farrer 'outbreak' may have influenced recall at Farrer.

Data were analysed within the three classical epidemiological parameters of *time*, *place* and *person*. Time was problematic as the investigation was conducted six weeks after the initial cases were said to have occurred. Nevertheless an epidemic curve was drawn for both schools for the current term (from April 9), shown in Figure 1. Though not providing information to suggest, for example, a common agent or point source of infection, this curve indicated a change in illness during the period implicated by the media reports. The geographic distribution of cases was clear, though we attempted to define a more localised illness pattern within Farrer (eg by dormitory).

Analyses by 'person' included analysis by status (ie teacher, boarding or day student), food histories, exposure to specific areas at Farrer including the dairy and vegetable garden.

Specific control measures were not required, however advice about certain food-handling techniques and hygiene was provided. Removal of interconnections between river and treated water was essential regardless of the results of our investigation. Surveillance of control measures introduced is an essential part of control of a disease outbreak. NER PHU arranged for a prospective study of presentations to Farrer sickbay to answer the question (posed in media reports) of a continuing excess of illness at Farrer.

The NER PHU was confronted with reports of a cluster of gastrointestinal illness among students of a local school. A systematic approach, utilising the skills of a range of PHU and E&HSEB staff, enabled a rapid assessment of risk and potential aetiology. A review of Farrer water supply, food handling and processing and sickbay arrangements was undertaken in conjunction with assessment of the acute disease outbreak. The PHU was thus able to reassure the local community and to recommend measures to Farrer School, aimed at improving their ability to deal with illness within the school and general hygiene precautions, within a short time of the initial reports.

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LISTERIOSIS IN WESTERN SYDNEY

Responding to identified clusters of disease is a continuing responsibility for Public Health Units. The type of response is dictated by the type of disease cluster, the size of the cluster, public expectations and political constraints. This report describes an investigation of a cluster of cases of listeriosis in western Sydney and discusses some relevant statistical and epidemiological issues in assessing disease clusters.

BACKGROUND

On April 24, 1991, the Institute of Clinical Pathology and Medical Research (ICPMR) at Westmead Hospital notified the Infectious Diseases section of the Epidemiology Branch of the NSW Health Department of four cases of confirmed *Listeria monocytogenes* it had identified.

SUBJECTS

Case summaries

1. 66-year-old male.

   Frequently hospitalised over past five months with chronic alcoholic liver disease and oesophageal varices. Fevers, nausea and diarrhoea. Cerebellar abscess. Blood cultures positive for *L. monocytogenes*. Lives in western Sydney. Onset 31/3/91?

2. 28-year-old male.

   Systemic Lupus Erythematosis recently diagnosed after prolonged illness. More recently fevers, nausea and vomiting. Cultures positive for *L. monocytogenes*. Lives in the central-west of NSW. Onset 2/4/91?

3. 3-year-old female.

   Previously well 3-year-old with no other major illnesses. Cultures positive for *L. monocytogenes* following five-day history of fevers, headaches, vomiting and diarrhoea. Lives in western Sydney. Onset 11/4/91.

4. Female neonate.

   Daughter of a refugee family living in a hostel in south-western Sydney. Mother well throughout pregnancy. Foetal distress noted at 31 weeks gestation. Blood cultures positive for *L. monocytogenes*. Onset 18/4/91?

METHODS

Case interviews

Case one and two were interviewed at Westmead Hospital by Dr Wayne Smith. Case three (family) was interviewed at Fairfield Hospital by Dr Jeremy McAnulty. Case four (family) was interviewed at Mt Druitt Hospital by Dr Chris Nielsen. All interviews were done using a specially designed standardised structured questionnaire.

Statistical analysis

All statistical calculations were done using the SPIDA[1] statistical package.

RESULTS

No specific foodstuffs or brands of foods were identified as a common potential source of infection. None of the cases had knowingly consumed any unpasteurised dairy products. No dairy product or vegetable types were common to all cases. Two cases had exposure to domestic animals.

