
ENHANCED SURVEILLANCE FOR INCIDENT CASES OF HEPATITIS C IN AUSTRALIA, 1995

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Abstract

An enhanced surveillance system for identification of incident cases of hepatitis C and risk factors for infection was established on a trial basis in 1995 by the Communicable Diseases Network Australia New Zealand. There were 138 incident cases of hepatitis C identified by participating States and Territories. From the notifications of hepatitis C received, a rate of 7.8 incident cases per 100,000 population was estimated for 1995. However, the estimate is unreliable due to a range of factors including the variance in methods used by the States and Territories (particularly for case ascertainment), response bias and the presence of duplicates among the total notifications of hepatitis C. This report identifies a number of areas where surveillance of hepatitis C could be improved. *Comm Dis Intell* 1996;20:384-388.

Background

Hepatitis C is a notifiable disease in all States and Territories. Since the introduction of testing for hepatitis C virus (HCV) in early 1990, the National Notifiable Diseases Surveillance System has received in excess of 39,000 notifications from States and Territories (unpublished data). It is not known how many of these were incident cases. Identification of incident cases is difficult since a laboratory test alone can not distinguish an incident case from a prevalent case and the vast majority of new infections are mild or asymptomatic^{1,2}.

Risk factors for infection with HCV in Australia include a history of injecting drug use (IDU), blood transfusion prior to the introduction of screening (February 1990), occupational exposures such as needlestick injuries, and unsterile tattooing practices. In Australia and elsewhere many infections have had no identified risk factor^{2,3,4}.

As recommended by the National Hepatitis C Action Plan³, the Communicable Diseases Network Australia New Zealand (CDNANZ) undertook to improve surveillance of hepatitis C by identifying incident cases and risk factors for infection. An enhanced surveillance system was trialed in 1995.

The aim of this report is to outline the methods and results of the enhanced surveillance system, estimate the number of incident cases among the total notifications of HCV received in 1995, report on the notified risk factors, and comment on the feasibility of maintaining this form of surveillance for hepatitis C.

Methods

The enhanced surveillance system incorporated a revised definition for incident cases of hepatitis C, follow-up by States and Territories of seropositive tests to differentiate incident from prevalent cases, and collection of risk factor

information. Although a core protocol was proposed, States and Territories implemented varying approaches.

CDNANZ defined an incident case of hepatitis C as:

- a) demonstration of documented seroconversion to HCV when the most recent negative specimen was within the last 12 months;

or

- b) demonstration of an anti-HCV positive test or HCV polymerase chain reaction (PCR) positive test, and a clinical illness consistent with acute hepatitis C within the last 12 months where other causes of acute hepatitis can be excluded.

All other cases were classified as prevalent or unspecified. The reporting period was based on the date of initial notification of HCV to the State or Territory.

Data collection

All States and Territories received notifications of cases who had tested positive to HCV from either medical practitioners or laboratories, or both. Western Australia is the only State that did not require laboratory notification.

From 1 January 1995, the Australian Capital Territory, Northern Territory, South Australia and Victoria sent questionnaires to all medical practitioners who either notified a case of HCV or initiated a positive HCV test result that was subsequently notified by the laboratory. Tasmania sent questionnaires for all HCV notifications received from 1 October 1995. Queensland did not participate. New South Wales sent questionnaires for a systematic sample of one in 20 notifications received in 1995 by regional public health units. Western Australia followed up an

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estimated 80-90% of positive HCV tests conducted after 1 July 1995 (D. Jones, personal communication). In Western Australia, two major laboratories distributed questionnaires to medical practitioners attached to positive HCV test results.

The information requested in the questionnaires varied between States and Territories for both case ascertainment and risk factor information.

States and Territories took varying approaches to case ascertainment. For example, incident cases reported by medical practitioners in South Australia were contacted directly for a semi-structured personal or telephone interview. Where previous negative tests were indicated, the laboratory was contacted to confirm the test result and date. For cases of clinical illness, responses were checked to confirm that symptoms were consistent with clinical illness and records were checked for previous positive results. In New South Wales, although a range of information was requested, a case was considered to be incident if the practitioner ticked the relevant box.

Risk factor information

South Australia sought risk factor information from the patient, others sought the information through the medical practitioner.

