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## HEPATITIS A OUTBREAK IN A SOCIALLY-CONTAINED RELIGIOUS COMMUNITY IN RURAL SOUTHERN ONTARIO

### Introduction

Hepatitis A is a virus usually causing a self-limiting illness with very mild to inapparent symptoms in children. Adult illness can be severe, lasting 2 to 6 weeks or longer with symptoms of fever, malaise, anorexia, nausea, and abdominal pain followed by dark urine and jaundice[1]. For persons > 60 years of age, the case-fatality rate is 3%[2]. The usual route of transmission is fecal-oral. Outbreaks of hepatitis A have been associated with contaminated water or food. Infected individuals can shed the virus from 2 weeks before to 2 weeks after symptom onset, usually 5 to 10 days after the onset of jaundice. The incubation period is from 2 to 6 weeks.

On 14 January 1997, a public-health unit in southern Ontario was alerted to four possible cases of hepatitis A in one of its rural farming communities. The alert had come from a neighboring health unit following its investigation of a laboratory report of hepatitis A in a 16-year-old male who lived on the boundary separating the two health units. An 8-year-old brother and the mother were also ill with clinical symptoms consistent with hepatitis A, including jaundice. A third child, a 1-year-old daughter, was reported to have been ill with mild, undifferentiated malaise.

The mother was the first to become ill around 11 December 1996 with nausea, malaise, gastric pain, tea-colored urine, pale stools, and jaundice. The source of her infection could not be determined after interviews with three different investigators. Her symptoms persisted into mid-January.

This family of eight belonged to a socially-contained religious community of approximately 6,000 people. Access to an indoor water source for this family was limited to one hand pump drawing water from a private well. During her illness, the mother had prepared food for many large holiday-season gatherings, several of which were in her own home.

The health-unit staff contacted all persons known to have been with this family during the infectious period. Another case was identified, the school teacher of the 8-year-old son, who presented on 13 January with abdominal distress, nausea, dark urine, and jaundice.

### Scope of the Outbreak

Over the course of 4 months, mid-December to mid-April, a total of 21 cases of hepatitis A were identified within the religious community of the index family (Figure 1); 14 of these were laboratory confirmed. These cases lived within the area of three bordering health units. One 42-year-old male was hospitalized, and one infant was treated in emergency with high fever. No cases were identified outside of this community.

Figure 2 illustrates the age and sex distributions of the identified cases. Over one-third of the cases (8/21) were between 14 and 19 years of age. These cases were known to have participated in weekly youth gatherings held at their homes for socializing and sharing meals.

The investigation established four generations of infection with linkages back to the index family. Linkages were made based on a reported high-risk contact with an infectious individual approximately 4 weeks before symptom onset. In only one situation – the final case with an onset date of 22 April – was an epidemiologic link to a previously identified case unclear. The only possible source identified was unpasturized milk provided to this case by the family of a known case who had been ill 2 months earlier.

### Outbreak Response

An immunization clinic was established on 17 January by the health unit, 5 days following the original investigation. Immune globulin (IG) was administered to all persons potentially exposed to hepatitis A during the previous 2 weeks. Initially, individuals

were considered exposed contacts if they were household family members of a case, had attended a meal with one of the identified cases while he or she was infectious, had eaten food prepared by an infectious case, or had slept over at the home of an infectious case. The ill school teacher and all 28 students of the two-room school attended by the children of the index family were also given IG. In total, 125 contacts were given IG during this first response. Ninety-six contacts were assessed to be too late to receive IG (2 weeks had passed since exposure). All contacts were advised of symptoms and to alert the health unit and/or their physician if any such symptoms occurred among family members. Information was also given on appropriate hygienic precautions to prevent the spread of disease.

Notification of the outbreak was sent to all local hospitals, physicians, bordering health units, and the Public Health Branch of the Ministry of Health. A case definition was developed to facilite identification and prompt response to any new cases. Individuals were considered cases if they had a laboratory result demonstrating IgM anti-HAV in their sera, or presented with jaundice and had significant contact with a laboratory-confirmed hepatitis A case in the past 6 weeks.

New cases were reported primarily by community members. As cases occurred in bordering health units, each health unit assumed responsibility for tracing contacts living in its respective area. In many situations the responsibility for administering IG to contacts was shared if contacts were found to reside across different health-unit jurisdictions.

A joint outbreak team was established with representatives from each affected health unit, as well as the locally assigned Laboratory Centre for Disease Control field epidemiologist who had been involved with the outbreak from the beginning. The team reviewed information on the outbreak, and developed common definitions for both cases and contacts requiring follow-up. Because of often poor access to adequate hand-washing facilities in the outbreak community, and the occurrence of cases where apparent contact with a source case was limited to mutual attendance at a food-sharing event or use of the same washroom, the contact definition was broadened to include these circumstances. Individuals providing toilet care to known cases were also considered contacts.