There was no apparent potential source of infection common to all cases. No specific exposure can be implicated in any single case.

DISCUSSION

Statistical assessment of whether this cluster constitutes an epidemic.

Case definition

A case is defined as laboratory-confirmed listeriosis requiring hospitalisation.

Incidence

From Benenson[2], the expected incidence of illness requiring hospitalisation is 1:150,000 population per annum.

Population base

The source population for these cases is approximately 1.8 million, as the cases originated in the three health areas: Western Sydney/Wentworth; Central-Western NSW and South Western Sydney. The expected number of cases in this area per year is 12. The expected number of cases over three weeks is 0.69.

The observed number of cases was four over a period of three weeks. Using the Poisson distribution, the probability of this number of cases occurring by chance in this particular three-week period is less than 0.006[1] (Figure 3).

Therefore, four cases occurring in this population over this three-week period satisfies the statistical definition of an epidemic. If three cases had occurred during this timeframe, the result would still be significant ($p < .05$), but not if two cases had occurred. As seen from Figure 3, if these four cases had occurred over a time period up to five weeks and five days, the result would still be significant ($p < .05$).

Precautions in interpreting this result

1. Incubation period

Because of the large variance in potential incubation period for listeriosis (three days to 70 days), these four cases presenting in this three-week period may have arisen from incident infection over a 13-week period (if 70-day incubation before first case and three-day incubation before last case).

2. Error in background incidence rate

Using incidence rates for listeriosis requiring hospitalisation from another region or country is a potentially large source of bias. Figure 3 shows the effect of varying the incidence rate on the probability of a false-positive epidemic.

3. Statistical issues in defining timeframes

There are 344 three-week periods in a year. Given that there are six chances in 1000 that four cases of listeriosis requiring hospitalisation can occur purely by chance in a three-week period, there is a:

$(0.994)^{344}$ = 12.6 per cent probability of AVOIDING a cluster of four cases in a three-week period in a year.

That is, there is an 87.4 per cent chance that a cluster of four cases will occur in one of the 344 three-week periods in a year.

Whether to do special studies?

Case-control studies to determine statistically significant associations between exposure variables and outcome in outbreaks such as this have been done with results providing direction for interventions[3,4]. However, such case-control studies require at least five cases and high relative risks (about 20 times for five cases) to make them worthwhile[5]. In this case none of these requirements is met, so no special study is justified.

Continued on page 134 ►

Listeriosis in western Sydney

► *Continued from page 133*

FIGURE 3

Probability of a type 1 error (false positive), using the Poisson distribution, of four and five cases of listeriosis requiring hospitalisation occurring over various timeframes using different background incidence rates.

A. FOUR CASES

	Background Incidence (cases per annum per population)		
Time period	**1:100,000**	**1:150,000**	**1:200,000**
3 weeks	p = .021	.006	.002
4 weeks	p = .051	.015	.006
5 weeks	p = .098	.03	.012
6 weeks	p = .157	.052	.021

B. FIVE CASES

	Background Incidence (cases per annum per population)		
Time period	**1:100,000**	**1:150,000**	**1:200,000**
3 weeks	p = .004	.0007	.0002
4 weeks	p = .014	.003	.0007
5 weeks	p = .032	.007	.002
6 weeks	p = .06	.014	.004

SUMMARY AND RECOMMENDATIONS

Four cases of listeriosis from three Health Areas over a period of three weeks were reported to the Infectious Diseases section of the Epidemiology Branch. This incidence rate represents a statistically significant epidemic for this particular three-week period, if a usual incidence of infection requiring hospitalisation is assumed to be the same in Australia as in the United States.

