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USING THE INTERNATIONAL CLASSIFICATION OF DISEASES WITH HOIST

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This article provides assistance with using the International Classification of Diseases (ICD) with the Health Outcomes and Information Statistical Toolkit (HOIST), which is a collection of databases (data warehouse) maintained by the Epidemiology and Surveillance Branch of the NSW Department of Health. The article is for readers who have access to HOIST or who want to learn how to use HOIST. Please note that HOIST is only available to staff of the NSW public health system.

Many datasets available in HOIST include variables that allow you to select data according to the disease or condition that led to a patient being hospitalised or that caused a person's death. These datasets include the Australian Bureau of Statistics (ABS) cause of death data collection (see the HOIST 'DEATHS' library), the NSW Inpatient Statistics Data Collection (see the HOIST 'ISC' library), and the NSW Emergency Department Data Collection (see the HOIST 'EDDC' library).

The ICD commenced in 1893 and has been revised periodically by the World Health Organization (WHO) to accommodate new developments in the understanding and awareness of diseases. The ICD currently in use is the ICD-10; that is, the tenth revision of the ICD. Many of the datasets in HOIST still use ICD-9 (the ninth revision), because there is a time lag between the introduction of a new revision and the release of data collections that use the new standard.

The WHO ICD-10 (international version) is currently used by the ABS to code causes of death in the ABS mortality data collection. For deaths registered between 1979 and 1998 inclusive, the WHO ICD-9 was used. For deaths registered in 1997 and 1998, causes of death were coded using both the WHO ICD-9 and WHO ICD-10. From 1999, only the WHO ICD-10 was used.

CLINICAL MODIFICATION OF THE ICD

For coding of hospitalisation statistics, Australia uses an adaptation of the WHO ICD that has been modified for clinical use, often known as the *Clinical Modification*. These modified editions are

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very similar to the WHO versions, but may contain subtle differences for specific codes (see the 'Take Care' section below). The latest version of the Australian edition is called the *ICD-10 Australian Modification* (ICD-10-AM). In Australia, the modified editions are developed and maintained by the National Centre for Classification in Health (NCCH) at **www.cchs.usyd.edu.au/ncch**.

Prior to July 1995, the United States version of the *ICD-9 Clinical Modification* (ICD-9-CM) was used for coding hospitalisation statistics in NSW. From July 1995, an Australian version of the ICD-9-CM was used. From July 1998, the first edition of the ICD-10-AM was used; and from July 2000, the second edition of the ICD-10-AM was used. Further editions are likely to be developed in the future.

The modified editions include additional sections on codes for clinical procedures and tables of drugs and chemicals used in coding. There are alphabetic indexes of diseases and drugs and chemicals that help in finding the correct code.

WHAT DO THE CODES LOOK LIKE?

ICD-9 and ICD-9-CM diagnosis codes are numeric and of the form *rrr*, *rrr.n*, or *rrr.nn*. The first three numbers, *rrr*, represent a specific diagnosis. For example, code *038* in the ICD-9-CM represents septicaemia. Additional numbers after the decimal point, *n* or *nn*, allow more detail. For example, *038.4* represents septicaemia due to 'other gram-negative organisms', and *038.42* represents septicaemia due to the *Escherichia coli* organism.

ICD-10 and ICD-10-AM diagnosis codes start with a letter of the alphabet followed by a two-digit number and are of the form *Xrr*, *Xrr.n* or *Xrr.nn*. There may be a further two numbers after the decimal point. For example, in the ICD-10-AM, *A41* represents 'Other septicaemia', *A41.5* represents septicaemia due to 'other gram-negative organisms', and *A41.51* represents septicaemia due to the *Escherichia coli* organism.

At the level of the first three characters (for example, *038* or *A41*), codes are usually consistent between the Australian versions that have been clinically modified and the WHO versions. It is only when you get to more detailed codes that differences may become apparent.

EXTERNAL CAUSES OF MORBIDITY AND MORTALITY

The ICD includes supplementary sections that permit the coding of circumstances that led to the occurrence of a disease or injury. These codes, known as 'external causes', are particularly useful for analysing the causes of injury or poisoning. In the ICD-9, external causes referred to injury and poisoning only. In the ICD-10, the meaning was broadened to include external causes of disease or disability (morbidity) and death (mortality). External causes in the ICD-9 had codes that started with 'E' and were in the range *E800–E999*. In the ICD-10 these codes are constructed in the same way as diagnosis codes, but are in the range *V01–Y98* at the three-character level.

Like diagnosis codes, additional numbers after the decimal point provide more detail. For example, ICD-9 code *E965* represents assault by firearms or explosives, and *E965.0* represents assault by a handgun. The ICD-10 is different, with more detailed three-character codes, a fourth character to classify the place of occurrence of the event, and a fifth character for the activity the person was engaged in when the event happened. For example, ICD-10 code *X93* represents assault by handgun discharge, and *X93.72* represents assault by handgun discharge occurring on a farm while engaged in working for income.

For most deaths caused through injury or poisoning, the underlying cause of death code in the ABS cause of death collection records an external cause code obtained from the death certificate. For example, a person who died from head injuries as a result of a vehicle collision might have a code of *E812—Other motor vehicle traffic accident involving collision with another motor vehicle* as the underlying cause of death, not a diagnosis code for head injury such as *800—Fracture of vault of skull.*

Since 1997, the ABS has coded all causes contributing to the person's death (multiple cause coding) that were recorded on the death certificate. This meant that for a death caused through injury or poisoning, the diagnosis became available in addition to the cause. In HOIST, these additional codes are saved in separate datasets. Consult HOIST staff within the Epidemiology and Surveillance Branch at the NSW Department of Health if you intend analysing these (see the contact details below).

For underlying causes other than injury or poisoning, a diagnosis is coded as the underlying cause. For example, a person who died of a heart attack might have an ICD-9 diagnosis code of *410—Acute myocardial infarction.*

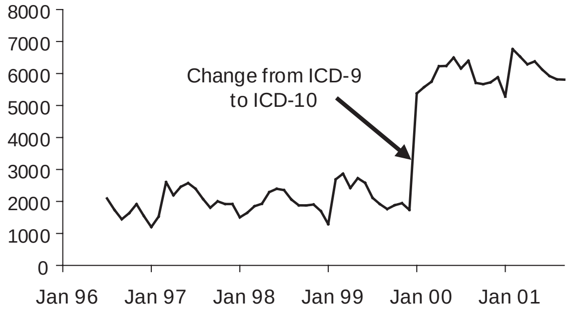
For hospital inpatient datasets, both diagnoses and external causes are coded and appear as separate variables in HOIST. For Emergency Department datasets, external cause codes are not available, only diagnoses.

TIME SERIES

When analysing data over a number of years, you might need to select HOIST variables that contain ICD codes that were coded using different versions of the ICD. You may also need to combine these into one variable for your analysis. At the 'Downloads' page of the NCCH Web site (**www.cchs.usyd.edu.au/ncch**), you can obtain details describing the concordance between the ICD-9-CM and ICD-10-AM (first edition) and between the first and second editions of the ICD-10-AM. These details are known as 'mappings'. You should check the relevant ICD books, however, because the mappings may not be quite what you expect. Mapping errors will probably show up

FIGURE 1

ICD TIME SERIES MAPPINGS



as discontinuities in the time series graph where the ICD changeovers occurred, as illustrated below.

In 1997, the ABS introduced an automated system for coding causes of death. This caused a break in time series for some causes because of different standards used in the automated system. With the introduction of the ICD-10 for coding deaths that were registered in 1999, the automated system was used to recode deaths registered in 1997 and 1998 using ICD-10. For more information about breaks caused by this changeover, see the ABS publication Causes of Death Australia (Catalogue no. 3303.0). More detailed information can be obtained directly from the ABS.

TAKE CARE

- You have to take care to use the version of the ICD that applies to the HOIST dataset you are using, or you can end up producing inaccurate reports. When analysing hospital statistics, you even have to be careful to use the correct edition of the clinical modification, because clinical modifications can change quite significantly between editions. Do not use the clinical modification to select codes for cause of death analysis.

  For example, in the ICD-9-CM, the external cause code *E850.1* represents accidental poisoning by methadone, whereas in the WHO ICD-9, *E850.1* represents accidental poisoning by salicylates.
- Be aware that the SAS format used in HOIST for each variable based on the ICD may not accurately reflect underlying codes. The formats are usually based on a particular version of the clinical modification and, while correct for most purposes, may on occasions give incorrect results. This is usually not a problem at the three-digit code level.
- Disease codes in hospital data are only as good as the clarity and completeness of the medical records from which they were coded, the tools available for helping clinical coders code the data, and the skill and experience of the clinical coder. Sometimes many specific categories of diseases end up in the 'other' category at the three, four, or five digit code level because not enough information is in the medical record. So you should err on the side of inclusiveness when selecting codes, but then report the resulting uncertainties when writing up the results.
- Disease codes in ABS death data are only as good as the accuracy of the death certificates from which they were coded. The ABS now uses an automated coding system for improving consistency and is rigorous in applying coding standards. Causes of death can be particularly unclear for older people who may have multiple contributing causes.
- Coding standards may not always be obvious. For example, under the ICD-9, deaths from opiate overdose were coded by the ABS mainly using codes *304.0—Morphine type drug dependence*; *304.7— Combinations of morphine type drug with any other*; and *305.5—Morphine type nondependent use of drugs*. The code *E850.0—Accidental poisoning by opiates and related narcotics* was only used when it was unclear whether the death resulted from