**Figure 1**
**Hepatitis A cases, by week of onset**

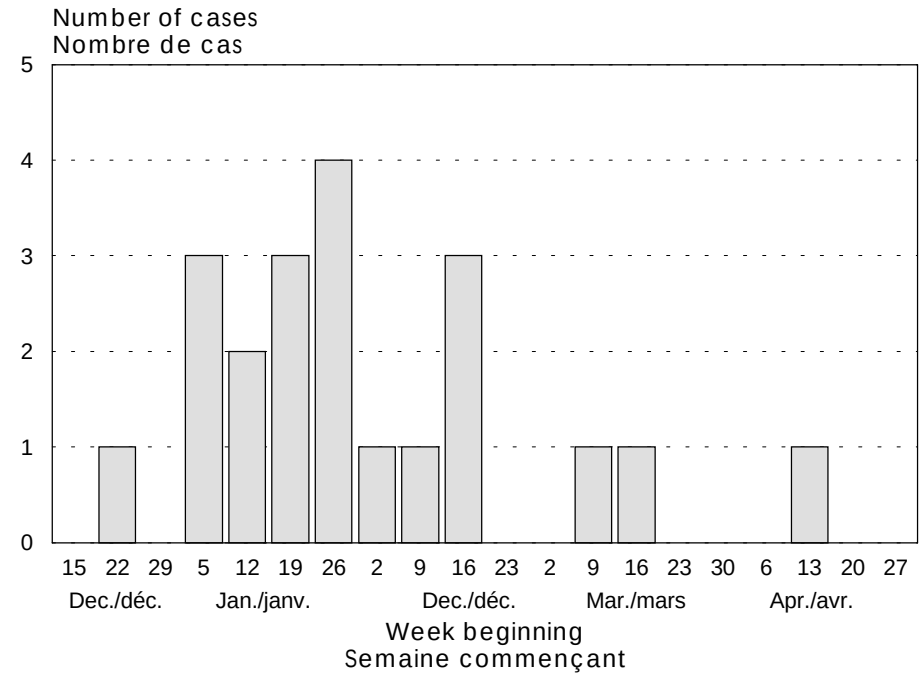
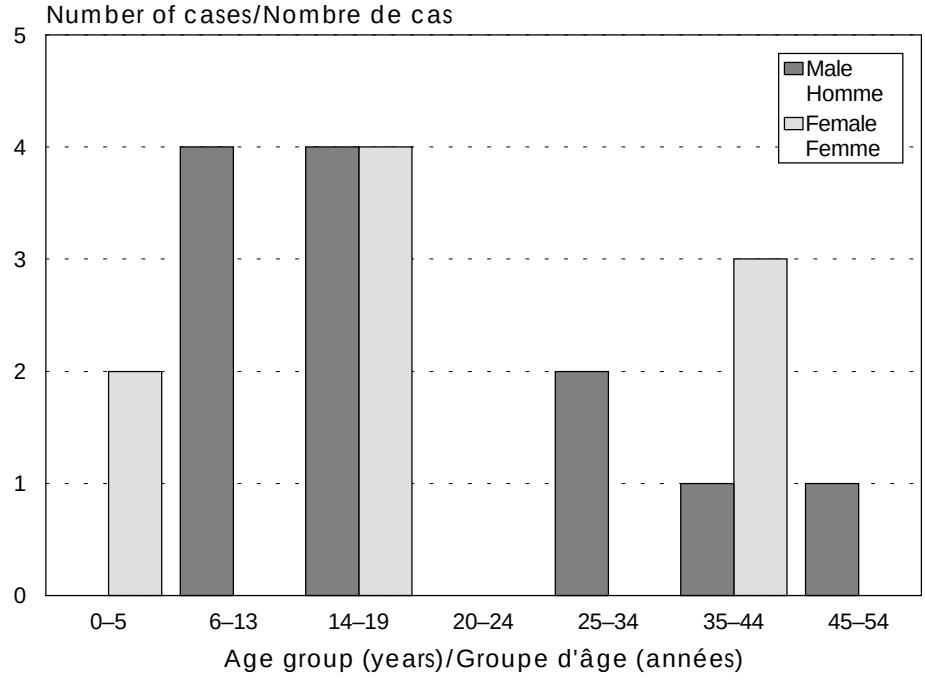



**Figure 2**
**Hepatitis A cases, by age and sex**



A common communication plan was developed with the outbreak community, with one health unit taking the greater responsibility for maintaining contact with community elders who met on occasion within the health unit's borders. Educational materials developed for a previous outbreak by the same health unit in consultation with a similar religious community were shared with the other health units.

