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Changing epidemiology of hepatitis A in the 1990s in Sydney, Australia

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SUMMARY

Surveillance of hepatitis A in residents of Eastern Sydney Health Area identified substantial epidemics in homosexual males in 1991–2 with a peak rate of 520 per 100000 recorded in males aged 25–29 years, and again in 1995–6, with a peak rate of 405 per 100000 per year in males aged 30–34 years. During 1994–5 an epidemic was detected among disadvantaged youth associated with injecting drug use; peak rates of 200 per 100000 per year were reported in males aged 25–29 years and of 64 per 100000 per year among females aged 20–24 years. The epidemiology of hepatitis A in these inner suburbs of Sydney is characterized by very few childhood cases and recurrent epidemics among homosexual men. Identified risk groups need to be targeted with appropriate messages regarding the importance of hygiene and vaccination in preventing hepatitis A. However, poor access to health services among disadvantaged youth and a constant influx of young homosexual males into these inner suburbs present major challenges to hepatitis A control.

INTRODUCTION

In industrialized countries, the recent epidemiology of hepatitis A has been one of low endemicity and low prevalence of immunity in all but the oldest members of the community, with the result that the majority of cases occur in children and young adults [1, 2]. With the growth in number of young children using group child care, in particular day nurseries or long day care, it has become apparent that a large proportion of recognized cases are attributable to child care; cases occur among children attending group child care as well as among adult family and occupational contacts [3, 4]. Homosexual men have also been recognized as a risk group for hepatitis A [5, 6], and case-control studies have identified oral–anal and digital–anal sexual practices as specific behaviours associated with transmission of hepatitis A [7].

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During 1991, the Eastern Sydney Health Area was the Australian epicentre of an epidemic of hepatitis A among homosexual men [8], which was observed concurrently in major cities in Australia and around the world [9, 10]. In response to the rapidly mounting rate of hepatitis A notifications which signalled the start of the epidemic, the Eastern Sydney Public Health Unit established a purpose-designed hepatitis A database separate from the standard notifiable diseases database used throughout New South Wales. The database was used for cases notified in Eastern Sydney residents and contained deidentified demographic and risk factor information which would not otherwise have been collected through the routine notification mechanism. This database continues to be maintained, and has been modified since its inception by addition of appropriate fields pertaining to newly relevant risk factors. During the early 1990s, the epidemiology of hepatitis A in the Eastern Sydney

Health Area has varied markedly. In this paper, demographic and risk-factor information held in the database has been analysed to draw attention to the changing epidemiology of hepatitis A in this urban area during the period 1991–6.

SETTING AND METHODS

The Eastern Sydney Health Area has a resident population of approximately 312000 and includes the Sydney central business district, major industrial complexes and a mixture of densely populated inner city precincts, lower density bungalow suburbs, and medium- and high-density public housing estates. This region has a large gay community and is thought to have one of the highest concentrations of homosexual males in the world.

Under the NSW Public Health Act 1991, it is a statutory requirement for hospitals and medical practitioners to notify cases of acute viral hepatitis, and for microbiology laboratories to notify a positive hepatitis A virus (HAV) IgM assay to the Public Health Unit. Prior to introduction of the Public Health Act 1991, acute viral hepatitis was subject to mandatory clinical notification by medical practitioners, whilst detection of HAV-specific IgM was reported on a voluntary basis by clinical laboratories to the Public Health Unit [11].

At its inception, the hepatitis A database contained demographic data (date of birth, sex, suburb of residence, occupation), information on the disease (notification date and agency, date of onset of jaundice, date of laboratory confirmation) and information concerning the presence of risk factors (sexual preference for adult males, household or sexual contact within the incubation period with a person with hepatitis, overseas travel within the incubation period). More recently, fields pertaining to other risk factors have been added: attendance in child care; contact with a child attending child care; injecting drug use; contact with an injecting drug user; and attendance at a methadone clinic. In most instances, the information was obtained from the case's medical practitioner.

EpiInfo version 5 software was used to record and analyse the database. Analyses took the form of descriptive and comparative statistics for both categorical and continuous variables. Population data were based on the 1991 Census of Population and Housing, conducted by the Australian Bureau of Statistics.