TABLE 1

EXAMPLES OF HOW TO SUBSET DATA IN HOIST ACCORDING TO DISEASES OR GROUPINGS OF DISEASES

Select what?	HOIST–SAS code
Deaths caused by stroke from the DEATHS.NSWRES dataset using the ICD-9	*where '430' <=: ICD9_DTH <=: '438'*
Hospitalisations with a principal diagnosis of cerebrovascular disease–stroke from the ISC.ISC9798 dataset using ICD-9-CM (Australian version)	*where '430' <=: ICD1 <=: '438'*
Hospitalisations with a principal diagnosis of cerebrovascular disease–stroke from the ISC.ISC9899 dataset using ICD-10-AM (1st edition)	*where 'I60' <=: ICD10D1 <=: 'I69'*
Deaths from suicide by hanging from the DEATHS.NSWRES dataset using the ICD-9	*where ICD9_DTH =: 'E953.0'*
Hospitalisations for attempted suicide by hanging from the ISC.ISC9798 dataset using ICD-9-CM (Australian version)	*where EXTCAUS =: 'E953.0'*
Hospitalisations for attempted suicide by hanging from the ISC.ISC9899 dataset using ICD-10-AM (first edition)	*where ICD10EX1 =: 'X70'* or if you want to be really thorough: *where ICD10EX1 =: 'X70' or ICD10EX2 =:'X70' or ICD10EX3 =: 'X70'*

TABLE 2

COMMONLY USED DATASETS AND VARIABLES IN HOIST THAT USE ICD CODING

Dataset–variable	Valid period	ICD version	Comments
DEATHS.NSWRES (deaths of NSW residents)			
ICD7_DTH	Deaths registered 1964–1967	ICD-7 (WHO)	Principal cause of death. Contains an external cause code for deaths from injury or poisoning unless drug addiction was mentioned on the death cerificate for an accidental overdose). Check the relevant ICD book when selecting codes.
ICD8_DTH	1968–1978	ICD-8 (WHO)	
ICD9_DTH	1979–1998	ICD-9 (WHO)	
ICD10DTH	1997–	ICD-10 (WHO)	
ISC.ISC8889 onwards (NSW Inpatient Statistics Collection, by financial year of hospital separation)			
ICD1	Separations during 1988–89 to 1997–98	ICD-9-CM (The US CM was used prior to July 1995. The Australian version was used from July 1995.)	Principal diagnosis. Main admission diagnosis. This is the variable most used for analysis of diagnoses. Has been back-translated from ICD-10-AM for 1998–99, but probably better to use ICD-10-AM codes where available.
ICD2	1993–94 to 1997–98	ICD-9-CM as for ICD1	Stay diagnosis. Condition contributing to the length of stay. Usually the same as the principal diagnosis and not usually used.
ICD3-21	1993–94 to 1997–98	ICD-9-CM as for ICD1	Additional diagnoses. Not usually used because they may be comorbidities, pre-existing conditions, or historical conditions. There is no way to identify which.
EXTCAUS	1988–89 to 1997–98	ICD-9-CM as for ICD1	Main external cause of injury and poisoning (E-code). Has been back-translated from ICD-10-AM for 1998–99, but probably better to use ICD-10-AM codes where available.
EXTCAUS2	1996–97 to 1997–98	ICD-9-CM (Australian)	Additional external cause.
EXTCAUS3	1997–98	ICD-9-CM (Australian)	Additional external cause.
ICD10D1	Separations during 1998–99 (The 1st edition was used July 1998–June 2000. The 2nd edition was used July 2000.)	ICD-10-AM	Principal diagnosis.
ICD10D2	Separations during 1998–99	ICD-10-AM	Stay diagnosis. Condition contributing to the length of stay. Usually the same as the principal diagnosis and not usually used.
ICD10D3-21	1998–99	ICD-10-AM	Additional diagnoses. Not usually used because they may be comorbidities, pre-existing conditions, or historical conditions. There is no way to identify which.
ICD10EX1-ICD10EX3	1998–99	ICD-10-AM	External cause codes. The place of occurrence and activity codes were in the fourth and fifth characters of the code in the first edition of ICD-10-AM. In the second edition, new codes were added for these (Y92 and Y93).
PROC1	1988–89 to 1997–98	ICD-9-CM as for ICD1	Principal clinical procedure.
PROC2-20	1988–89 to 1997–98	ICD-9-CM as for ICD1	Additional clinical procedures.
MBS_EP1	1998–99 to present	ICD-10-AM	Principal clinical procedure.
MBS_EP2-20	1998–99	ICD-10-AM	Additional clinical procedure.
EDHIE.ED199607 onwards (NSW Emergency Department Data Collection, by month of attendance)			
ICD1	1996–97	ICD-9-CM (probably based on the Australian version of July 1996)	Primary Emergency Department diagnosis. Some hospitals do not provide data in ICD format and these will have blank codes. ICD-10-AM hasn't been implemented in Emergency Departments yet (at time of writing).
ICD2-5	1996–97	ICD-9-CM (probably based on the Australian version of July 1996)	Additional Emergency Department diagnoses. Best to not use as these may be even less consistently recorded than ICD1.

overdose. Check with the relevant authority (details below) if you are uncertain.

- When using the Emergency Department Data Collection remember that diagnoses are often coded by Emergency Department staff as they do their clinical work. Clinical coders are not generally involved in Emergency Department coding. Accuracy of the coding depends on the pressure the staff are under, the ease of use of their Emergency Department information system and other workplace issues that may result in inconsistent or inaccurate codes. For these reasons Emergency Department diagnoses should only be used for coarse analyses and should be considered as indicative only.
- Copies of both the WHO ICD and the clinical modification should be part of your library or you should have access to these, if you are planning anything other than the most superficial analyses.
- You can use the footnotes of graphs or the Methods section of *The Health of the People of NSW—Report of the Chief Health Officer* to find out what codes to use if you want to conduct analyses of the same disease groups.

SAS EXAMPLES

Table 1 gives examples of how to create a subset of data in HOIST according to diseases or groupings of diseases. Table 2 lists the commonly used datasets and variables in HOIST that use ICD coding.

The *:* operator in SAS is useful for selecting ICD groupings. When you put the *:* after a SAS operator, only the number of characters that you typed are compared. For example, if you type *=: '038'* then all codes beginning with 038 are captured, including '038', '038.4' and '038.42'. It is wise to use the *:* operator even when you want to select very specific codes also, because sometimes there can be sub-codes that you may not be aware of.

WHERE TO GET HELP

For hospital coding practices contact:

- your local clinical coder or Health Information Manager;
- Senior Clinical Data Consultant, NSW Department of Health by phoning (02) 9391 9684;
- the National Centre for Classification in Health at **www.cchs.usyd.edu.au/ncch**.

For cause of death coding standards, contact the Vital Statistics Unit of the Australian Bureau of Statistics by phoning 1800 620 963.

For help with HOIST, contact Alan Willmore, Epidemiology and Surveillance Branch, NSW Department of Health, by emailing **awill@doh.health.nsw.gov.au** or by phoning (02) 9391 9226.

ACKNOWLEDGMENTS

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TIME TRENDS IN EMERGENCY DEPARTMENT PRESENTATIONS OF CHILDREN WITH ACUTE SEVERE ASTHMA IN NSW

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It has been observed that the number of admissions of children to NSW hospitals for asthma increases sharply during the month of February.[1] Recent anecdotal evidence suggested that this increase occurred again in 2001. Of greater concern, however, is the observation that the number of *severe* asthma episodes in children also rose sharply. This prompted an investigation to determine whether the reported peak was supported by the data routinely collected by the NSW Department of Health.

The data confirmed the report showing a seasonal increase of asthma presentations, and also highlighted an increasing trend in the proportion of asthma presentations that were severe. The Emergency Department Data Collection (EDDC) was the most up-to-date source of routinely collected data available to investigate this phenomenon.[2] Despite some shortcomings, the results exemplify the usefulness of the EDDC as a public health surveillance tool. This article describes the methods used and the trends observed using the data from the EDCC.

METHODS

The EDDC is maintained by the NSW Department of Health and collects information on Emergency Department (ED) activity at 54 hospitals across NSW. It covers most urban hospitals and regional base hospitals. In this article, 'participating EDs' will refer to the EDs of these 54 hospitals. Information collected includes the patient's demographics, primary diagnosis, date and time of presentation, and the clinical response of the participating ED. Information collected at the participating EDs is periodically uploaded to a central data repository held at the NSW Department of Health. At