The enhanced surveillance system specifically required information on injecting drug use, skin penetration in a non-medical setting, receipt of blood or blood products, medical procedures, and other. However, the information requested by States and Territories varied. Some States and Territories asked if the case was a current injecting drug user, others asked if the case had ever injected drugs. New South Wales asked only if the case shared drug injecting equipment. In terms of skin penetration in a non-medical setting, some States and Territories asked only about tattooing, others included ear or body piercing or acupuncture. New South Wales included acupuncture as a medical procedure. South Australia and the Northern

Territory did not explicitly seek any information on medical procedures.

Responses were not mandatory in the risk factor fields so it was not clear whether responses other than 'Yes' meant the case did not have the risk factor or if the risk factor was unknown.

Estimate of incident cases among total notifications

Each State and Territory provided information on the total number of HCV notifications received in 1995 (HCV_{total}), the number of questionnaires distributed to medical practitioners and the number of responses. An estimated number of incident cases (I_e) among the total notifications was calculated thus:

$$I_e = (\text{incident cases/responses}) \times HCV_{total}$$

This assumed that the incidence of HCV in the non-responders was the same as the incidence of HCV in the responders. A sensitivity analysis was conducted to assess non-response bias for each State and Territory.

The Australian Bureau of Statistics' 1994 estimates of mid-year populations for the participating States and Territories were used as the denominator for calculating the annual rate of incident cases.

Revised data

New South Wales indicated that data previously reported for the first quarter of 1995 contained some prevalent cases⁵. Amended data were provided and are included in this report.

Results

In 1995, 138 incident cases of HCV were reported to the enhanced surveillance system. Practitioner response rates ranged from 53% in Victoria and the Northern Territory to 87% in the Australian Capital Territory. From the notifications of hepatitis C received by each State and Territory in 1995, an annual rate of 7.8 incident cases per 100,000 population was estimated (Table 1).

Table 1. Identified incident cases of hepatitis C by State and Territory, 1995

State or Territory	Total number of HCV notifications in 1995 ¹	Number of questionnaire responses (response rate %)	Number of incident cases identified	Estimated number of incident cases ²	Estimated rate of incident cases per 100,000 population ²
Australian Capital Territory	423	370 (87)	7	8	2.7
New South Wales ³	8320	264 (63)	30	945	15.6
Northern Territory	312	164 (53)	5	10	5.6
South Australia	2185	2149 (83)	33	34	2.3
Tasmania ⁴	265	58 (79)	1	5	1.0
Victoria	4301	2300 (53)	49	92	2.0
Western Australia ⁵	1346	357 (80)	13	49	2.9
TOTAL	17152	5662	138	1143	7.8

1. Refers to all HCV notifications in 1995, not just incident cases.

2. Estimates may be unreliable - see discussion.

3. NSW investigated 5% of total notifications.

4. Tas investigated notifications from 1 October 1995, 73 questionnaires distributed.

5. WA investigated notifications from 1 July 1995, estimated 449 questionnaires distributed.

In New South Wales, 11% of the questionnaire responses were identified as incident cases compared with 2 - 4% in other States and Territories. South Australia, Western Australia and the Australian Capital Territory indicated that some incident cases reported by medical practitioners did not meet the case definition and were excluded.

The 30 incident cases identified in New South Wales contributed 945 of the 1,143 estimated incident cases. Of the 30 cases, 14 had seroconverted in the previous 12 months, 13 were diagnosed on clinical grounds with a seropositive test and three had clinical illness as well as having seroconverted. South Australia advised that the ratio of seroconversion to clinical illness was 3:1. The one case identified in Tasmania was diagnosed on clinical grounds. Comparable information was not reported from other States and Territories.

A sensitivity analysis showed the estimated rate of incident cases would range from 5.0 per 100,000 if none of the non-responders were incident cases, to 10.8 per 100,000 if twice as many non-responders were incident cases. This only addresses non-response bias, not other biases that are inherent in the data.

Approximately 9% of the total notifications for 1995 were thought to be duplicates in New South Wales while the Australian Capital Territory indicated that about 20% were duplicates.

The median age for the identified incident cases was 26 years (range 1 to 68 years) with 80% between 15 and 34 years of age. The male:female ratio was 1.8:1.0. The age-sex distribution is shown in the Figure.

Risk factors

Of 138 incident cases, 84% had one or more risk factors for HCV. The remaining 16% (22) had no risk factors indi-

cated; 13 were male and 9 were female, the median age was 31.5 years (range 15 to 51 years).