It became apparent that many contacts were too late to receive IG by the time the local health unit had been notified. On average there were 30 contacts per case, 11 (35%) of whom were too late for IG. As well, the lack of ready access to adequate washing facilities within the community (e.g. the lack of running water or flush toilets, shared hand towels, limited hot water) meant that the recommended hygienic practices to prevent the spread of disease were absent. As a long-standing tradition, community members continued to meet regularly in large family gatherings following a church service, or for social events for youth to share meals.

Under these circumstances, the outbreak team decided that a hepatitis A vaccination program for the community was necessary to control the outbreak. On 5 March, a joint request was made to the Ministry of Health for a supply of vaccine to be administered by health-unit staff to all community members between 2 and 45 years of age. The selection of this age group for vaccine targeting was based on the age distribution of cases to date. The lack of older cases supported historic reports from community members of hepatitis A illness in the community more than 40 years ago. After a review of the available information and noting that the closed nature of the community made a vaccine campaign response feasible, the Ministry agreed.

A special request for tender was submitted by the Ministry to the two vaccine manufacturers. After due process, vaccine was purchased and distributed to the health units in early May. Each health unit established locally accessible vaccine clinics, and promoted attendance through schools and local community leaders. Community members were active in helping to organize the vaccine clinics and in recruiting families to attend.

Over the course of the month, an estimated 69% (3,487/5,054) of the target population received vaccine (Table 1) from 39 temporary, community-based clinics. No new cases were identified for over 8 weeks following the vaccine campaign. The outbreak was declared over.

**Table 1**
**Vaccine coverage by age group**

| Age group | Estimated population | Number vaccinated | Coverage rate |
|---|---|---|---|
| 2 to 5 years | 601 | 478 | 80% |
| 6 to 13 years | 1,366 | 1,028 | 75% |
| 14 to 17 years | 610 | 466 | 76% |
| 18 to 45 years | 2,477 | 1,515 | 61% |
| **Totals** | **5,054** | **3,487** | **69%** |

## Discussion

Other reports demonstrating the use of hepatitis A vaccine to successfully control outbreaks have dealt with endemic situations, with large numbers of cases occurring over years[3,4] (Dr. S. Dobson, University of British Columbia, Dr. A. King, British Columbia Centre for Disease Control, Vancouver: personal communications, 1997). Obviously, the situation reported here had not yet reached this stage, although the continuing spread of disease over an extended period was anticipated. In this particular community, increased risk conditions and social behaviour were not typical of the general population. Despite the low number of reported cases, each case generated a large number of exposed contacts. A hepatitis A outbreak that had occurred 6 years previously in a similar neighbouring community continued for a year despite a vigilant IG and educational campaign[5]. These factors were the justification for a community-wide vaccination approach.

The use of hepatitis A vaccine is further supported in the literature where it is noted that an IG response in outbreak situations may reduce the number of new cases but not affect the duration of the outbreak over time[6-8]. One explanation for this is the subclinical nature of the disease in young children. Children with unrecognized and unchecked subclinical illness can act as a reservoir for the disease for months, placing older persons at continuous risk of clinical illness[4]. This would be particularly true in communities where the disease is not endemic and, therefore, the natural level of immunity of its adult members is low.

At no time is the spread of disease or its consequences totally predictable. As a resource issue, a persistent outbreak requires continuous active surveillance by health-unit staff, and a readiness to commit to contact tracing and IG administration at the sacrifice of other program or service delivery needs.

In this particular outbreak, the actual number of new cases did not escalate over time. This can be largely attributed to the use of IG among contacts. During the month before the vaccine campaign, one new adult case had been reported. Whether or not there would have been a resurgence of cases without the use of vaccine is not known. The risk, however, of transmission through children with subclinical illness still remained. The vaccination campaign resulted in a 77% vaccine coverage for children 2 to 13 years of age, thereby greatly diminishing this risk.

## Acknowledgments

We would like to congratulate the inspection and nursing staff of the four Health Units, Wellington-Dufferin-Guelph, Waterloo Region, Perth County, and Bruce-Grey-Owen Sound, for their collaborative response and proficiency in controlling this outbreak. We would also like to thank Dr. Jay Keystone and Dr. Lillian Yuan for their contributions as consultants to the outbreak, and to Dr. Evelyn Wallace for her support within the Public Health Branch, Ministry of Health, Ontario.

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### Editorial Comment

This outbreak emphasizes the importance of prompt reporting, investigation, and intervention in the control of hepatitis A infection. Cooperation between involved health units in responding to this specific situation is to be commended.

The precise place of hepatitis A vaccine in outbreak control is not well defined[1]. Vaccine has been used in a number of outbreak situations, including in Canada[2,3], with apparent advantage; however, it is not clear, for example, when vaccination should be initiated, how to target the delivery of vaccine, and what level of vaccination delivery is beneficial. From the current report, it cannot be determined if vaccine usage significantly contributed to extinguishing the outbreak.