FIGURE 1

SEVERE ASTHMA PRESENTATIONS IN CHILDREN AGED 1–14, NSW, JULY 1996–MAY 2001

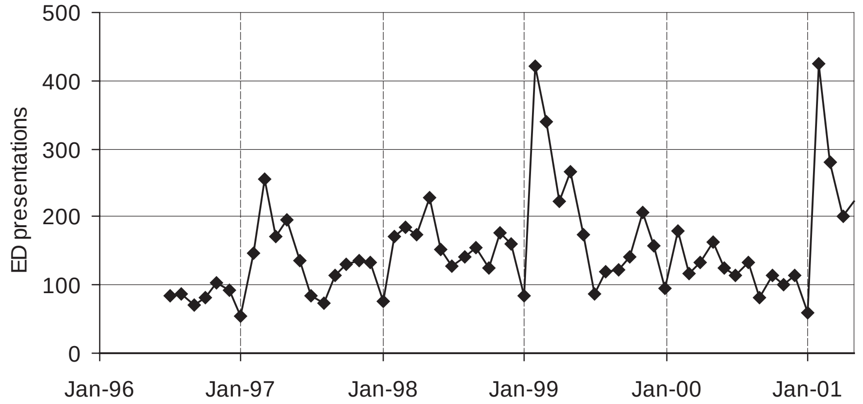


FIGURE 2

SEVERE ASTHMA PRESENTATIONS AS A PROPORTION OF ALL ASTHMA PRESENTATIONS IN CHILDREN AGED 1–14, NSW, JULY 1996–MAY 2001

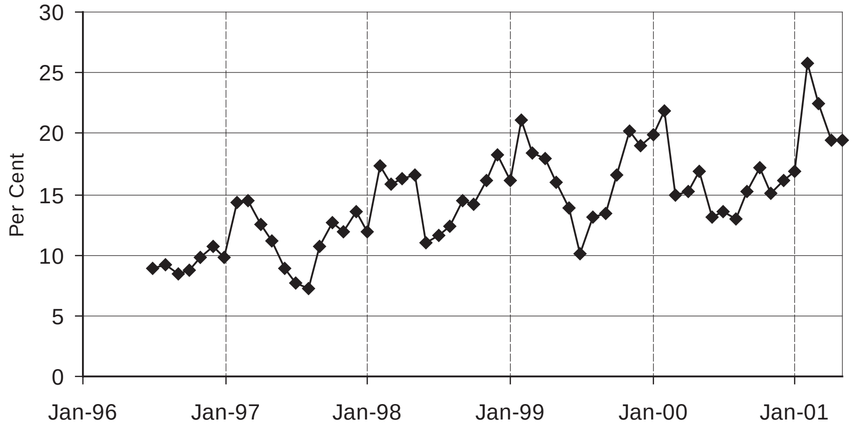
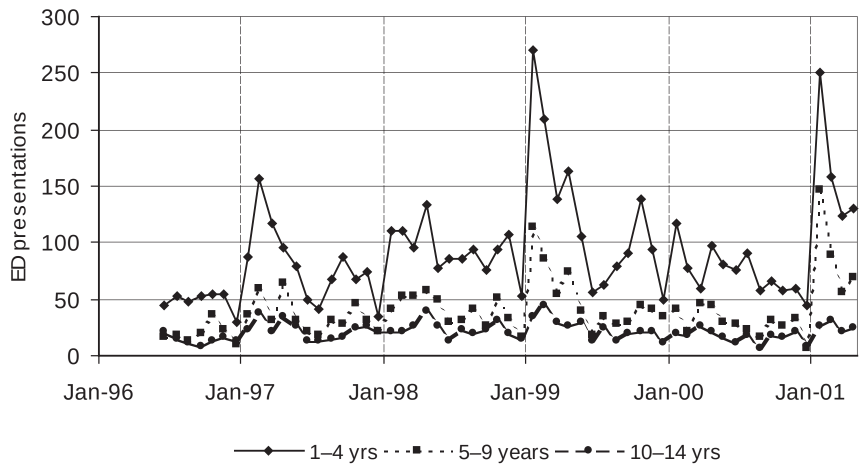


FIGURE 3

SEVERE ASTHMA PRESENTATIONS BY AGE GROUP, NSW, JULY 1996–MAY 2001



the time of this investigation, updates were received between every fortnight to one month, which made the EDDC the most up-to-date NSW hospital utilisation information available. The data from six hospitals were removed from the analysis because they had incomplete or non-standard data at the time of this investigation.

We analysed presentations of children aged one to fourteen years of age to participating EDs for the period July 1996 to May 2001. Children aged less than one year were excluded from the analysis, since a diagnosis of asthma can be unclear in this age group. An asthma presentation was a presentation assigned a primary diagnosis of 'asthma' (ICD-9-CM = 493) in the participating ED.[3] We used the triage category assigned by the triage nurse on presentation to the participating ED as a proxy for asthma severity. A case of severe asthma was defined to be a presentation assessed as requiring medical attention within 10 minutes according to the Australasian Triage Scale ('resuscitation' or 'emergency' categories in the EDDC). We plotted time series of the number of participating ED presentations for severe asthma to identify any monthly peaks. We also plotted severe asthma as a proportion of all presentations for asthma to assess trends in severity. We also analysed the data by the age groups 1–4, 5–9, and 10–14 years.

RESULTS

There was a significant peak in the number of presentations of children aged 1–14 years with severe asthma to participating EDs in February 2001. This peak was a sevenfold increase over the number of presentations for severe asthma in the previous month. Similar peaks occurred early in 1997 and 1999 indicating a possible seasonal pattern (Figure 1).

When severe asthma was plotted as a proportion of all asthma presentations, clear peaks were observed in February of each year since 1996. A strong increasing trend was apparent in both the February proportion and the total annual proportion for severe asthma (Figure 2).

The sharp February peaks in presentations for severe asthma were most strongly apparent in children aged 1–4 years, although in February 1999 and 2001 there were also well-defined peaks in presentations for children aged 5–9 years (Figure 3). When the age-specific time series of severe asthma was plotted as a proportion of all presentations for asthma, the two younger age groups showed a pronounced rising trend over the five years of available data. This trend was not apparent in children aged 10–14 years.

DISCUSSION

The EDDC data supported the anecdotal evidence of a sharp increase in the number of acute cases of severe asthma in children aged 1–14 years in February 2001. This peak was possibly typical of a seasonal pattern of such peaks in the early months of each year, as suggested previously. The peaks occurred mainly in children aged 1–9 years. The proportion of asthma cases that were severe also appears to be increasing over time. This could indicate an increased use of EDs over primary care facilities, a gradual change in triaging patterns in participating EDs, or a true rise in the severity of asthma in children. This rising trend was only apparent in children aged 1–9 years.

The EDDC has several limitations. Firstly, the EDDC includes approximately half of NSW EDs, so the information may not be representative of the whole population of children with asthma in NSW. Also, unlike hospital inpatient information, diagnoses in EDs are not coded by trained clinical coders, but can be entered by a variety of staff in the ED. This means that the standardisation of diagnoses is difficult to maintain. Finally, patterns of ED presentations may be influenced by the availability of general practitioners or other factors influencing ED utilisation. Despite the limitations of the EDDC, the results of this analysis suggest a concerning trend in the incidence of ED presentations for severe asthma in younger children in NSW.

Seasonal peaks in presentations for severe asthma in children in the early part of each year should be anticipated and prevention strategies investigated. Further research into the reasons for these concerning patterns is recommended.

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THE IMPACT OF A GENERAL PRACTICE STAFFED CASUALTY SERVICE ON OVERALL PRIMARY MEDICAL SERVICES

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Michael Jones
Jones and Just Data Analysts

The Balmain Hospital General Practice Casualty (GPC) is a GP-staffed casualty-style service that meets the needs of the local community when local general practitioner services are not available. This article describes the effects of the GPC on the volume of services provided by nearby general practices.

The GPC seeks to provide primary medical care to patients. In Australia, primary medical care conditions have been accepted to be those that 'could be competently managed by a general practitioner in a well equipped surgery'.[1]

The GPC model has similarities with minor injury units,[2,3] and services provided by GPs to patients in emergency departments.[4–7] Patients of the GPC are more satisfied than similar patients seen in emergency departments, and have similar health outcomes.[8]

The GPC was established in September 1993 and replaced a small emergency department. At the time of this role-change, the emergency department was treating an average of 50 patients per day, of whom eight arrived by ambulance and eight were admitted. On this basis, it is estimated that the emergency department saw approximately 40 primary care patients per day. Immediately after the role change, the GPC saw 33 patients per day. By 2000, this had risen to 45 patients per day. At this time an average of 2.5 patients were either admitted to Balmain Hospital or transferred to another hospital for admission each day. Assuming that patients requiring admission are not suitable for primary care, in 2000 the GPC treated approximately 40 primary care patients per day.

From a policy perspective, one concern about such new services is that they may increase expenditure by addressing previously unmet need.[10] It is possible to examine this hypothesis for the GPC using data collected by the Health Insurance Commission (HIC).

TABLE 1

THE LOCALITIES USED FOR THIS ANALYSIS

Localities	Approximate Area (km²)	Population (1991 census)
GPC catchment area	12	58,147
Eastern part of Central Sydney Health Area	30	113,148
Western part of Central Sydney Health Area	60	151,232

The HIC administers Medicare, the universal system of health insurance that is available to everyone normally resident in Australia except for foreign diplomats and their dependents.[10,11] A scheduled fee is paid by Medicare for the majority of services provided by general practitioners.[10,11] Services that are not eligible for Medicare include those provided to eligible veterans and their dependants, services provided under certain types of insurance including motor vehicle and workers compensation insurance, and services not necessarily for patient care, such as medical examinations for employment purposes.[10,11] These exclusions affect only a small proportion of general practitioner consultations and are likely to have remained proportionate to services billed under Medicare in recent decades. For this reason data about services provided under Medicare have been used as the basis for reviewing time series data about services provided by general practitioners by the Australian Institute of Health and Welfare and the General Practice Branch of the Commonwealth Department of Health and Family Services.[10,11] The same approach will be used here.

METHOD

Three geographical areas within the Central Sydney Area Health Service were defined using postcodes. Details of these are provided in Table 1. Aggregate data were provided by the HIC about the number of GP consultations provided in each of these localities for each quarter commencing with September 1984 until September 1996.

Demographic data about the proportion of males and females in each five-year age group in each of the three localities were provided by the Australian Bureau of Statistics (ABS) from the 1986 and 1991 national censuses. These data were used to linearly interpolate and extrapolate quarterly demographic data for the period for which HIC data had been obtained. Population changes between censuses were small and so linear projections are thought to be appropriate.

The results of the third national survey of morbidity in general practice in Australia (AMTS) were reviewed to determine the pattern of use of GP services by different age and sex groups.[12] The AMTS is a national survey of the services provided by a representative stratified random sample of 495 Australian GPs. This suggested that the proportion of services required by different demographic segments of the population falls in to five distinct groups. These are:

- children less than 15 years of age;
- adult males;
- adult females;
- males older than 65 years;
- females older than 65 years.

Accordingly, the demographic data was aggregated into these five categories.

The generalised estimating equation (GEE) model was used to analyse the longitudinal GP consultation data available to gain some insight into the impact of the opening of the GPC on consultations in the three localities taking into account the changing age and sex distributions of the population. The model regressed the number of encounters on indicator variables for localities, the GPC being open or not, age and gender, with the latter two independent variables representing proportions by age and sex category. In addition the model included interactions between location and GPC status. The interaction term was of primary interest in the analysis since it compares locations in terms of change after the introduction of the GPC and therefore controls for changes in contemporary but extraneous factors. The statistical model was parameterised such that the GPC catchment, pre-GPC status and adult male categories were the reference categories for each independent variable, respectively. Hence the interaction relative rates represent a comparison of non-GPC localities with the GPC catchment area in terms of the change in rates with the opening of the GPC.

The model assumed a Poisson distribution for the number of encounters and an autoregressive (AR1) correlation structure due to the time series nature of the dependent variable. The population for each area, interpolated as described above, was used to define the person-years at risk.

RESULTS

Relevant results from the GEE are provided in Table 2. The opening of the GPC was associated with a reduction in the quarterly rate of increase in the number of age-sex adjusted GP consultations per capita of 1.5 per cent per capita in the GPC catchment, compared to other localities.