RESULTS

Overall pattern of notifications

There were 1138 hepatitis A notifications recorded in the database with date of onset of jaundice between January 1991 and December 1996, with 421 cases in 1991, 156 cases in 1992, 43 cases in 1993, 92 in 1994, 208 in 1995 and 218 in 1996 (Fig. 1). Of these, 991 (87·1%) cases were in males, 144 (12·7%) in females and in 3 (0·3%) gender was recorded as transsexual. The mean age of cases was 30·4 years (median 29 yr), with only 14 (1·2%) cases in preschool-aged children (0–4 yr), 30 (2·6%) cases among 5–14 year olds and the remainder (96·2%) in those 15 years or older. A history of recent travel to a country with high hepatitis A endemicity was reported for 164 (14·6%) of the 1122 cases with this field completed.

The 6-year interval can be readily divided into four periods, (i) an epidemic period lasting from January 1991 to August 1992, (ii) a 'baseline' period from September 1992 to August 1994, (iii) a smaller epidemic period from September 1994 to June 1995 and (iv) a second larger epidemic from July 1995 to December 1996.

A breakdown of cases by age, sex and recognized risk factors for each of these four periods is summarized in Table 1.

January 1991 to August 1992

There were 561 cases notified in this period (Fig 2*a*), with a mean age of 31 years for both sexes.

A history of recent overseas travel was obtained from 8·3% of homosexual and bisexual men compared to 21% of heterosexual men ($\chi^2 = 125{\cdot}2$, $P < 0{\cdot}00001$) and 31% of women ($\chi^2 = 20{\cdot}7$, $P < 0{\cdot}00001$). In contrast, a history of recent contact with someone with hepatitis was elicited from 21% of homosexual and bisexual men compared to 4·9% of heterosexual men ($\chi^2 = 135{\cdot}0$, $P < 0{\cdot}00001$ and 18% of women ($\chi^2 = 0{\cdot}28$, $P =$ n.s.).

In the absence of vaccine (released in Australia in July 1993), public health strategies included raising awareness of the epidemic among general practitioners and other primary health care staff serving the inner city gay community, and among homosexual and bisexual men directly through the gay media. Specific advice was communicated regarding the mode of spread of hepatitis A and the importance of hygiene in preventing transmission. These messages high-

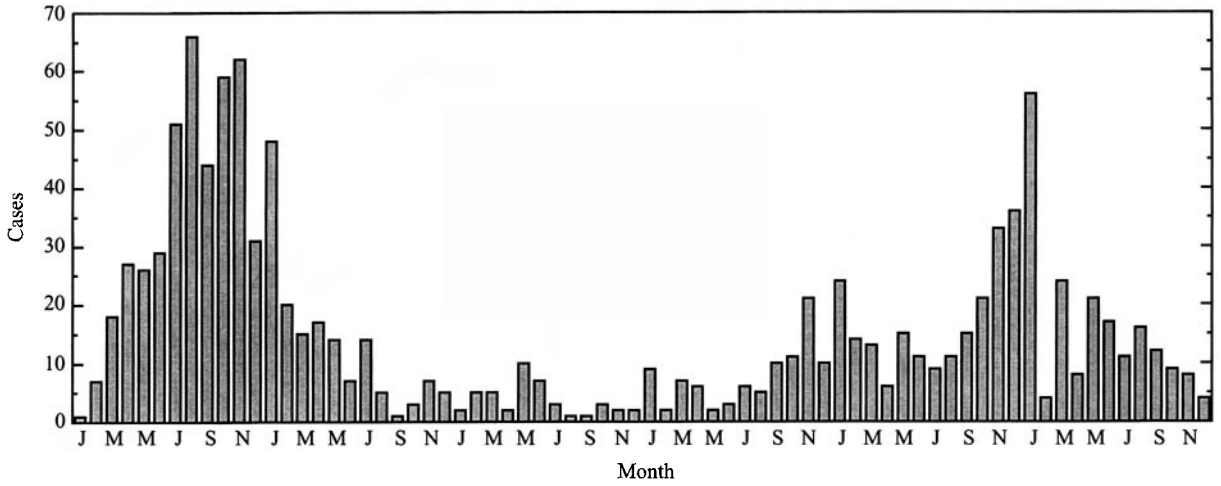

Fig. 1. Hepatitis A notifications by month of onset, eastern Sydney, 1991–6.

