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Epidemic and Epidemiological Survey in Panama

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Introduction

An epidemic of acute hemorrhagic conjunctivitis (AHC) caused by enterovirus 70 (EV70) first occurred in 1969 in Africa and by 1972 had become a pandemic that involved West and North Africa, Southeast Asia, India, Japan, and the Middle East.¹ Subsequent major epidemics involved Singapore, Taiwan, and India, but, remarkably, the disease did not spread to the New World. It was not until 1980 that AHC was imported into the United States, by Southeast Asian refugees, but significant secondary transmission did not occur.²

Between January and June 1981, extensive AHC epidemics involved Nigeria, Pakistan, and India, and in February 1981 an outbreak of AHC, with autochthonous transmission, was documented from the New World. The first cases occurred in Macapá, Brazil; the epidemic rapidly involved the entire Caribbean Basin including Belém, Manaus, Surinam, Guyana, Trinidad-Tobago, Colombia, Panama, Costa Rica, Honduras, Belize, and Cuba.^{3,4} By September 1981 the AHC pandemic had reached Florida and EV70 was shown to be the etiologic agent.⁵

Epidemic in 1981

In Panama, AHC began at the height of the rainy season in Colón, Panama's second largest city and the Caribbean terminus of the Panama Canal. The first officially recognized case occurred during the first week of August 1981. The outbreak spread across the isthmus to Panama City and continued westward to the Costa Rica border. By December 1981 the epidemic had run its course and 30,000 cases had been reported to the Ministry of Health from throughout the Republic (Fig. 1). The disease was clinically typical (acute and self-limiting), most reported cases involved adults, and no major neurologic

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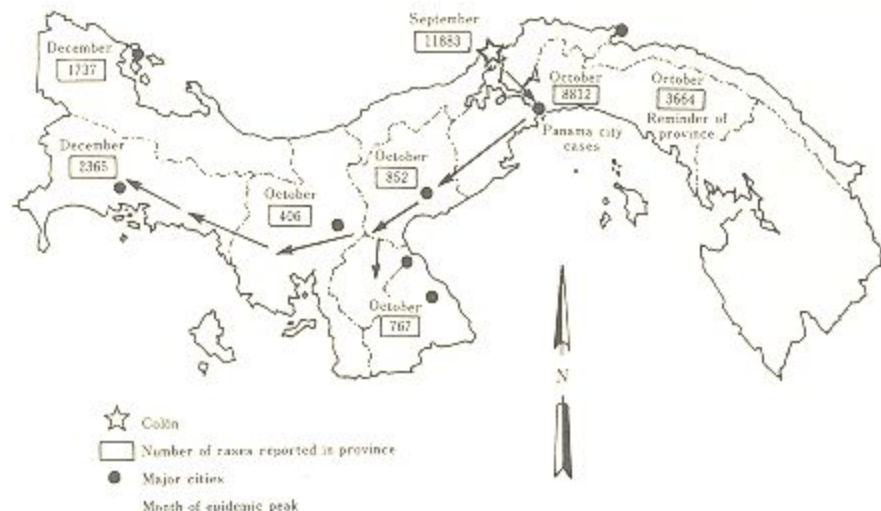


Fig. 1. Acute hemorrhagic conjunctivitis epidemic in the Republic of Panama, 1981.

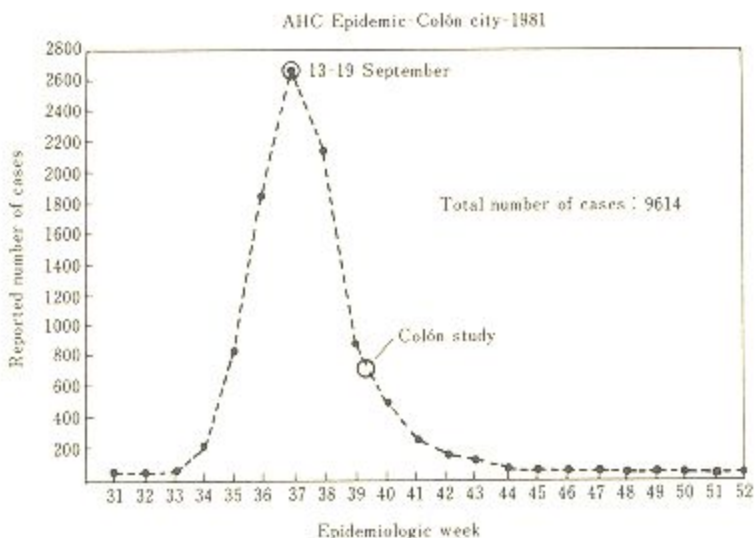


Fig. 2. Acute hemorrhagic conjunctivitis - Colón, 1981. Number of cases per epidemiologic week.

complications were identified. We were unable to isolate EV70 during the Panama epidemic even though many specimens were tested, but we did document seroconversion in a tube-neutralization assay system.

Although AHC involved all of Panama's major population centers, the epidemic was most extensive in Colon, which contains 5% of the Republic's population and which reported 9,614 cases (33% of the total in Panama), giving an attack rate of 14%. The Gorgas Memorial Laboratory and Panamanian Ministry of Health conducted a detailed sero-epidemiologic study in Colón as the epidemic there was beginning to decline (Fig. 2). The objective was to better estimate the true magnitude of the epidemic, describe the clinical epidemiology (with particular reference to EV70 infection and disease) in a setting where EV70 AHC had never before occurred, measure the utilization of public health services during this type of outbreak, and compile information on EV70 and the introduction of AHC and its spread within families.