These results are also shown in Figure 1 which uses the output of the analysis to calculate the age–sex population size adjusted predicted number of consultations against the quarter for which they apply. The *y* scale is cardinal but values have been omitted because they are of comparative value only. Lines of best fit have been calculated for each set of data, and the gradients of these lines provided. These have been extrapolated beyond September 1993 for data from the period prior to the opening of the GPC for comparison. The top line represents the western part of Central Sydney Health Area. The opening of the GPC is not associated with significant change here. The middle line represents the rest of the eastern part of Central Sydney Area Health Service. Again, the opening of the GPC is seen to be associated with a non-significant effect. The lowest line represents the GPC catchment area in which the opening of the GPC is seen to have had a significant effect.

DISCUSSION

The results presented support an association between the opening of the GPC and a reduction in the growth of other GP services provided in the adjacent area. There is no other immediately obvious factor that might explain the differences observed.

The non-significant trend for the existence of the GPC to be associated most strongly with a reduction in growth of demand for primary medical care in its catchment area, less strongly with a reduction in the surrounding eastern part of the Central Sydney Area Health Service, and not at all with the more removed western part of Central Sydney Area Health Service supports the notion of a common link between the two.

In the year from September 1995 to September 1996 there were just under 364,000 encounters billed to Medicare by GPs in the GPC catchment area. According to the analysis there are 1.5 per cent fewer consultations per quarter—that is, 6.0 per cent fewer consultations per annum—in the GPC catchment compared to the other two districts since the GPC opened. If these were due to the GPC then one would expect the GPC to see around six per cent of the encounters seen by GPs in its catchment—that is, 22,000 (95 per cent CI 16,100–26,400) encounters per annum. This is the appropriate order of encounters, because the GPC sees approximately 15,000 encounters per annum.

A reason that the number of encounters provided by the GPC is lower than the number suggested by the model is that the GPC provides a ‘one stop shop’ for patients requiring x-rays. Patients who require x-rays and who see a GP in the community have two encounters with the GP: one to receive an x-ray request and a second to discuss the results and management. Only one visit is required for these purposes for similar patients attending the GPC because the GPC provides on-site radiography services during the day. Patients in the GPC receive an x-ray at 20.9 per cent of encounters.[8] Were all of these patients to

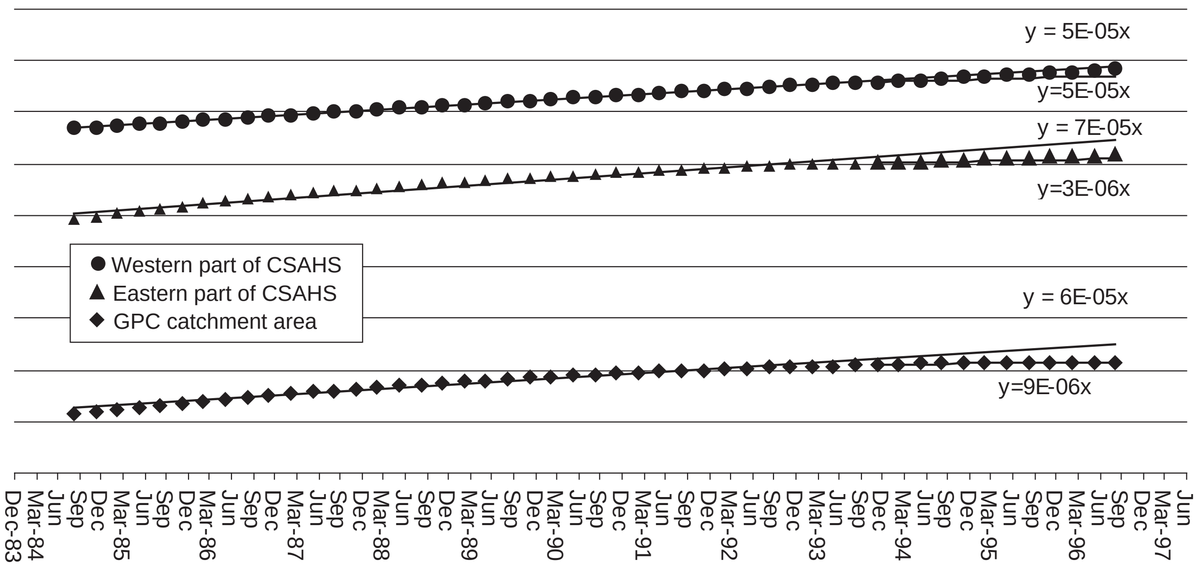
TABLE 2

COMPARISONS OF NON-GPC LOCALITIES WITH THE GPC CATCHMENT AREA—CHANGE OF RATES AFTER THE OPENING OF THE GPC

Comparison	*p*	Relative Risk	95% CI
GPC catchment versus the Eastern part of Central Sydney Health Area	<0.0005	1.015	1.011–1.018
GPC catchment versus Western part of Central Sydney Health Area	<0.0005	1.015	1.011–1.019

FIGURE 1

NORMALISED USE OF GP SERVICES BY LOCALITY, 1983–1997



require an additional visit to follow up on their x-rays then the GPC would provide over 18,000 encounters per year.

The analysis and discussion provided suggest that the GPC not only meets patients' needs for primary medical care when their regular GP is not available, but also that it does not duplicate existing services. If it is generalisable then this finding has positive implications for the funding of similar services.

ACKNOWLEDGEMENT

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SURVEY OF PUBLIC SWIMMING POOLS IN THE MID WESTERN AREA HEALTH SERVICE: 2000–2001

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This article describes a survey conducted by the Mid Western Public Health Unit to identify potential risks to the public health presented by public swimming pools within the geographical area covered by the Mid Western Area Health Service (MWAHS) during the 2000–2001 swimming season.

BACKGROUND

Public swimming pools are well-recognised sources of infection. For example, external otitis media is 2.3 times more likely to occur in swimmers than non-swimmers.[1] Disease-causing organisms can be introduced from many sources but are mainly associated with bathers (see Box below).

MICROORGANISMS THAT CAN BE INTRODUCED TO SWIMMING POOLS BY BATHERS

Bacteria

P. aeruginosa associated with eye, ear and skin infections;

Coagulase positive staphylococci associated with skin infections such as boils, carbuncles and wound infections;[2]

Fungi

Trichophyton mentagophytes, which causes athletes foot and tinea pedis;

Candida albicans, which can cause urino-genital, skin and nail infections;[2]

Viruses

Enteroviruses, which can cause gastroenteritis;

Adenoviruses types 3 and 4, which can cause pharyngo-conjunctival fever;[2]

Protozoa

Cryptosporidium parvum, which can cause Cryptosporidiosis;

Giardia lambia, which can cause Giardiasis.[2]

These organisms can reside in a bather's skin, saliva, urine, or faeces and can be transmitted to fellow bathers if they are not killed quickly and effectively through disinfection. Some of these disease-causing organisms can live and grow in pool water unless the pool is properly and continuously disinfected.[2,3]

To combat the potential health risks associated with public swimming and spa pools, the *Public Swimming Pool and Spa Pool Guidelines 1996* were developed by the NSW Department of Health.[2] The Guidelines specify minimum levels of chemicals and disinfectants for treating the water of public swimming and spa pools. The Guidelines were specifically drafted for application in:

- municipal swimming pools and spa pools;
- pools in hotels and motels, clubs, schools, gymnasiums and health resorts, squash and tennis centres, recreational resorts, hospitals (hydrotherapy pools), workplaces, and places of entertainment.

The Guidelines were not intended to apply to private residential premises (such as single and dual occupancy premises, flats, strata title residential premises, or retirement villages).[2]

AIM AND OBJECTIVES OF THE PUBLIC SWIMMING POOLS SURVEY

The aim of the public swimming pools survey was to determine the overall compliance rates of public swimming pool operators with a number of chemical parameters for water quality in accordance with the *Public Swimming and Spa Pool Guidelines 1996*.[2] The objectives of the survey were to determine:

- the number of public swimming pools that satisfy the requirements of the Guidelines;
- whether pool operators are familiar with and using the Guidelines;
- the location of pools for future surveys.

METHODOLOGY

Thirty-six of 42 local government operated public swimming pools were surveyed. To determine the compliance rate, and to test water quality, the parameters used for testing were based on those set out in the Guidelines. Olympic, 25-metre, and toddler pools were surveyed between December 2000–January 2001.

Water samples from the Olympic pools were analysed with a Palintest–Pooltest 25 Interface Photometer,[4] and samples from the toddler pools were analysed using a Palintest–Photometer 5000,[5] following the procedures set out in each instruction booklet.[4,5] The two test kits used were not calibrated against each other.

The following explains the parameters tested, the Guideline level required, and the test method used for each parameter:

- **chlorine**: the disinfectant form of chlorine is 'free chlorine'. This term refers to the concentration of hypochlorous acid and the hypochlorite ion in equilibrium concentration in the pool water. It is safe when used properly and is still the most popular form of disinfection. It is recommended that all of the chlorine is available as free chlorine.[2] The test for chlorine used was the diethyl-p-phenylene diamine suplhate (DPD) method by Palintest;[4,5]

- **pH**: the higher the pH above 7 the less the disinfecting power of free chlorine. The pH needs to be controlled in swimming and spa pools when chlorine is used and automatic adjustment is recommended to levels between 7.2–7.8.[2] The test used for pH was the phenol indicator method by Palintest;[4,5]
- **reserve alkalinity**: reserve alkalinity—if not within the required limit of the 1996 Guidelines—can affect the pH level, which in turn affects the disinfection power of free chlorine.[6] Total alkalinity is an important test in determining the scale forming tendency of the water. If the total alkalinity is low the water may cause corrosion to pipework and structures; if the total alkalinity is high the water may more readily promote scale formation. Alkalinity control is therefore an important part of many water treatment programs.[4,5] The test used for reserve alkalinity was the alkaphot method by Palintest;[4,5]
- **cyanurate**: chlorinated isocyanurate and isocyanuric acid are used to stabilise chlorine against losses due to ultra violet light in direct sunlight. Chlorinated isocyanurates provide free chlorine when dissolved in water. All isocyanurated chlorine compounds (except sodium dichloroisocyanurate) tend to lower the pH by varying amounts when added to water.[2] Research on outdoor pools has shown that, on a sunny day, free chlorine without isocyanuric acid had lost 90 per cent of the free chlorine within three hours. Pools containing 25 to 50 mg/L of isocyanuric acid under the same conditions only lost around 15 per cent of free chlorine. No appreciable increase in chlorine stability occurred above 50mg/L. The test for cyanurate was the diethyl-p-phenylene diamine suplhate (DPD) method by Palintest.[4,5]

Table 1 sets out the requirements of each of the chemical requirements of the above parameters.