Injecting drug use was the most frequently reported risk factor (Table 2). Of those cases with reported risk factors, 91% reported IDU. The male:female ratio was 2.1:1 and the median age was 24.5 years.

Only 11 cases were reported to have risk factors which did not include IDU. One of these reported a medical procedure including receipt of blood or blood products in Pakistan. Of the two needlestick injuries, one was a rubbish collector and the other was not indicated.

A total of 21 reports indicated sexual contact with an HCV positive person or injecting drug user. There were 10 males and 11 females and the median age was 28 years.

Figure. Identified incident cases of hepatitis C by age group and sex, 1995

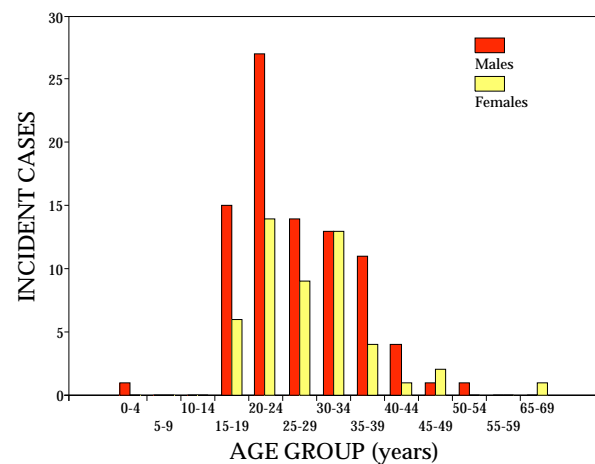


Table 2. Risk factors for incident cases of hepatitis C infection, 1995

Risk factors	IDU	Not IDU	Total (% of total cases)
Injecting drug use only	61	-	61 (44)
Skin penetration in a non-medical setting	18	1	19 (14)
- and medical procedure	1		1 (1)
- and sexual contact HCV positive or IDU		2	2 (1)
- and other ¹	4		4 (3)
- and medical procedure and contact with HCV positive blood		1	1 (1)
Sexual contact HCV positive or IDU	14	3	17 (12)
Needlestick injury	1	2	3 (2)
One year old child, mother HCV positive		1	1 (1)
Medical procedure			
- and sexual contact HCV positive or IDU	2		2 (1)
- and received blood/blood products		1	1 (1)
Other ²	4		4 (3)
No risk factors indicated	-	-	22 (16)
TOTAL	105	11	138 (100)

1. Indicated as sharing needles or razor with an HCV positive person or contact with HCV positive blood.

2. Risk factor indicated as 'other' with no comment provided.

Discussion

The enhanced surveillance system identified 138 incident cases of hepatitis C in 1995. However the estimate of 7.8 incident cases per 100,000 population is unreliable due to a range of factors including the variance in methods used (particularly for case ascertainment), response bias and the presence of duplicates among the total HCV notifications.

The data are limited to notifications of HCV received by States and Territories and include follow up of notifications over only three months in Tasmania, an estimated 80-90% sample over six months in Western Australia, and a five per cent sample from New South Wales.

The large proportion of mild or asymptomatic hepatitis C infections means that many incident cases will not be detected under the case definition used by this surveillance system unless they have documented seroconversion. Those who have documented seroconversion are perhaps predominantly those in screening programs such as drug and alcohol programs, sexually transmitted disease (STD) clinics, prisoners and to a lesser extent blood donors (those in high risk groups are actively discouraged from donating blood). There is likely to be a bias towards higher-risk populations as they are the most likely to be tested.

Those States and Territories where more tests are conducted and particularly those with greater numbers in screening programs may be more likely than others to detect a case through seroconversion.

While some States or Territories may have a higher incidence of HCV than others, it seems unlikely that the two most populous States, Victoria and New South Wales, could have an almost eight-fold difference in the rate of incident cases per 100,000 population.

In the absence of an agreed protocol for case ascertainment, some States and Territories may be overestimating the number of incident cases while others may be underestimating the number of incident cases. In New South Wales, where case ascertainment was based on the medical practitioner's response alone, a greater proportion of cases were diagnosed on a clinical basis than in South Australia, where individuals were followed up. Follow up of reported incident cases to confirm seroconversion or clinical illness can only reduce the number of cases identified as incident.