Table 1. *Age, sex and other risk factors in hepatitis A cases notified in eastern Sydney, 1991–6, by epidemic period (not all data available for all cases)*

	Period			
Risk	Jan 91–Aug 92 (n = 561)	Sep 92–Aug 94 (n = 99)	Sep 94–Jun 95 (n = 126)	Jul 95–Dec 96 (n = 330)
Male sex	506 (90·2)*	72 (73)	101 (80)	95 (89·4)
Age				
< 5 yr	1 (0·2)	7 (7·1)	2 (1·6)	1 (0·3)
< 15 yr	14 (2·5)	13 (13)	3 (2·4)	10 (3·0)
Contact with hepatitis	88/505 (17·4)	24/83 (29)	22/65 (34)	52/157 (33·1)
Travel to endemic country	71/512 (13·9)	27/98 (28)	16/115 (14)	36/277 (13·0)
Associated with child care	n.a.	11/80 (14)	2/101 (2·0)	9/261 (3·4)
Injecting drug use or contact	n.a.	n.a.	30/87 (34)	22/256 (8·6)
Homosexual or bisexual†	323/404 (80·0)	36/54 (67)	42/64 (66)	186/209 (89·0)

* Values in parentheses are percentages.
† Of males aged > 14 years.

lighted those sexual practices, including oral–anal contact, which were considered to promote spread. As we were concerned about the risk of transmission from infected food handlers, considerable effort was put into educating staff of food establishments regarding transmission of hepatitis A and its prevention. We detected no outbreaks which could be attributed to foodborne transmission.

September 1992 to August 1994

There were 99 cases notified in this period (Fig 2*b*), with a mean age of 27 years for females and 28 years for males.

During this period, an outbreak of hepatitis A occurred in a local preschool (nursery school) caring for Aboriginal children aged 3–5 years. The icteric index cases were a hospitalized 3-year-old from the preschool and the 7-year-old sibling of another child from the preschool. A second preschool child suffered an anicteric gastrointestinal illness requiring hospital admission and was later found to be HAV IgM positive. A nurse caring for this child whilst he was in hospital developed hepatitis A 1 month later. Outbreak management involved: testing of children for IgM and total antibodies to HAV; emphasis on hygiene; and recommending use of normal human immunoglobulin for staff, household contacts and susceptible or untested children. Of 19 preschool children tested, 6 were IgM positive, a further 6 were IgG positive but IgM negative and in 7 no antibodies were detectable. In view of the number of children