TABLE 1

CHEMICAL REQUIREMENTS FOR CHLORINATED PUBLIC SWIMMING POOLS

Pool Type	Chemical Parameters for Pool Type: Free Chlorine (mg/L) minimum	Total Chlorine (mg/L) maximum	Combined chlorine (mg/L) maximum	pH Range	Total Alkalinity (mg/L) range
Outdoor	1.0	10.0	1.0	7.2–7.8	80–200
Outdoor stabilised with isocyanuric acid	3.0	10.0	Not Applicable	7.2–7.8	80–200
Indoor–temperature ≤26ºC	1.5	10.0	1.0	7.2–7.8	80–200
Indoor–temperature >26ºC	2.0	10.0	1.0	7.2–7.8	80–200

TABLE 2

PERCENTAGE OF POOLS FAILING EACH CHEMICAL PARAMETER 2000–2001

Pool Type	Number of pools	Number surveyed	Free chlorine >1mg/L	Total chlorine <10mg/L	Combined chlorine <1mg/L	pH 7.2–7.8	Reserve alkalinity 80–200mg/ L	Cyanurate 25–50mg/L
50m Olympic	14	14	21	14	0	29	36	36
25m	13	11	7	7	0	20	40	33
Toddler	15	11	25	17	0	17	17	25
Total	**42**	**36**						

TABLE 3

PERCENTAGE OF POOLS FAILING EACH CHEMICAL PARAMETER 1992–1993

Pool Type	Number of pools	Number surveyed	Free chlorine >1mg/L	Total chlorine <10mg/L	Combined chlorine <1mg/L	pH 7.2–7.8	Reserve alkalinity 80–200mg/ L	Cyanurate 25–50mg/L
50m Olympic	14	14	21	7	0	21	36	43
25m	13	13	52	46	8	31	15	8
Toddler	15	15	20	13	0	13	20	61
Total	**42**	**42**						

The results of the 2000–2001 survey were compared to the results of a 1992–1993 survey for local government operated swimming pools in the MWAHS.

RESULTS

Table 2 shows the percentage of pools failing each chemical parameter in 2000–2001. Table 3 shows the results for the 1992–1993. Table 4 shows the overall failure rate for pools in both surveys. The failure rate is expressed as a percentage, which was calculated by dividing the number of failures by the number of samples that were taken for each parameter.

A pool failed testing if one or more of the chemical parameters for the pool did not meet the requirements of the 1996 Guidelines. The overall failure rate for the pools surveyed in 2000–2001 was 69 per cent as compared to the 71 per cent for the 1992–1993 survey, indicating similar failure rates in both surveys. The high overall failure rate in the 2000–2001 survey can be attributed to the high percentage of cyanurate and reserve alkalinity failures.

As can be seen from the tables, there were improvements in three of the seven parameters for 2000–2001, notably in free chlorine and cyanurate. Free chlorine improved by 19 per cent and cyanurate had a 15 per cent improvement.

DISCUSSION

Although the majority of public swimming pools failed to meet the minimum chemical levels for parameters set out in the Guidelines, the risk to public health should not be overstated given that chlorine levels are the primary indication of public health risk. In spite of this, like the 1992–1993 survey, the results for the MWAHS public swimming pools survey are disappointing. The high overall failure rates can be attributed to pool operators' maintaining the minimum chemical levels for parameters set out in the Guidelines, which do not allow for external influences that affect those chemical parameters.[6] Bather load, type of dosing, weather and temperature can all have a bearing on what the levels of each parameter are and how easy or difficult they are to maintain.

At the time of the 2000–2001 survey, pool operators were asked whether or not they held a copy of the 1996 Guidelines, with most operators stating they had received a copy in previous years from their local council or inspecting officers from the Mid Western Public Health Unit. The main emphasis was placed on chlorine and pH levels as these two parameters are seen to be of greatest risk to public health.

Cyanurate returned the highest overall failure levels. However, if cyanurate levels were low and free chlorine was >1mg/L, there was no public health risk, therefore there was no need to place a closing order on the pool.

TABLE 4

OVERALL FAILURE RATE FOR ALL POOLS, BROKEN DOWN BY CHEMICAL PARAMETER IN 2000–2001 COMPARED TO 1992–1993

Chemical Parameter	Failure Rate (%) 1992–1993	Failure Rate (%) 2000–2001
Free chlorine	36	17
Total chlorine	12	14
Combined chlorine	2	0
pH	24	25
Reserve alkalinity	26	28
Cyanurate	83	68
Overall Failure Rate	**71**	**69**

Reserve alkalinity recorded higher levels in both the Olympic pools and 25m pools when compared to the 1992–1993 survey. The pH levels can have a bearing on the disinfecting power of free chlorine, particularly when they are greater than 7.8 as the equilibrium favours the hypochlorite ion rather than more efficient hypochlorous acid species. A pH level of 7.2–7.8 is preferred as it offers a more comfortable environment for swimmers. There was no significant change in pH levels between the two surveys.

The failure rates for free and total chlorine were relatively low compared to the 1992–1993 survey with both showing a reduction in overall failure rates. Because free chlorine is readily consumed, constant monitoring is required. If free chlorine is not maintained at the required levels, then its effectiveness as a disinfectant can not be guaranteed.[2] Another factor that led to failure rates in free and total chlorine was not maintaining free and total chlorine greater than 3mg/L as required by the 1996 Guidelines when using cyanurate.

Each type of pool seemed to have their problem parameters. Olympic pools had higher levels in both pH and cyanurate, the 25-metre pools recorded higher levels in reserve alkalinity, and the toddler pools recorded higher levels in both free and total chlorine.

Public swimming pools run by the community in smaller townships returned the highest non-compliance rates with the 1996 Guidelines. A lack of understanding of water chemistry requirements and maintenance seems to be a contributing factor. At the time of the 2000–2001 survey, if a parameter did not meet the requirements of the 1996 Guidelines, the pool operators were made aware of what the failure was; and advice was given on how to adjust the chemicals in the pool so that the parameters would meet the requirements. Requests were made at the time of the survey to have the adjustments made as soon as possible.

CONCLUSION

Modest improvements have occurred in some chemical levels for parameters of water quality in swimming pools. Since the introduction of the NSW Department of Health's Public Swimming and Spa Pool Guidelines 1996 greater emphasis has been placed on maintaining disinfection at a level that will assist in the removal of disease-causing organisms.

Pool operators not meeting requirements of the 1996 Guidelines were given on the spot advice to rectify problems identified in the survey. Failures in chemical levels for parameters alone do not necessarily mean a health risk to the public. Where failures were identified, additional factors were considered such as number of bathers, and type and method of disinfection. If the pool was assessed as a public health risk it would be closed until problems were rectified. In this survey, none of the pools required closure.

The Mid Western Public Health Unit will be working with pool operators during the 2001–2002 summer season to ensure that appropriate maintenance and monitoring occurs. With regard to chemical levels for parameters of water quality, an emphasis will be placed on chlorine and pH levels, as these are considered the greatest risk to public health if not maintained appropriately.

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DEVELOPMENT OF A CHILD AND YOUTH HEALTH REPORT CARD FOR CENTRAL SYDNEY, 2000

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This article describes how the first Child and Youth Report Card for the Central Sydney Area Health Service (CSAHS) was developed. The purpose of the Report Card is to contribute to the improvement of child and youth health outcomes through supporting service planning by providing regular information on the status of child and youth health in CSAHS to managers, planners, health professionals and other relevant stakeholders in child and youth health.

BACKGROUND

Over the past decade there has been an increased focus nationally and internationally on useful ways of monitoring child and youth health for the purpose of informing service planning.[1–3] The emphasis is moving from using information that is available and easy to collect for routine reporting, to information that is more helpful to service planning and service delivery, and for monitoring health outcomes.

The Strategic Plan *Health Gain for Children and Youth in Central Sydney* marked a first attempt in the CSAHS to determine priority issues for children and youth.[4] It used the *Health Goals and Targets for Australian Children and Youth* as a basis for the plan.[5] 'High priority' health issues were ascertained by analysing information on:

- prevalence
- severity of a condition
- community concern for the issue
- efficacy of available interventions.

METHODS

To establish the Report Card, it was necessary to determine the information that would be useful to include. In order to build on the work undertaken for the Strategic Plan—and to improve our understanding of indicators—Mahmic, Alperstein and Ward undertook a survey of 36 national and international 'experts' in child and youth health (unpublished data). 'Experts' were health professionals who had expertise in both child health and public health. The response rate was 72 per cent (26 respondents).