These points are relevant in considering recommendations:

1. Investigation of the cases reveals no common source of infection, and no particular source for each case.
2. Two of the cases were in immunocompromised patients, and in only one, a 3-year-old girl, were there no predisposing factors.
3. Overall, this cluster of cases of listeriosis fits the classical picture of only particular groups of individuals (neonates, immunosuppressed persons) being at risk from *Listeria monocytogenes*, an agent common in many foods.
4. Benenson[1] recommends no concurrent disinfection, quarantine or immunisation of contacts.
5. There is an almost 90 per cent chance that this 'epidemic' will occur in a three-week period in any given year.
6. No special study can be justified.

Taking these points into account, the most appropriate recommendation is to continue surveillance and investigate further clusters, but not to undertake any more formal study, e.g. case-control study, in this case. To this end, pathology services should be alert to the importance of reporting cases of listeriosis. This will require some reinforcement of existing recommendations and feedback from investigations such as for this cluster of four cases, including summaries of what results and actions are possible from such investigations. In this case, to illustrate some possibilities for formal feedback, the Western Sector Public Health Unit has presented the results of this investigation to the microbiological staff at the ICPMR at Westmead Hospital. This presentation included:

- investigation methods
- possible further study designs
- public health consequences
- Health Department public health powers
- statistical considerations for defining infectious disease epidemics and
- some discussion of the usefulness of investigating clusters of disease.

Wayne Smith, Public Health Officer
Western Sector Public Health Unit

1. Gebski V et al. Statistical Package for Interactive Data Analysis (SPIDA) Version 5.25, 1989.
2. Benenson AS. Control of Communicable Diseases in Man 15th Ed. APHA, Washington DC, 1990.
3. Linnan MJ et al. Epidemic Listeriosis Associated with Mexican-Style Cheese. *N Eng J Med*, Vol. 319 No. 13, 1988.
4. Schlech WF et al. Epidemic Listeriosis: evidence for transmission by food. *N Eng J Med* 1983; 308:203-6.
5. Neutra RR. Counterpoint from a Cluster Buster. *Am J Epidemiol* 1990; 132:1-8.

CHILD AND FAMILY HEALTH CONFERENCE

Dr David Hall, who chaired a British working party that produced the radical report *Health for All Children*, which suggested a more stringent approach to child health surveillance and screening, will be a key speaker at a conference next month at the University of Newcastle. The fourth annual NSW Community Child and Family Health Conference, from January 29 to 31, is to be opened by the Minister for Health and Community Services, Mr John Hannaford.

Other key speakers will include the Director of the National Health Strategy, Jenny Macklin, who will discuss some of the implications for child and family health services of the national review; the Chief Nursing Officer in NSW, Judith Meppem; the Director of the Western Australia Research Institute for Child Health, Professor Fiona Stanley; and the Professor of Sociology at the University of Newcastle, Lois Bryson, who will give the closing address with her provocative paper *And after all this, who really benefits?*

Themes at the conference will include infectious diseases, rural child safety, early intervention and a new look at delinquency. Workshops will examine the use of computers in effective child health service management, domestic violence, alcohol and drug abuse, providing services to mobile families and working with toddlers.

Brochures are available from the Central Coast AHS Child and Family Health Service (telephone 043 20 3618) or the Child, Adolescent and Family Health Service in the Hunter (telephone 049 69 4955).

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.

COMMON COLDS INCREASE WITH STRESS

Stressful life events are commonly believed to suppress resistance to infection. When demands imposed by events exceed a person's ability to cope, a stress response occurs which appears to operate through the nervous system affecting lymphoid tissue or hormonal effects on immune cells.

There is now substantial evidence that stressful life events and perceived stress are associated with changes in immune function. A major study conducted at the Common Cold Unit in Salisbury, England, clearly indicates that rates of both respiratory infection and clinical colds increase in a dose-response manner with increases in the degree of psychological stress. Infection rates change from about 74 to about 90 per cent according to levels of psychological stress.

However as Swartz, commenting on this study, states, 'some caution is warranted in interpreting the results. The observed effects of stress were relatively small, although they were detected in a large study group'.

Cohen S, Tyrrell DAJ, Smith AP. Psychological Stress and Susceptibility to the Common Cold. *New Eng J Med* 1991; 325:606-612.
Swartz MN. Stress and the Common Cold. *New Eng J Med* 1991; 325:654-655.