Response bias may contribute to incident cases being overrepresented among the returned questionnaires. Perhaps medical practitioners are less likely to respond if they believe a case is not incident or, conversely, are more likely to respond if they have diagnosed an acute case. While the sensitivity analysis provides a range from 5.0 to 10.8 estimated incident cases per 100,000 population, this does not account for other biases such as those caused by variations in case ascertainment and the presence of false positives and duplicates among the total notifications.

False positive hepatitis C tests have been reported². Some laboratories in some States or Territories may notify an

HCV positive result without undertaking supplementary testing. Although this is not a true confirmatory test², it should always be undertaken following an initial positive result. As has been indicated, there may be a number of duplicates among the total notifications received. The number of duplicates and the capacity for States and Territories to detect duplicates may vary. Given that each State and Territory checked for duplicates among the incident cases, the net effect of false positives and duplicates among the total notifications is to increase the estimated number of incident cases.

Risk factors

Despite the lack of consistency in the risk factor information collected by States and Territories, the results were generally in accord with past experience⁴. The enhanced surveillance system did not identify any unusual mechanisms of transmission. The case definition and the practitioner's recognition of IDU as a risk factor for HCV may have contributed to an over representation of this group, particularly as the information was obtained from the medical practitioner rather than directly from the patient in most cases. Even so, the data suggest young male injecting drug users should be a target for prevention activities.

The enhanced surveillance system

The enhanced surveillance system has been resource intensive and States and Territories have followed up over five thousand seropositive tests for relatively few cases meeting the incident case definition.

There is a need to identify incident cases of HCV and the risk factors associated with infection, particularly those infections acquired by unusual routes of transmission. However, the ability of the enhanced surveillance system to identify incident cases has been compromised by the variance in methods used by the States and Territories, particularly with respect to case ascertainment.

To have meaningful routine surveillance of hepatitis C, a number of factors should be considered:

1. Can the sensitivity of the case definition be improved to identify more incident cases? Consideration could be given to include cases who have received their first positive HCV test result. This may lead to identification of cases which are not true incident cases and would most probably mean increased resources being needed for arguable gain. Until a laboratory test is available to distinguish incident from prevalent cases, improving the sensitivity of the case definition may prove problematic.
2. An agreed protocol for case ascertainment. Is a case to be considered incident if a practitioner so indicates or should all reported incident cases be followed up to confirm seroconversion, clinical signs and the existence of any previous positive HCV test result?
3. Information is required as to how cases are identified, that is by seroconversion or by clinical illness.
4. All questionnaire responses, both those identified as incident and others should be reported to the surveil-

lance system, including risk factor data as recommended in the National Hepatitis C Action Plan⁴. In the development of the system it was decided that reporting of other than incident cases would be resource intensive. However, since States and Territories collected the data, reporting would enable comparison between incident and prevalent/unspecified cases and an age-sex profile of non-responders.

5. Agreement on the core questions to be asked for risk factors is essential so that uniform information is collected. Any agreement should include definitions for the risk factors.
6. The minimum data set should require mandatory responses for risk factors so that it is clear whether a case did not have the risk factor, or if the risk factor was unknown or not stated.

Routine surveillance may not be the most appropriate mechanism for gathering detailed epidemiological data on HCV. The South Australian approach of contacting the patient direct appears the most likely to gain reliable risk factor information. However this is not possible where notifications are de-identified as is the case in New South Wales. Perhaps surveillance should be confined to identifying incident cases with further prospective research to identify risk factors. Other approaches for estimating the incidence of HCV, and in particular collecting risk factor information, should be considered. Sentinel screening

programs such as sexually transmitted disease clinics and methadone programs may be more appropriate mechanisms.

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References

1. Benenson AS, editor. *Control of communicable diseases manual*. Sixteenth edition. Washington: American Public Health Association, 1995.
2. Mandell GL, Bennett JE, Dolin R, eds. *Principles and practice of infectious diseases*. Fourth edition. New York: Churchill Livingstone, 1995.
3. Australian Health Ministers Advisory Council. *National hepatitis C action plan*. Canberra: AHMAC, 1994.
4. National Health and Medical Research Council. *Hepatitis C draft report on a strategy for the detection & management of hepatitis C in Australia*. Canberra: NHMRC, 1996.
5. Curran M. Acute hepatitis C notifications and associated risk factors in Australia, 1995 first quarter report. *Comm Dis Intell* 1995; 19: 615-617.