A questionnaire requested the experts to rate the importance of monitoring 135 health, social and educational issues for the population as a whole and for the socioeconomically disadvantaged, and also to rate how frequently the data should be collected (annually or every five years, etc.). The list of 135 issues was developed from the Strategic Plan as well as from the national and international literature on the monitoring of child health and indicators. The responses were analysed for agreement by the experts at two levels of concordance—75 per cent and 90 per

TABLE 1 SUMMARY OF INDICATORS RATED AS ESSENTIAL TO COLLECT FOR THE WHOLE POPULATION, AND FOR THE SOCIOECONOMICALLY DISADVANTAGED, AT 75 PER CENT AGREEMENT

Indicators	Essential for the population as a whole	Essential for the socioeconomically disadvantaged
INFANTS (0–1 years)	No. (%)	No. (%)
Mortality		
Infant	26 (100)	21 (81)
Perinatal	25 (96)	21 (81)
Sudden Infant Death Syndrome	25 (96)	-
Unintentional injury	24 (92)	20 (77)
Drowning	23 (88)	-
Traffic related	23 (88)	-
Morbidity, Disability and Developmental		
Physical abuse	26 (100)	21 (81)
Pertussis cases	25 (96)	20 (77)
Sexual abuse	24 (92)	-
Birth defects (overall)	24 (92)	-
Prematurity	23 (88)	21 (81)
Unintentional injury	23 (88)	-
Low birthweight	23 (88)	23 (88)
Neural tube defects	23 (88)	-
Measles	23 (88)	-
Haemophilus influenza type B	23 (88)	-
Traffic-related injuries	22 (85)	-
Breastfeeding at three months	22 (85)	20 (77)
Burns and scalds	21 (81)	-
Congenital rubella	21 (81)	-
Falls	20 (77)	-
Neglect	20 (77)	-
CHILDREN (1–9 years)		
Mortality		
Unintentional injury	25 (96)	21 (81)
Poisoning	25 (96)	-
Drowning	24 (92)	-
Traffic related	24 (92)	20 (77)
Falls	22 (85)	-
Morbidity, Disability and Developmental		
Physical abuse	26 (100)	21 (81)
Sexual abuse	25 (96)	20 (77)
Measles	24 (92)	20 (77)
Pertussis	24 (92)	-
Fully immunised at age two years	24 (92)	20 (77)
Unintentional injury	23 (88)	-
Fully immunised at school entry	23 (88)	20 (77)
Traffic-related injuries	22 (85)	-
Poisoning	21 (81)	-
Disability (all cases)	21 (81)	-
Burns and scalds	20 (77)	-
Emotional abuse	20 (77)	-
Neglect	20 (77)	-
ADOLESCENTS (10–18 years)		
Mortality		
Unintentional injury	26 (100)	20 (77)
Suicide	26 (100)	-
Traffic related	25 (96)	20 (77)
Poisoning	23 (88)	-
Morbidity, Disability and Developmental		
Unintentional injury (all cases)	24 (92)	-
Tobacco consumption rates	24 (92)	20 (77)
Alcohol consumption rates	23 (88)	-
Sexually Transmitted Diseases	23 (88)	-
HIV–AIDS	23 (88)	-
Self-inflicted injuries	22 (85)	-
Disability (all cases)	22 (85)	-
Teenage births	22 (85)	-
Physical abuse	22 (85)	-
Sexual abuse	22 (85)	-
Traffic-related injuries	21 (81)	-
Other substance abuse	20 (77)	20 (77)
SOCIAL AND EDUCATION		
Families below poverty line	24 (92)	23 (88)
High school retention rate	24 (92)	24 (92)
Children in foster care	23 (88)	21 (81)
Unemployment rate	23 (88)	23 (88)
Youths in juvenile justice	22 (85)	23 (88)
Overall homeless rate	21 (81)	-
Youth homeless rate	21 (81)	20 (77)
Family homeless rate	20 (77)	-

TABLE 2

SUMMARY OF HEALTH STATUS OF CHILDREN AND YOUTH IN CSAHS COMPARED TO NSW

Health goal or target	Rate compared to NSW	Rate compared to NSW	Rate compared to NSW
Reduce preventable premature mortality	**Worse** ☹☹☹ Perinatal mortality Falls deaths Poisoning deaths	**Similar** 😐😐 Infant mortality (+) Burns deaths (+)	**Better** ☺☺☺☺☺☺ SIDS deaths Drowning deaths Total unintentional deaths Traffic deaths AIDS deaths Suicide 10–19
Reduce the effect of disability	**Worse** ☹☹ Asthma hospitalisations Traffic-related injury	**Similar** 😐😐 Low birth-weight (-) Prematurity (-)	**Better** ☺☺☺☺☺☺☺☺ Neural tube defects Birth defects overall Drowning hospitalisations Unintentional injury hospitalisations Burns hospitalisations Falls hospitalisations Poisons hospitalisations Sensorineural hearing loss
Reduce the effect of vaccine-preventable disease	**Worse**	**Similar** 😐😐😐 Measles (+) Influenza type B (+) Immunisation Coverage (+)	**Better** ☺ Pertussis
Reduce the effect of conditions occurring in adulthood that have their origins in childhood or adolescence	**Worse** ☹☹☹☹ Male smoking prevalence Hepatitis C 15–19 years Hepatitis B 0–19 years Gonorrhoea 0–19 years	**Similar** 😐😐😐 Dental disease (-) Syphilis 0–19 years (-) Breastfeeding at discharge from hospital (-)	**Better** ☺☺☺ Maternal smoking in pregnancy Female smoking prevalence AIDS
Enhance family and social functioning	**Worse** ☹☹☹☹ Self harm 10–14 Homelessness Youth crime High school retention	**Similar** 😐😐😐😐 Divorce (-) Youth unemployment (-) Child abuse and neglect (-) Basic skills test performance (-)	**Better** ☺☺ Teenage births Self harm 15–19
TOTAL SCORE	**Worse 13** ☹	**Similar 14** 😐	**Better 20** ☺

cent. The results were collated using both the 75 per cent and 90 per cent levels of concordance that the information was important to collect for the population as a whole and the socioeconomically disadvantaged, and the 75 per cent level of concordance for how frequently the data should be collected.

The feasibility of collecting information from a range of sources was assessed by reviewing sources of health information and consulting with other sectors including housing, education, community services, juvenile justice, NSW Roads and Traffic Authority and Australian Hearing Services. Representatives from Aboriginal and some Non-English Speaking Background (NESB) groups in the health sector were also consulted to ascertain the importance and the cultural sensitivity of reporting certain types of information.

To establish ways that we could best present the information to suit a wide readership, we reviewed a range of local, national and international reports monitoring child health.[1–3]

Finally, a draft of a near complete version of the Report Card was evaluated using a semi-structured, qualitative, self-administered questionnaire. The questionnaire was distributed to local service planners and managers of the sectors involved. The questionnaire covered content, the format to be used for data presentation, and the potential use of the various sections of the Report Card.

RESULTS

At the 75 per cent level of agreement, 64 indicators were rated as essential to monitor for the population as a whole, and 25 indicator were rated as essential to monitor for the

TABLE 3

TWO EXAMPLES TO ILLUSTRATE THE USE OF INDICATORS FOR TARGET SETTING AND SERVICE PLANNING

Health Issue	Indicator	Data Source	Current Level CSAHS	Current Level NSW	Current level Aboriginal & Torres Strait Islander	Current level OSB or LSAH not English	Target 2003	Future trend	Past trend	Relevant programs required
Antenatal										
Maternal smoking in pregnancy rate	% mothers that smoked during pregnancy	MDC (HOIST) Epidemiology and Surveillance Branch, NSW Dept. of Health	(1998) *N*=591; 8.9%	*N*=16881; 19.7%	*N*(5y)=204 53.4%	Overseas born *N*(5y)=975 6.1%				
Youth–Workforce										
Traffic-related injuries	Rate of traffic-related injury by age group (0–20 years) (and road user type) and *n* per year	NSW Provisional Road Traffic Accident Database, Road and Traffic Authority, NSW	(1998) *N*=479 43.2/ 10000	*N*=6362 35.6/ 10000						

socioeconomically disadvantaged group (Table 1). At the 90 per cent level of agreement, experts rated 24 indicators as essential to monitor for the population as a whole, compared with only one indicator for the socioeconomically disadvantaged group—high school retention rate (Table 1). In relation to periodicity of data collection at the 75 per cent level of concordance, annual collection was nominated for nearly all of the indicators except breast feeding at three months where only 46 per cent supported collecting this information.

The following criteria were used to discern what was included on the Report Card:

- 75 per cent agreement by experts that the issue was important to collect for the general population;
- 'high priority' issues from the CSAHS 'Strategic Plan';
- state or national child health priorities;
- issues where recent developments had changed the opportunity for health gain (for example, where new technology has improved early detection for congenital sensorineural hearing loss).

We divided the Report Card into three sections, using the framework of the Health Goals and Targets for Australian Children and Youth:

- Section One included a comparison of the health status of children and youth in CSAHS with NSW using the *Health Goals and Targets for Australian Children and Youth* framework (Table 2).
- Section Two included graphs and tables of the health and social issues, presented by life stage: that is, antenatal, birth, pre-school, primary school to youth–workforce, comparing CSAHS and NSW.
- Section Three (Table 3) presented indicators in the life stage format and in such a manner as to facilitate target setting and service planning.

Information was presented on sub-populations of Aboriginal and Torres Strait Islander, and some ethnic groups, and by local government authority (LGA) where possible, depending on the availability of information and the population numbers. Where numerator data were small, we presented five-year mean rates.

The Report Card described the intended periodicity of data collection (Table 4). Approximately half the indicators could be collected annually, since they were part of regular statewide data collections. However, about 20 per cent of the indicators will be available through the NSW Child Health Survey. Approximately 30 per cent of indicators would only be available by initiating specific research or surveillance (Table 4).