DRASTIC EFFECTS OF WESTERNISATION

When Australian Aboriginals make the transition from a traditional hunter/gatherer to a westernised lifestyle, they have been shown to be particularly vulnerable to developing obesity and non-insulin dependent diabetes. They share this vulnerability with other populations around the world which have been subjected to a similar rapid lifestyle change in the 20th century, including native Americans and many Pacific Islanders.

A detailed review by Kerin O'Dea of Deakin University suggests that insulin resistance was important to the survival of Aborigines as hunter/gatherers, and this characteristic has predisposed them to obesity, diabetes and coronary heart disease after westernisation. Accordingly, intervention strategies should be directed at lifestyle modification.

O'Dea K. Westernisation, Insulin Resistance and Diabetes in Australian Aboriginals. *Med J Aust* 1991: 155:258-264.

BLOOD CHOLESTEROL STUDIES FROM CHINA

In populations in which serum cholesterol is relatively high, studies indicate a strong association between serum cholesterol and coronary heart disease. But questions remain about the relation at lower concentrations of cholesterol. In a very large (more than 9000 subjects) prospective study in Shanghai, China, it has been shown that the relationship between serum cholesterol and coronary heart disease remains despite the average serum cholesterol levels in these subjects being 20 to 25 per cent lower than that in western populations.

Accordingly, the question of what constitutes a desirable blood cholesterol concentration is an important practical issue. Comparison with populations in which cholesterol concentrations are low and coronary heart disease is rare suggests that few people in western populations have a biologically normal (as opposed to population average normal) cholesterol concentration. The population studied had an average serum cholesterol of about 4mmol/L (the Australian average is between 5.5 and 6mmol/L). However, there are populations in rural China in which the serum cholesterol is below 3mmol/L and in which rates of coronary heart disease are even lower than in Shanghai. This provides an interesting speculation about what might be achievable in the West if practicable methods could be devised to reduce cholesterol concentrations on a population basis.

Chen Z, Peto R, Collins R, MacMahon S et al. Serum Cholesterol Concentration and Coronary Heart Disease in Population with Low Cholesterol Concentrations. *Br Med J* 1991; 303:276-282.

96 PER CENT VACCINATION COVERAGE IN FINLAND

In the 1970s mass vaccination projects against measles and congenital rubella were started in various parts of the world, with eradication as the final goal. In many countries, including Finland, the elimination of measles failed because of low vaccination coverage.

A combined measles/mumps/rubella vaccination program was started in Finland in 1982. Computerised recording of the vaccinated children was used and was integrated with a population registry to identify hard-to-reach families. Several interventions improved compliance, including a mass media campaign and notification of non-vaccinated children to local health professionals and parents. All successive campaigns increased vaccination significantly, with the notification of parents about their non-vaccinated child being especially affected. A vaccination cover of more than 96 per cent was achieved.

Paunio M, Virtanen M, Peltola H, Cantell K et al. Increase of Vaccination Coverage by Mass Media and Individual Approach: intensified measles, mumps and rubella prevention program in Finland. *Am J Epidemiol* 1991; 133:1152-1160.

TOBACCO SCIENTISTS BELIEVE SMOKING IS BAD NEWS

The United States Surgeon General has stated that 'smoking represents the most extensively documented cause of disease ever investigated in the history of biomedical research'. However, despite overwhelming scientific evidence against cigarettes, the tobacco industry continues to assert that controversy, debate and uncertainty exists among scientists concerning smoking as an important cause of illness.

But a survey among scientists receiving funds from the tobacco industry found that the vast majority of these scientists also believe cigarette smoking is an addiction that causes a wide range of serious and often fatal diseases. This result suggests that the tobacco industry is unwilling to accept even the opinions of scientists it has deemed worthy of funding.