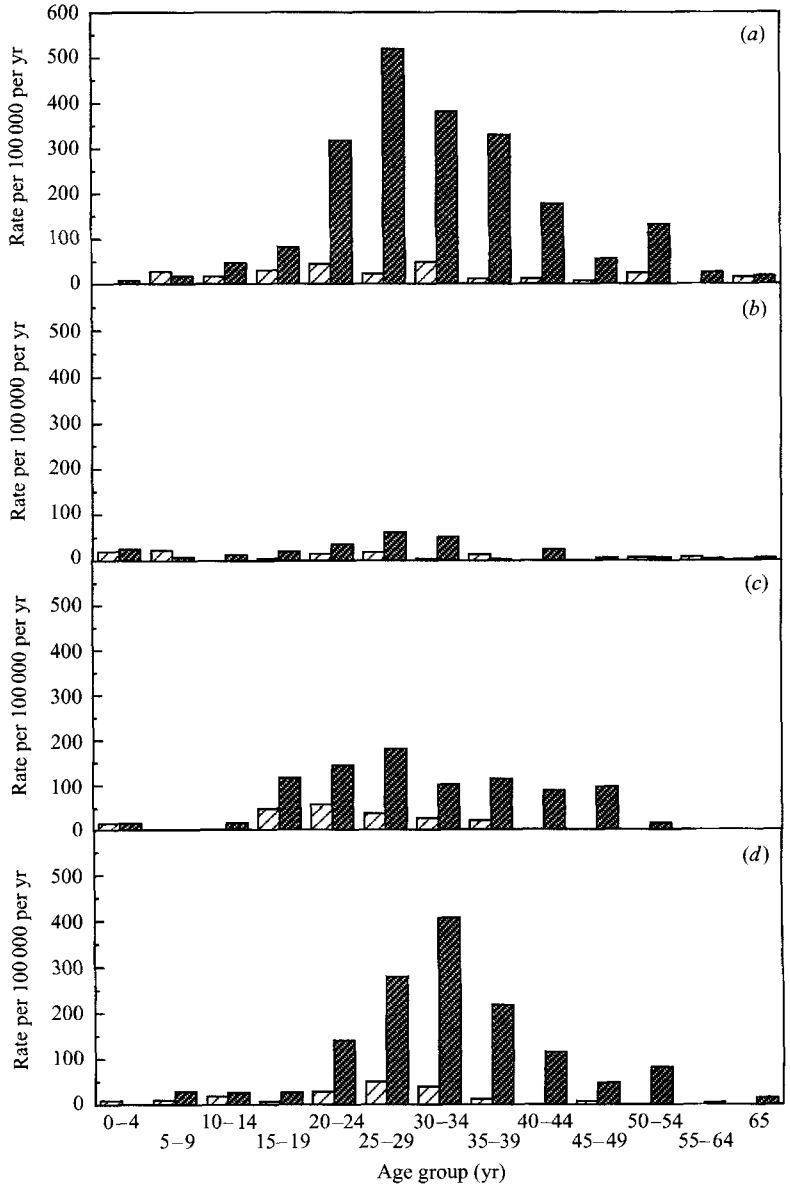

Fig. 2. Hepatitis A notification rates by age and sex, eastern Sydney, 1991–6, by period. (a) January 1991 to August 1992; (b) September 1992 to August 1994; (c) September 1994 to June 1995; (d) July 1995 to December 1996. ■, males; ▨, females.

with IgG seropositivity, viral transmission had probably occurred in the preschool over a number of months by the time the index cases came to light.

September 1994 to June 1995

One hundred and twenty-six cases were notified with onset in this 10-month period (Fig. 2*c*); the mean age in females was 24 years and in males was 30 years.

A disproportionate number of cases was reported by an inner city clinic which provided primary health care to young disadvantaged people, mainly homeless youth and sex workers. Staff of this clinic drew our attention to an apparent outbreak of hepatitis A associated with injecting drug users (IDU). There were 30 (24%) cases identified as IDU (27 cases) or their close contacts (3). Among the latter was a 1-year-old child of IDU parents. Nine of the IDU cases were sex workers (6 female; 2 male; 1 transsexual) and 2 were male prison inmates. Men who had sex with men remained a risk group; of 64 men in whom sexual preference was reported, 42 (66%) identified as homosexual or bisexual. Thirteen male IDU provided information on sexual preference, and of these 6 were homosexual or bisexual while 7 were heterosexual.

The response to recognition of this outbreak included informing inner city general practices, hospital emergency departments, sexual health and

methadone clinics of the outbreak and its characteristics. Advisory letters were also sent to youth services and we met with youth service representatives to seek advice on most appropriate means to educate the target group regarding hepatitis A prevention. Subsidized hepatitis A vaccine was provided through the primary care clinic serving the at-risk population.

July 1995 to December 1996

This 18-month period saw a return to the pattern of the 1991–2 epidemic, when 330 cases were notified (Fig 2*d*). The mean age was 32 years in males and 26 years in females.

A history of recent overseas travel was obtained from 7·3% of homosexual and bisexual men compared to 13% of heterosexual men (Fisher exact P = n.s.) and 29% of women (Fisher exact $P = 0{\cdot}0025$). Injecting drug use or close contact with IDU was reported in 22 cases, all adults, including 6 sex workers (4 female; 2 male).