There was a sixty per cent (19 of 32) response rate for the evaluation survey. Seventeen respondents were from the health sector. Several managers commented positively on the Report Card as a 'great reference document', providing an 'overview of youth issues', established 'a baseline of health status from which to measure improvements' and as a document 'useful in

TABLE 4

PERIODICITY OF COLLECTION AND PUBLICATION OF DATA BY HEALTH ISSUE

Health Issues	Annually	About every five years	Child Health Survey
Antenatal			
Tobacco smoking in pregnancy	✔		
Birth			
Low birthweight	✔		
Prematurity	✔		
Perinatal mortality	✔		
Infant mortality	✔		
SIDS behaviours			✔
SIDS rate	✔		
Neural tube defects		✔	
Birth defects (overall)	✔		
Breastfeeding	✔		✔
Exposure to smoking at home			✔
Early childhood–pre-school			
Sensorineural hearing loss	✔		
Measles	✔		
Pertussis	✔		
Influenza type B	✔		
Immunisation Coverage	✔		
Drowning		✔	
Asthma	✔		
Inactivity		✔	
Primary School			
Immunisation coverage	✔		
Emotional–behavioural problems			✔
Dental disease	✔		
Unintentional injury	✔		
Burns		✔	
Falls		✔	
Poisoning		✔	
Exposure to harmful ultraviolet light			✔
Youth–Workforce			
Traffic-related injury	✔		
Tobacco consumption		✔	
Hazardous alcohol use		✔	
Regular condom use		✔	
Teenage births	✔		
AIDS	✔		
Hepatitis C		✔	
Hepatitis B		✔	
Syphilis		✔	
Gonorrhoea		✔	
Depression			✔
Self harm	✔		
Suicide		✔	
SOCIAL, EDUCATIONAL AND ECONOMIC ISSUES			
Whole of life			
Home ownership by family type		✔	
Overcrowded housing (public)	✔		
Domestic violence rates	✔		
Social support			✔
Social capital			✔
Birth–Preschool–Early childhood			
Divorce		✔	
Child abuse or neglect	✔		
Types of out of home care placements	✔		
Number placed in out of home care	✔		
Attendance pre-school–child care		✔	
Primary School			
Basic skills levels	✔		
Absence levels	✔		
English language proficiency by ethnicity		✔	
Youth–workforce			
High school retention	✔		
Post compulsory school age transition	✔		
Homelessness	✔		
Youth labour force status		✔	
Youth occupational profile		✔	
Youth unemployment		✔	
Youth crime	✔		

planning service delivery'. They found the most useful section to be Section 2. Suggested changes were to provide more breakdown of information by sub-groups and regions, and to invest in ways to make the Report Card more user friendly, such as providing summaries of each section. Recommended indicators to include in future Report Cards included social capital, local data collections and service delivery data. Changes were made where possible to improve the presentation of the Report Card and to investigate other information sources. Recommendations for future Report Cards were developed.

DISCUSSION

The issues that were selected for inclusion in the Report Card represent a combination of a comprehensive view of child and youth population health, opportunities for health gain, child health priorities, expert opinion and relevance to service planning.

Overall, the unpublished research by Mahmic, Alperstein and Ward revealed an unexpected disparity between expert ratings of indicators as essential to monitor for the general population, compared to the low socioeconomic sub-group. The method used to ascertain expert opinion meant that experts relied more on personal opinion rather than published literature to rate important indicators. Some experts commented that they did not rate indicators for the low socioeconomic subgroup highly because they were aware that these data were not available in Australia. It is for this reason that we were unable to report health issues by socioeconomic status.

The feasibility of collecting population-based information for some selected health and social issues, such as mental health and homelessness was poor. The main barrier to accessing important information in the health sector was lack of available information, whereas in the case of other sectors, a range of barriers emerged, including:

- limited resources;
- timeliness of our request in relation to their work agenda;
- privacy of information;
- lack of reliable information on people 0–20 years at the area health service level.

Managers and planners from other sectors and non-health organisations were very positive about collating information from multiple sources onto one monitoring system. However, it was difficult to manage data collection from the wide range of organisations, due to data availability, data aggregation and the need to contact a range of people within the same organisation to negotiate release of data.

It is expected that as more population-based child health information becomes available through improved monitoring and stronger ties with other sectors, a range of currently unreported indicators can be presented.

CONCLUSION

This was the first Child and Youth Report Card for CSAHS. As such, it will be refined and modified over time. The development of the Report Card was a valuable exercise, which not only brought together a range of previously unrelated information sources into the one report, but also has the potential to reinforce the process of evidence-based planning of child and youth health services in CSAHS, and improved inter-agency collaboration.

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FACT*SHEET*

LISTERIOSIS

WHAT IS LISTERIOSIS?

Listeriosis is a rare illness caused by eating food contaminated with bacteria called *Listeria monocytogenes*. The listeria bacteria are common in soil and some raw foods. Eating foods that contain listeria bacteria does not cause illness in most people.

WHO IS MOST AT RISK?

Pregnant women, newborns, the elderly and people with weakened immune systems.

HOW COMMON IS IT?

There are typically 20 to 30 cases of listeriosis reported each year in NSW. Although listeriosis is rare, it has a high death rate.

WHAT ARE THE SYMPTOMS?

The incubation period (between infection and symptoms) can vary from three to 70 days but on average is about three weeks. Infections may cause septicaemia (blood poisoning), meningitis (inflammation of the brain) and miscarriage in pregnant women.

Symptoms include: fever, muscle aches and sometimes gastrointestinal symptoms such as nausea and diarrhoea. In the more severe form, symptoms also include collapse and shock. If infection spreads to the central nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, convulsions and coma can occur. About a third of these patients may die. Infection during pregnancy can lead to premature delivery (abortion), infection of the newborn, and stillbirth.

HOW IS IT SPREAD ?

Listeria monocytogenes is widespread throughout nature, being commonly carried by many species of both domestic and wild animals. Raw meat, unpasteurised milk, raw fruit and vegetables can be contaminated with the bacteria. Outbreaks of illness have been associated with raw or contaminated milk, soft cheeses, pre-prepared salads (for example, from salad bars), unwashed raw vegetables, and ready to eat meat such as paté.

People who are at risk can contract listeriosis through eating food contaminated with the listeria bacteria. Babies can be born with listeriosis if their mothers eat contaminated food during the pregnancy.

HOW IS IT DIAGNOSED AND TREATED?

The diagnosis of listeriosis can be confirmed by a blood or other tests. Treatment involves antibiotics and supportive therapy. When infection occurs during pregnancy, antibiotics can often prevent infection of the foetus or newborn. Even with prompt treatment, some infections result in the death of the patient. This is particularly in the elderly and in people who have other serious medical problems.

HOW IS IT PREVENTED?

To prevent listeriosis:

- thoroughly cook raw food from animal sources, such as beef, lamb, pork, or poultry;
- wash raw vegetables and fruit thoroughly before eating;
- keep raw meat separate from vegetables, cooked foods, and ready- to-eat foods (that is, do not allow the blood from raw meat to come into contact with other food);
- use separate cutting boards for raw meat and foods that are ready to eat (for example, cooked foods and salads);
- avoid unpasteurised milk or foods made from unpasteurised milk (for example, soft cheeses);
- wash your hands before and after preparing food;
- wash knives and cutting boards after handling uncooked foods;
- wash your hands after handling animals;
- perishable foods should be stored in a cold (less than 5^{o} C) refrigerator and be washed and eaten as soon as possible.

People at increased risk of listeriosis should not eat:

- pre-packed salads,
- pre-cut fruit,
- pre-cooked chicken,
- rare meats,
- cold delicatessen meats,
- paté,
- raw seafood,
- smoked fish,
- soft cheeses such as brie, camembert, ricotta, or blue-vein,
- sprouted seeds and raw mushrooms,
- soft-serve ice cream.

For further information please contact your local Public Health Unit, Community Health Centre, or doctor.

October 2001

NSW HEALTH
Better Health Good Health Care

Health Working as a Team The Way Forward

COMMUNICABLE DISEASES, NSW: NOVEMBER 2001

TRENDS

Notable features of communicable disease reports received by the NSW Department of Health through to September (Figure1, Table 2) include:

- the continuing **pertussis** epidemic that seems to be primarily affecting older children and adults and rural dwellers;
- the number of cases of **meningococcal disease** peaked in August (31 cases), with cases predominant among small children and young adults.

INFLUENZA IN NSW, 2001

Rob Menzies, Elizabeth Anne Griggs, and Valerie Delpech

The 2001 influenza season in NSW was a relatively mild one. Reports from general practitioners of 'influenza-like-illness' peaked in late July at 33 cases per 1,000 consultations, slightly lower than last year's peak of 37. Routine laboratory diagnoses—predominantly from specimens from hospitalised children with respiratory illnesses—peaked in early August at 5.9 positives per 100 samples, the lowest rate reported in more than four years. Laboratory testing of specimens from patients of sentinel general practitioners (Directed Virological Surveillance) also peaked in early August with a predominance of influenza type A. The H1N1 A/New Caledonia/20/99-like strain, by far the most common (94 per cent of samples), was included in the Australian vaccine this year. For Australia and New Zealand as a whole, the A/New Caledonia/20/99 (H1N1) was predominant (77 per cent of isolates). Last year, by contrast, type A H3N2 predominated.

Many thanks to all who participated in the influenza surveillance—NSW public laboratories, public health units, many general practitioners, the Australian Sentinel Practice Research Network, and the World Health Organization Collaborating Centre for Influenza.

Weekly reports are coordinated by the NSW Department of Health between May and September and are available from the Communicable Disease Surveillance and Control Unit, NSW Department of Health, by contacting the Influenza Surveillance Officer on (02) 9391 9234.

QUARTERLY REPORT: AUSTRALIAN CHILDHOOD IMMUNISATION REGISTER

The table below reports immunisation coverage by area health service for children aged 12 months to less than 15 months.

These data refer to two different cohorts of children whose age has been calculated 90 days before data extraction. The information contained in each of the reports has been extracted from the Australian Childhood Immunisation Register (ACIR) and may not reflect actual coverage due to under-reporting.