Cummings KM, Sciandra R, Gingrass A, Davis R. What Scientists Funded by the Tobacco Industry Believe About the Hazards of Cigarette Smoking. *Am J Pub Health* 1991; 81:894-896.

INFECTIOUS DISEASES

NOTIFICATIONS

PUBLIC HEALTH ACT

The Public Health Act (1991) was proclaimed on November 18. Medical practitioners, laboratories and Chief Executive Officers of hospitals are now notifying Public Health Units directly, according to the lists of scheduled medical conditions. Epidemiology and Health Services Evaluation Branch is interested in any comments about the new notification system. The Infectious Diseases Advisory Committee will review the notification schedules every six months in the light of the needs of NSW and comments received.

ARBOVIRAL INFECTION

For the period January to November 1991, 526 notifications for arboviral diseases were received. Ross River disease accounted for 73 per cent (386) of these; 242 Ross River notifications were laboratory confirmed. Four Barmah Forest virus isolations were laboratory confirmed.

HEPATITIS A

The hepatitis A outbreak continues in NSW. By the end of November, PHUs had received 973 hepatitis A notifications. Hepatitis A notifications rates range from 147.3/100,000 population a year in the Eastern Sydney Area and 21.2/100,000 in the Northern Sydney Area to fewer than 10/100,000 in other Areas and Regions. Of 952 cases with recorded age and sex data, 80.8 per cent were male (male:female ratio 4.1:1) and 41.2 per cent were males in the 20-29 age group.

ADVERSE REACTIONS FOLLOWING IMMUNISATION

This month we include, for the first time, the "condition" *Adverse reaction*. Surveillance of reactions following immunisation allows us to identify possible illnesses linked to immunisation, estimate the rates of illness following immunisation, identify particular batches of vaccine that may be problematic, alert health-care providers to the risks and benefits of immunisation and identify areas for further epidemiological research.

FOODBORNE DISEASE

Epidemiology and Health Services Evaluation Branch and Food Branch are collaborating in an investigation of *Salmonella typhimurium* phage type 9 isolates in two areas of Sydney in October. The outcome of the investigation will be reported in a future issue of the *Bulletin*.

Notifications for salmonella infections have decreased by 19.3 per cent this year over the same period last year. The notification rate for NSW is 20.5/100,000 population a year, compared with a rate of 25.8/100,000 for the calendar year 1990. Continued vigilance with food handling and distribution is required to reduce further this high rate.

MEASLES

Four Areas/Regions have notified measles in the past month. The Hunter Area continues to notify the highest rate of this vaccine-preventable disease, with 32.8/100,000 a year. This compares with an annual rate of 39.1/100,000 for 1990 for the Hunter, and 6.8/100,000 for 1990 for the State.

The measles epidemic in New Zealand continues, with 8487 cases reported up to November 22. At least 217 people have been admitted to hospital, and there have been four deaths. We repeat the warning published in the November *Public Health Bulletin*, that children travelling to New Zealand should have their immunisation status assessed.

HEALTH OUTCOMES

The key infectious diseases recommended in the Year 2001 Health Outcomes Goals for NSW include the vaccine-preventable diseases (measles, rubella, poliomyelitis, diphtheria, whooping cough, tetanus, hepatitis B), viral hepatitis, tuberculosis, mosocomial infections, and sexually transmitted diseases (HIV, syphilis, gonorrhoea). Specific outcomes and performance indicators will continue to be developed in consultation with infectious disease experts.