DISCUSSION

Previous descriptions of the epidemiology of hepatitis A in industrialized countries have emphasized the low overall notification rate, the large proportion of infections acquired overseas and the preponderance of children among indigenous cases. A UK Public Health Laboratory Service study of hepatitis A surveillance in the period 1980–8 found that 23–30% of cases were in children under 15 years of age, males comprised 56·6% of cases, recent overseas travel was noted in 14·5% of cases and there was a history of contact with a case in 15·3% [1]. The Sentinel County Hepatitis Study coordinated by the US Centers for Disease Control examined characteristics of a sample of confirmed cases of hepatitis A reported in 1979–80 [2]. Thirteen percent of cases were in under 15 year olds, males comprised 65% of cases, overseas travel was reported in 14% of cases, previous contact with someone with hepatitis in 26% and contact with child care in 11%. Several large community-based outbreaks lasting for more than 1 year have also been characterized [12–16]. Common features have been the high attack rates in school children and association with markers of lower socio-economic status, in particular overcrowding and poor sanitation. Such outbreaks have proven difficult to control, although mass use of normal human immunoglobulin appeared to have some effect in outbreaks within a well-defined and accessible community [13]. Mass vaccination has recently been used during prolonged community outbreaks, but the success of this strategy requires very high vaccine uptake among susceptibles [17].

Our analysis is subject to limitations of the hepatitis A database which relies on cases recognized as hepatitis A and reported to the Public Health Unit, so is likely to have missed most individuals with anicteric infection. This particularly affects ascertainment of the disease in young children, of whom the majority may be subclinical or anicteric. We believe that laboratories were assiduous in notifying cases; however, we cannot be certain to what extent medical practitioners may have decided against serological confirmation of typical cases during epidemic periods and then neglected to notify the same cases on the basis of clinical diagnosis. Information held in the database changed with time; in particular we did not collect information on injecting drug use early in the period of study.

The epidemics occurring in eastern Sydney during 1991–2 and again in 1995–6 largely affected men who have sex with men. During both epidemics, cases in this group frequently reported a history of household or sexual contact with someone with acute hepatitis. Both epidemics lasted about 18 months despite public health campaigns to raise awareness among at-risk individuals and local primary health care providers, recommendation for use of immunoglobulin in contacts, encouragement of primary care providers to offer targeted hepatitis A vaccination (in the later epidemic) and intensive education of staff of food establishments. Homosexual men have previously been shown to be at risk of hepatitis A [5, 6], and increased transmission in this group has been ascribed to oral–anal or digital–rectal sexual practices [7], which our education campaign also targeted.

In so far as epidemic periodicity is determined by the rate of accumulation of susceptibles, the occurrence of two epidemics 4 years apart in the same locality affecting homosexual men of the same age group (mean age 31 years in 1991–2 and 32 years in 1995–6) is best explained by a continuing influx of susceptible young adult males into the inner suburbs of Sydney at the centre of the epidemic. The proportion of young Sydney homosexual men who are immune to hepatitis A is unknown; however, Stewart and Crofts tested men attending gay venues in Melbourne, Australia, during 1991, the year in which this city also experienced an epidemic among homosexual men, and showed that only 27% had HAV antibodies [9]. Inactivated hepatitis A vaccine is safe and immunogenic in homosexual men [18] and it will

need to be targeted at young gay men arriving in inner Sydney (and other gay communities). Further work is underway to determine barriers to hepatitis A vaccination in this target group and also to determine levels of susceptibility required to trigger and maintain a hepatitis A epidemic.

In 1994–5 an epidemic was recognized among homeless youth many of whom admitted injecting drug use. Use of illicit drugs has been associated with hepatitis A acquisition relatively recently. Clusters were recognized in Oklahoma in the mid-1980s in young adults smoking marijuana and/or injecting drugs; it was postulated that the drugs or paraphernalia had become contaminated in some way with infected faeces [19]. An epidemic among Helsinki IDU was linked epidemiologically to one batch of amphetamine [20]. Although our current surveillance is not suited to obtaining details of illicit drug use, the period of time over which the cases occurred argues against a single contaminated batch of parenteral drug as the cause of the 1995–6 epidemic. Hepatitis A seroprevalence of 51% was reported among heroin addicts enrolled through methadone clinics in Rome, suggesting a substantial risk of hepatitis A associated with injecting heroin [21]. One third of cases in Eastern Sydney residents notified in the 9 months to June 1995 were associated with injecting drug use, as were 9% of cases in the following 18 months. Roughly one third of cases associated with IDU were also reported to be involved in sex work, in itself a risk factor for hepatitis A acquisition. An ongoing risk of hepatitis A (as well as of blood-borne viral infections) warrants targeting injecting drug users and young sex workers with prevention programmes as early as possible after they take up injecting.

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