TABLE 1

IMMUNISATION COVERAGE BY AREA HEALTH SERVICE FOR CHILDREN AGED 12 MONTHS TO LESS THAN 15 MONTHS

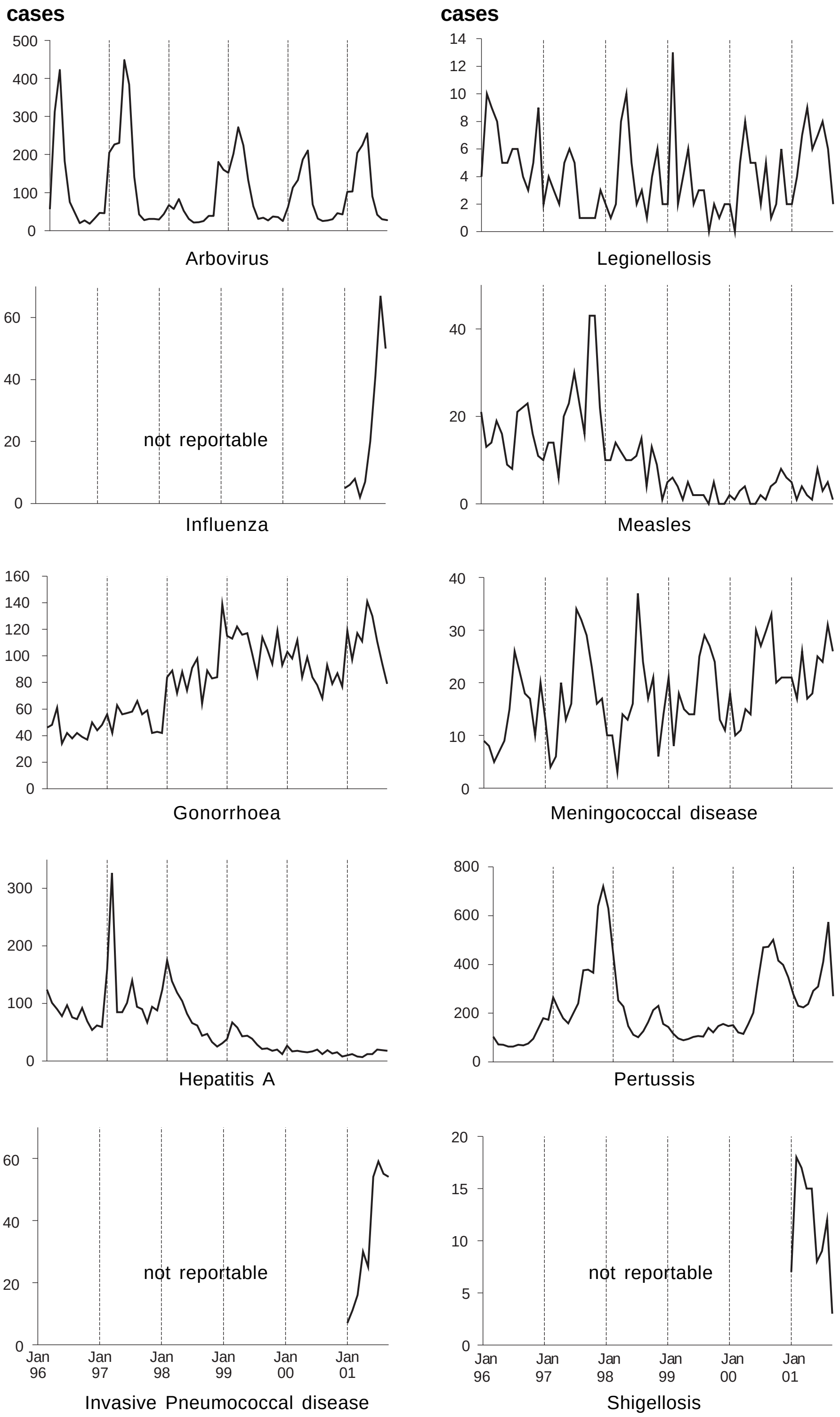
Area Health Service	30 June 01	30 Sept 01
Central Coast	94	93
Central Sydney	91	89
Hunter	94	96
Illawarra	92	93
Northern Sydney	90	89
South Eastern Sydney	89	89
South Western Sydney	92	90
Wentworth	92	92
Western Sydney	89	90
Far West	87	92
Greater Murray	93	93
Macquarie	93	92
Mid North Coast	91	91
Mid Western	90	92
New England	92	92
Northern Rivers	86	86
Southern	91	91
NSW	**91**	**91**

FIGURE 1

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

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

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



Arbovirus

Jun–Sept 01	
Male	54%
<5	0%
5–24	12%
25–64	73%
65+	14%
Rural	89%

Legionellosis

Jun–Sept 01	
Male	87%
<5	7%
5–24	0%
25–64	67%
65+	27%
Rural	13%

Influenza

Jun–Sept 01	
Male	56%
<5	7%
5–24	31%
25–64	45%
65+	17%
Rural	58%

Measles

Jun–Sept 01	
Male	33%
<5	44%
5–24	44%
25–64	11%
65+	0%
Rural	33%

Gonorrhoea

Jun–Sept 01	
Male	90%
<5	2%
5–24	22%
25–64	77%
65+	0%
Rural	13%

Meningococcal disease

Jun–Sept 01	
Male	45%
<5	25%
5–24	40%
25–64	31%
65+	4%
Rural	45%

Hepatitis A

Jun–Sept 01	
Male	68%
<5	4%
5–24	20%
25–64	66%
65+	11%
Rural	27%

Pertussis

Jun–Sept 01	
Male	40%
<5	10%
5–24	54%
25–64	33%
65+	4%
Rural	57%

Invasive Pneumococcal disease

Jun–Sept 01	
Male	55%
<5	24%
5–24	8%
25–64	23%
65+	44%
Rural	36%

Shigellosis

Jun–Sept 01	
Male	78%
<5	1%
5–24	9%
25–64	87%
65+	0%
Rural	17%

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

TABLE 2 REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN SEPTEMBER 2001 BY AREA HEALTH SERVICES

Condition	Area Health Service (2001)																		Total	
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	CHS	for Sept†	To date†
Blood-borne and sexually transmitted																				
AIDS	-	-	-	-	-	-	-	-	4	1	-	-	-	-	-	-	-	-	5	73
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	41	41	28	10	1	2	27	12	78	15	10	14	11	8	3	11	5	5	326	3,378
Gonorrhoea*	22	5	5	1	1	-	1	1	41	-	2	7	-	-	-	1	-	3	90	1,014
Hepatitis B - acute viral*	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	3	56
Hepatitis B - other*	41	45	66	6	-	2	11	9	59	-	2	3	4	2	4	1	2	1	259	3,356
Hepatitis C - acute viral*	1	-	1	-	-	-	-	-	-	-	-	-	4	-	-	1	-	-	7	121
Hepatitis C - other*	91	43	78	25	1	28	56	22	82	32	28	9	4	9	-	14	13	31	572	6,634
Hepatitis D - unspecified*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
HIV infection*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	222
Syphilis	9	-	6	-	-	-	-	-	12	1	4	-	2	-	-	-	-	-	34	547
Vector-borne																				
Arboviral infection (BFV)*	-	-	-	-	-	-	-	-	-	6	10	1	-	-	-	-	-	-	17	356
Arboviral infection (Other)*	-	-	-	-	-	-	-	-	1	-	1	-	-	-	1	-	-	-	3	49
Arboviral infection (RRV)*	-	-	-	-	-	-	3	-	-	-	1	1	-	-	1	-	-	-	6	729
Malaria*	-	3	1	-	-	-	-	1	-	1	4	-	-	-	-	1	-	-	11	119
Zoonoses																				
Anthrax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptospirosis*	-	-	-	-	-	-	1	-	-	-	1	5	1	-	-	-	-	-	8	57
Lyssavirus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	1	-	-	4	27
Q fever*	-	-	-	-	-	-	-	-	-	2	3	4	6	-	-	-	-	-	15	112
Respiratory and other																				
Blood lead level*	-	-	-	1	1	-	3	2	1	-	1	-	1	-	-	2	-	-	12	325
Influenza	-	3	9	1	-	2	4	3	7	6	3	6	-	-	-	4	6	-	54	177
Invasive pneumococcal infection	4	2	13	4	2	4	9	1	12	1	-	-	-	1	-	-	-	1	54	295
Legionnaires' longbeachae*	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	22
Legionnaires' pneumophila*	-	1	2	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	5	30
Legionnaires' (Other)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Meningococcal infection (invasive)	2	-	2	2	2	-	-	3	2	-	1	-	4	3	-	-	2	-	23	205
Tuberculosis	4	4	4	-	1	1	1	3	6	1	1	-	-	-	-	-	-	-	26	272
Vaccine-preventable																				
Adverse event after immunisation	-	2	-	-	1	-	4	-	1	-	-	-	-	-	1	2	2	-	13	73
H.influenzae b infection (invasive)*	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	10
Measles	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	30
Mumps*	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	19
Pertussis	15	39	56	23	19	6	51	14	29	48	24	6	27	24	1	56	7	-	445	2,966
Rubella*	-	-	1	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	6	47
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Faecal-oral																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cryptosporidiosis*	-	-	4	-	-	-	-	-	2	1	1	-	-	-	-	-	-	-	8	119
Food borne illness (not otherwise specified)	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	20
Gastroenteritis (in an institution)	11	-	11	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	23	338
Giardiasis*	1	6	3	3	-	-	3	8	13	3	5	5	-	-	-	3	1	-	54	746
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Hepatitis A*	4	3	6	-	2	-	-	1	-	-	-	-	-	-	-	-	1	-	17	123
Hepatitis E*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Listeriosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Salmonellosis (not otherwise specified)*	7	17	22	5	-	3	3	1	13	6	5	2	2	6	4	3	2	-	101	1,277
Shigellosis	-	1	1	-	-	-	1	-	6	-	-	-	-	-	-	-	-	-	9	104
Typhoid and paratyphoid*	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	29
Verotoxin producing E. coli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* lab-confirmed cases only † includes cases with unknown postcode

CSA = Central Sydney Area
NSA = Northern Sydney Area
WSA = Western Sydney Area
WEN = Wentworth Area
SWS = South Western Sydney Area
CCA = Central Coast Area
HUN = Hunter Area
ILL = Illawarra Area
SES = South Eastern Sydney Area
NRA = Northern Rivers Area
MNC = North Coast Area
NEA = New England Area
MAC = Macquarie Area
MWA = Mid Western Area
FWA = Far West Area
GMA = Greater Murray Area
SA = Southern Area
CHS = Corrections Health Service

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Articles, news and comments should be 1000 words or less in length, including references, and include a summary of the key points to be made in the first paragraph. References should be set out in the Vancouver style, described in the *New England Journal of Medicine*, 1997; 336: 309–315. Send submitted articles on paper and in electronic form, either on disc (Word for Windows is preferred), or by email. The article must be accompanied by a letter signed by all authors. Full instructions for authors are available on request from the managing editor.

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