TABLE 1

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

CONDITION	Number of Cases Notified			
	Period		Cumulative	
	November 1990	November 1991	November 1990	November 1991
Adverse Reaction	N/A	–	N/A	–
AIDS*	42	7	330	242
Arboviral infection (NOS)	6	1	259	526
Brucellosis	–	–	5	2
Cholera	–	–	–	–
Diphtheria	–	–	–	–
Foodborne illness (NOS)	292	53	2532	2687
Gastroenteritis (instit.)	N/A	2	N/A	44
Gonorrhoea	34	8	348	355
H influenzae epiglottitis	–	3	5	20
H influenzae B – meningitis	–	2	25	55
H influenzae B – septicaemia	–	–	3	9
H influenzae infection (NOS)	3	4	34	118
Hepatitis A	6	41	31	973
Hepatitis B – acute	–	–	6	18
Hepatitis B – carrier	–	–	–	22
Hepatitis B – unspecified	26	13	382	996
Hepatitis C	7	17	36	425
Hepatitis, acute viral (NOS)	–	2	2	264
HIV infection	89	9	662	685
Hydatid disease	–	–	2	7
Legionnaires' disease	4	–	27	25
Leprosy	–	–	7	–
Leptospirosis	4	–	41	32
Listeriosis	N/A	–	N/A	7
Malaria	12	3	167	128
Measles	101	23	340	323
Meningococcal meningitis	1	3	44	44
Meningococcal septicaemia	1	1	12	12
Meningococcal infection (NOS)	1	–	27	43
Mumps	N/A	–	N/A	4
Mycobacterial tuberculosis	–	4	–	210
Mycobacterial – atypical	–	–	14	65
Mycobacterial infection (NOS)	32	1	472	143
Pertussis	9	–	138	38
Plague	–	–	–	–
Poliomyelitis	–	–	–	–
Q fever	11	1	124	178
Rubella	N/A	2	N/A	44
Salmonella infection (NOS)	133	32	1325	1069
Syphilis	28	9	319	472
Tetanus	1	–	1	2
Typhoid & paratyphoid	2	3	33	46
Typhus	–	–	–	–
Viral haemorrhagic fevers	–	–	–	–
Yellow fever	–	–	–	–

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

TABLE 2

INFECTIOUS DISEASE NOTIFICATIONS BY HEALTH AREA AND REGION
November, 1991

CONDITION	CSA	SSA	ESA	SWS	WSA	WEN	NSA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	OTH	U/K	TOTAL
Arboviral infection (NOS)	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1
Foodborne illness (NOS)	5	7	10	1	11	5	–	–	–	2	4	3	–	5	–	–	–	53
Gastroenteritis (instit)	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	2
Gonorrhoea	1	–	1	–	–	–	–	1	1	–	1	2	–	–	–	1	–	8
H. influenzae epiglottitis	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	3
H. influenzae meningitis	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	2
H. influenzae infection (NOS)	–	–	2	–	1	–	–	1	–	–	–	–	–	–	–	–	–	4
Hepatitis A	8	–	11	–	2	1	14	–	1	–	1	2	1	–	–	–	–	41
Hepatitis B — Unspecified	–	–	1	–	4	2	2	–	1	–	–	3	–	–	–	–	–	13
Hepatitis C	1	–	–	1	6	4	2	–	2	–	–	1	–	–	–	–	–	17
Hepatitis, acute viral (NOS)	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2
HIV infection	–	–	2	–	–	1	–	–	–	–	–	–	–	–	–	–	6	9
Malaria	–	–	1	–	–	–	1	–	1	–	–	–	–	–	–	–	–	3
Measles	6	1	–	–	–	–	–	–	13	–	–	–	–	–	3	–	–	23
Meningococcal meningitis	1	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	3
Meningoccocal septicaemia	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1
Mycobacterial tuberculosis	–	–	–	–	–	–	2	–	–	–	–	–	–	–	2	–	–	4
Mycobacterial infection (NOS)	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1
Q fever	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
Rubella	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	2
Salmonella infection (NOS)	1	4	–	–	5	1	7	1	3	–	4	–	–	5	1	–	–	32
Syphilis	1	1	–	–	2	–	2	–	–	–	–	2	1	–	–	–	–	9
Typhoid & paratyphoid	–	1	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3

TABLE 3

INFECTIOUS DISEASE NOTIFICATIONS BY HEALTH AREA AND REGION
January 1 to Novembr 30, 1991