Epidemiologic Survey in Colón

The study design and findings have been reported in detail.⁶⁾ Briefly, we obtained a living-unit sample of residential Colón. We conducted the survey over a single weekend, selected representative homes from each city block, recorded information describing the physical dwelling, interviewed all residents (or obtained surrogate information), and collected 10 ml venous blood from all consenting residents older than one year. The survey included 1.2% of known Colon residences and 1.6% of the 1980 census population.

Overall, 336/608 (56%) of the study subject gave a history of AHC during the epidemic. AHC was defined as having one major or two minor symptoms lasting at least 24 hours. Major symptoms were: tearing or mucoserous discharge, ocular hyperemia or hemorrhage, and palpebral edema; minor symptoms included ocular pain, itching, foreign body sensation, and photophobia. The symptom complex and clinical course were typical of AHC. Male and female attack rates were similar; school-age children between 5 and 14 years of age had the highest risk for developing disease (77%), while people older than 50 were less frequently ill (33%). Six percent of the cases had consulted a government clinic for treatment. Most of those who sought treatment were adult males who required a medical certificate to document absence from work. Since government clinics were the source of reported cases, this explains the discrepancy between officially reported attack rates and those ascertained by community surveys.

We collected serum from 58% of the study subjects and 52% had antibodies against EV70 (tube-neutralization against strain J670/71). Overall, 144 of 183 (79%) cases identified in the survey were seropositive and 29 of 148 (20%) subjects denying AHC had antibodies. To verify that EV70 had not been present in the population prior to the epidemic we tested 277 sera collected in Colon in 1978 during a random serologic survey and there was no evidence of prior infection.

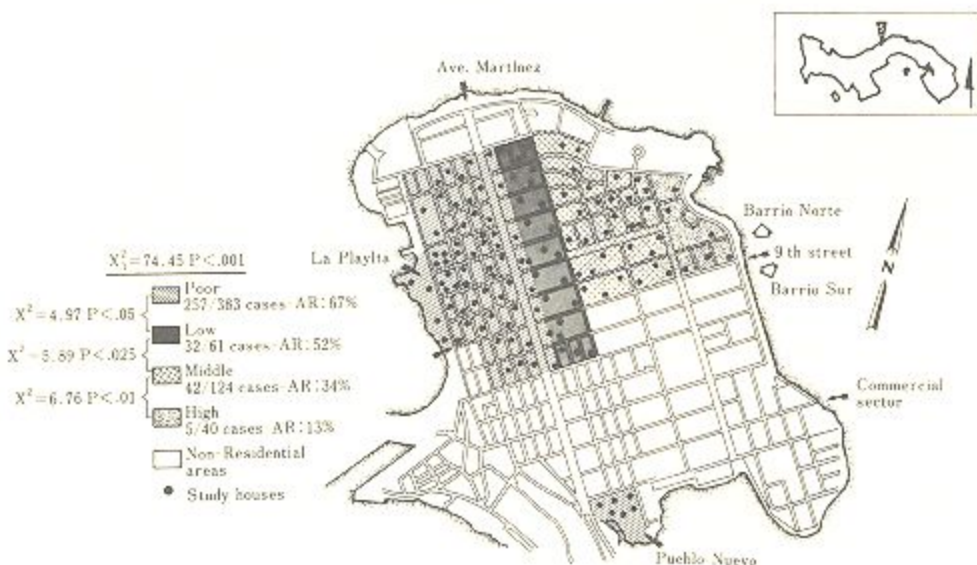


Fig. 3. Acute hemorrhagic conjunctivitis epidemic - Colón, 1981. Attack rates according to sector of residence and homes included in population survey.

Overall attack rates had a significant geographic gradient from 67% in western Colón to 13% in the east city and this reflected a similar socioeconomic gradient (Fig. 3). The socioeconomic gradient included many factors such as housing density, age and condition of homes, racial composition, occupation, and household income, so that the sector of residence was controlled for in-risk factor analysis.

Univariate analysis of living unit and individual risk factors showed that household crowding (number of people sharing a sleeping room), type of bathroom (communal facilities shared with neighbors vs. private bathroom in the home), and average monthly household income less than \$200 per month were significant risk factors for AHC. Other information determined in the study but not associated with AHC included race, occupation, type of house, and known contact with AHC cases outside the home.

At the time of our original investigation we did not have the capability to perform multivariate statistical analyses. We have subsequently reanalyzed the original data using a stepwise logistic regression model available in the BMD-PC statistical programs.^{7,8} We entered subject status as an AHC case (yes/no) as the dependent variable and the four variables which were significantly as-

Table 1. Relative risk estimates from logistic regression analyses of risk factors for acute hemorrhagic conjunctivitis - Colón 1981 Epidemic.

	Odds ratio	95% C.I.
Share communal bathroom	4.84	2.94 - 7.92
3 or more persons per sleeping room	2.17	1.41 - 3.33

sociated with AHC in univariate analyses into the model. Independent variables were categorized as: Bathroom Facilities (private in the home vs. shared with other families); Sector of Residence (Poor, Low, Middle, Upper); Average Monthly Household Income (<\$75, \$75 to \$200, \$201 to \$1000, >\$1000); Persons Sharing Sleeping Room (1 or 2 vs 3 or more). Five hundred ninety-four (98%) of the study participants had complete data and were included in the overall analysis. The two variables which entered the model as significant determinants of AHC were shared bathroom facilities with neighbors and three or more persons per sleeping room (Table 1). This supports the hypothesis that EV70 is more likely to be introduced into families that use communal bathrooms, and the probability of intrafamily transmission is greater in extensively crowded households, for example with many people sleeping together.^{9,10)}

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