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## International Notes

# OUTBREAK OF CYCLOSPORIASIS — NORTHERN VIRGINIA-WASHINGTON, D.C.-BALTIMORE, MARYLAND, METROPOLITAN AREA, 1997

During July 1997, state and local health departments in Virginia, the District of Columbia (DC), and Maryland received reports of clusters of cases of cyclosporiasis associated with events (e.g. luncheons) held in their jurisdictions during June and July. This report describes the preliminary findings of the investigation of a cluster in Virginia and summarizes the findings from ongoing investigations of the other clusters. Fresh basil has been implicated as the probable vehicle of infection.

**Alexandria, Virginia:** On 7 July, a company physician reported to the Alexandria Department of Health (ADOH) that most of the employees who attended a corporate luncheon on 26 June at the company's branch in Fairfax, Virginia, had developed gastrointestinal illness. The luncheon was catered by the Alexandria branch of company A. Company A operates nine stores in the northern Virginia-DC-Baltimore, Maryland, metropolitan area: a central production kitchen and retail food store in Bethesda, Maryland; and eight branch stores, each with a kitchen and retail store.

On 11 July, the health department was notified that a stool specimen from one of the employees who attended the luncheon was positive for *Cyclospora* oocysts. A clinical case of cyclosporiasis was defined as onset of at least four gastrointestinal symptoms, such as diarrhea, nausea, vomiting, or abdominal cramps, 1 to 14 days after the luncheon. All 54 persons who attended the luncheon on 26 June or who ate leftover food on 27 June were interviewed. Of the 54 persons, 48 (89%) had illness that met the clinical case definition, including 17 whose infections were laboratory confirmed by examination of stool specimens. The median incubation period was 8 days (range: 3 to 12 days). Of the 48 case-patients, 45 had diarrhea (three or more loose stools during a 24-hour period), with a median number of stools per day of seven (range: three to 35 stools) and a median duration of diarrheal illness of 5 days (range: 1 to 10 days).

Eating the basil-pesto pasta salad, which was served cold, was the only exposure significantly associated with risk for illness in univariate analysis; 43 (98%) of the 44 persons who ate this food item became ill, compared with one (17%) of six persons who did not eat it (relative risk = 5.9; $p < 0.001$, Fisher's exact test); four ill persons did not recall whether they had eaten the salad. The one ill person who did not eat the salad used the spoon from the salad to serve himself leftovers of another food item that he ate on 27 June. The salad had been prepared in the Alexandria store with basil-pesto sauce made in the production kitchen in Bethesda. No raspberries or mesclun lettuce, which caused outbreaks of cyclosporiasis in the United States this spring[1], were served at the luncheon.

**Other Investigations:** Twenty-five clusters of cases of cyclosporiasis with at least one laboratory-confirmed case per cluster (i.e. confirmed clusters) have been reported in association with events held in the northern Virginia-DC-Baltimore metropolitan area during June and July. In addition, at least 20 possible clusters for which laboratory confirmation has not yet

been obtained have been reported. The dates of the events associated with confirmed and possible clusters ranged from 16 June to 8 July, and from 15 June to 12 July, respectively. Based on preliminary interview data, the 25 confirmed clusters comprise approximately 185 cases (approximately 60 laboratory-confirmed and 125 clinically defined cases), and the 20 possible clusters, approximately 75 clinically defined cases.

All 25 confirmed clusters were associated with events at which at least one food item that contained fresh basil from company A was served (i.e. fresh basil or a prepared food item that contained fresh basil was either purchased at one of its retail stores or served at a meal prepared in one of its kitchens). Six of the nine company A stores have been linked to clusters. For 23 of the 25 events, a basil-containing item that included basil-pesto sauce (e.g. in a pasta salad or on a sandwich) made at the Bethesda store was served. Company A reported that its practice was to wash basil that it used to make pesto sauce. Eating the food item that contained basil was significantly associated ($p < 0.05$) or associated (i.e. all ill persons had eaten the item but the p value was $\geq 0.05$) with risk for illness for all six events for which preliminary epidemiologic data are available.

At the direction of the ADOH, on 12 July, company A terminated production and sales of pesto sauce made with fresh basil and of food items that contained this sauce and terminated sales of fresh basil. On 18 July, health departments in Virginia and Maryland issued press releases to inform the public not to consume fresh basil or fresh basil-containing food items previously purchased from company A. State and local health departments, the United States Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA) are continuing investigations to determine the sources and distribution of the basil; to determine how basil is handled, processed, and distributed by company A; and to identify modes of contamination. FDA and CDC are testing for the presence of *Cyclospora* oocysts in samples of fresh basil and basil-pesto sauce obtained in mid-July from company A and in leftover pesto sauce obtained from several ill persons.

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1. CDC. *Update: outbreaks of cyclosporiasis — United States and Canada, 1997*. MMWR 1997;46:521-23.

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