CONDITION	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	OTH	U/K	TOTAL
AIDS*	38	13	106	4	18	11	20	7	3	6	10	–	–	1	–	–	–	5	242
Arboviral infection	1	–	8	–	1	–	4	–	1	8	32	214	206	4	35	5	7	–	526
Brucellosis	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Foodborne illness (NOS)	212	376	613	168	268	156	1	37	19	102	314	151	106	25	120	2	17	–	2687
Gastroenteritis (instit.)	–	–	–	5	10	6	4	2	–	–	1	8	3	5	–	–	–	–	44
Gonorrhoea	40	12	135	33	22	1	11	1	12	6	16	7	43	4	8	2	2	–	355
H. influenzae epiglottitis	1	2	–	3	3	1	5	–	1	–	–	–	–	1	–	3	–	–	20
H. influenzae meningitis	2	4	–	11	2	1	11	–	2	10	–	2	2	3	2	3	–	–	55
H. influenzae septicaemia	–	2	–	1	–	1	3	–	–	2	–	–	–	–	–	–	–	–	9
H. influenzae infection (NOS)	13	20	15	5	14	11	1	5	10	2	1	1	7	2	10	1	–	–	118
Hepatitis A	132	48	476	37	33	5	154	10	4	18	10	14	13	2	2	14	1	–	973
Hepatitis B — Acute	12	4	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	18
Hepatitis B — Carrier	9	11	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	22
Hepatitis B — Unspecified	130	83	81	212	145	20	112	–	5	36	40	41	52	2	3	32	2	–	996
Hepatitis C	107	54	1	31	41	19	66	6	7	37	30	17	2	3	2	1	1	–	425
Hepatitis, acute viral (NOS)	–	–	–	5	191	11	1	3	8	2	1	1	26	–	8	7	–	–	264
HIV infection	55	16	159	18	28	14	37	6	2	16	15	1	2	4	1	2	6	302	685
Hydatid disease	3	1	1	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	7
Legionnaires' disease	–	–	–	5	7	3	4	–	–	2	2	–	–	–	1	–	1	–	25
Leptospirosis	1	–	–	–	–	–	–	–	–	9	6	4	5	–	4	–	3	–	32
Listeria	2	1	–	–	–	–	2	–	1	1	–	–	–	–	–	–	–	–	7
Malaria	7	6	9	4	14	3	50	3	4	11	3	3	1	–	5	4	1	–	128
Measles	78	8	12	14	21	5	32	9	12	92	21	2	4	–	1	12	–	–	323
Meningococcal meningitis	4	4	–	11	1	–	2	1	1	9	1	4	2	2	–	2	–	–	44
Meningococcal septicaemia	1	1	–	–	1	–	–	1	–	1	4	2	–	–	–	1	–	–	12
Meningococcal infection (NOS)	–	1	6	3	3	1	4	4	7	–	3	6	1	1	2	1	–	–	43
Mumps	–	–	–	–	2	–	1	–	–	–	–	–	–	–	1	–	–	–	4
Mycobacterial atypical	32	30	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	65
Mycobacterial tuberculosis	35	27	47	33	12	1	10	2	9	18	10	–	–	2	–	3	1	–	210
Mycobacterial infection (NOS)	–	–	–	1	29	8	54	1	17	12	3	6	2	4	3	3	–	–	143
Pertussis	–	2	6	4	6	1	1	–	–	1	3	2	7	1	3	1	–	–	38
Q Fever	–	1	–	1	1	–	–	–	–	5	22	55	85	4	3	1	–	–	178
Rubella	1	2	10	–	11	1	8	1	1	4	2	–	–	–	2	1	–	–	44
Salmonella infection (NOS)	76	123	82	136	148	67	93	1	44	20	70	68	60	20	27	16	18	–	1069
Syphilis	43	21	38	62	43	8	31	–	7	16	64	22	92	6	15	1	3	–	472
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	2
Typhoid & paratyphoid	10	7	15	–	2	–	2	–	1	3	–	5	–	–	–	–	1	–	46

* Data from January to October 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.