

## RESEARCH NOTE

### CHOLERA IN VIETNAM

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Despite improved methods for prevention and therapy cholera has remained a persistent problem for the developing world. Following the emergence of the seventh pandemic in Indonesia in 1961, *Vibrio cholerae* 01 biotype El Tor spread throughout Southeast Asia, into Africa, and most recently in 1991, cholera suddenly emerged in Peru with a rapid spread to most countries in Latin America (Blake, 1994; Tauxe *et al.*, 1994). Although *V. cholerae* has been a major cause of diarrhea in Vietnam for several decades, little information on cholera in Vietnam has been reported in the international scientific literature. Thus the present paper provides information about cholera in Vietnam.

Surveillance and prevention efforts of cholera in Vietnam occurs through District Epidemiology and Hygiene Brigades. These district health centers collect surveillance data from each commune and report them monthly to one of 61 Provincial Preventive Medicine Centers which report the data to one of four regional Pasteur Institutes under the direction of the National Institute of Hygiene and Epidemiology (NIHE) in Hanoi. The data include cases and deaths of 24 notifiable infectious diseases, and have been summarized and published for the period 1979-1995 by NIHE (National Institute of Hygiene and Epidemiology, 1995). Data received by the regional Pasteur Institutes and NIHE are reported to the Ministry of Health.

The district health centers report cases by residence, often defined clinically without formal case

definitions or culture of specimens. However, all provincial centers have the capacity to analyze stool samples for *V. cholerae* by standard methods including enrichment in alkaline-peptone-water (pH 8.6) followed by subculture onto thiosulfate-citrate-bile salt-sucrose (TCBS) agar and subsequently identification by agglutination tests employing polyvalent 01, monospecific Ogawa and Inaba, and 0139 antisera.

Although there are defects of the current system of health data collection, monitoring and analysis, cholera has always had a high priority for the responsible authorities. Because of the typical clinical manifestations of the disease, it is felt that the data shown in Table 1 represent more than 60% of the actual cholera cases. However, at present no formal mechanism exists for reporting by either the increasing number of private physicians or by various laboratories.

Cholera has been an important cause of diarrhea in Vietnam for more than a century with two million cases reported in 1850. In 1885, an outbreak of cholera was associated with mortalities up to 50% among French soldiers and from 1910 to 1930 between 5,000 to 30,000 cholera cases were reported annually (Nguyen, 1962). The first cases of cholera caused by the El Tor biotype appeared in southern Vietnam in 1964 with a total of 20,009 cases and 821 deaths (4.1% mortality).

*V. cholerae* 01 El Tor was rarely reported in northern Vietnam until 1976 where it caused outbreaks in the city of Hai Phong and in Quang Ninh province. The coastal city of Hai Phong has recently experienced an outbreak of cholera in September 1995 with more than 275 cases reported (Table 1). However, cholera is not recognized as endemic in northern Vietnam.

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Table 1

The number of cholera cases and deaths in Vietnam reported by the provinces to the National Institute of Hygiene and Epidemiology from 1983 to 1995.

Year	No. of cholera cases					All country/ deaths (%)
	North	Centrer	South	High Plateau		
1983	78	3,571	3,750	0		7,399/151 (2.0)
1984	0	114	149	0		263/3 (1.1)
1985	381	3,271	702	0		4,354/77 (1.8)
1986	1,622	3,147	832	0		5,601/66 (1.2)
1987	1,018	218	833	0		2,069/23 (1.1)
1988	1,389	916	224	12		2,541/41 (1.6)
1989	1	0	129	0		130/0 (0)
1990	0	798	1,161	0		1,959/15 (0.8)
1991	3	142	0	0		145/3 (2.1)
1992	12	1,849	649	0		2,510/12 (0.5)
1993	0	2,684	776	0		3,460/11 (0.3)
1994	216	1,822	626	1,459		4,123/58 (1.4)
1995	814	3,494	1,327	453		6,088/45 (0.7)

In Central Vietnam, several cities have experienced cholera outbreaks during the last decade and, as in southern Vietnam, cholera appears endemic in some central regions of the country (Table 1). Since its appearance, biotype E1 Tor cholera has been endemic in southern Vietnam (Table 1).

In 1994, a cholera outbreak including 1,459 cases occurred in the High Plateau area of Vietnam (the provinces of Dac Lac, Lam Dong and Gia Lai). This first cholera outbreak reported from the highlands during the last decade and the 453 cases reported in 1995 are a matter of concern, because sanitary conditions in the highlands are generally poor and access to public health services is limited (Table 1). It is likely that cholera will remain an important cause of diarrhea in the highlands in the future.

No data were available to explain the low number of cases reported to NIHE in 1989, 1990 and 1991 from some regions of the country. In spite of the

defects of the current system of health data collection, an increase in the number of reported cholera cases seems to have occurred in recent years with a total of 4,123 and 6,088 cases reported in 1994 and 1995 (Table 1), respectively. The reason(s) for this increase is unknown.

The emergence in 1992 of a previously unrecognized strain of epidemic *V. cholerae*, designated serotype 0139, in India and Bangladesh (Albert, 1994) and the subsequent spread to other Asian countries including Thailand (Chongsanguan *et al*, 1993), was cause for concern that 0139 may spread into Vietnam. Since 1994, 0139 antiserum has been used for agglutination of *V. cholerae* isolates at the regional Pasteur Institutes and NIHE. However, until now *V. cholerae* 0139 has not been detected in Vietnam. There have also been no outbreaks associated with other non-01 serogroups of *V. cholerae* which increasingly are being reported associated with diarrhea worldwide (Dalsgaard *et al*, 1995 a,b).

Although cholera outbreaks occur frequently in Vietnam, the authorities have been able to mobilize the necessary means to treat the cases by electrolyte replacement and the occasional administration of antibiotics. Compared with other Southeast Asian countries, Vietnam has been successful in treatment of cholera as indicated by the low mortality rates shown in Table 1. However, the transmission and epidemiology of cholera are poorly understood. Only preliminary case-control studies have been carried out and the role of water and various foods in the transmission of cholera remains to be established.

The recommended treatment of cholera patients is replacement of lost fluids mainly by oral rehydration which is often followed by the admin-

istration of tetracycline. However, ampicillin or trimethoprim/sulphamethoxazole are recommended for the treatment of children. During epidemics a daily dosage of 0.5 g tetracycline per person is recommended as a prophylactic measure in affected areas. Although resistance to a number of antimicrobial agents has been reported with increasing frequency in *V. cholerae* isolates from around the world (Bennish, 1994), limited antibiotic resistance has been seen among isolates in Vietnam. Antibiotic susceptibility testing is primarily carried out at NIHE by the disk diffusion method of Bauer *et al* (1966). Test results of *V. cholerae* O1 isolated from patients in southern, central and northern Vietnam in 1991, 1992, 1994 and 1995 are shown in Table 2.

Table 2

Antibiotic susceptibility of *Vibrio cholerae* O1 isolates recovered from patients in Vietnam<sup>a</sup>.

Year of isolation	No. of strains	Antibiotics tested (percent susceptibility) <sup>c</sup>						
		Antibiotic <sup>b</sup> susceptibility	Am (%)	Tc (%)	Cm (%)	Tmp (%)	Gm (%)	Other antibiotics (100% susceptibility)
1991	93	S	95.7	100	100	100	100	Km, Nal, Su
		I	4.3	-	-	-	-	
		R	-	-	-	-	-	
1992	113	S	100	98.2	98.2	99.1	100	Nal
		I	-	-	1.8	-	-	
		R	-	1.8	-	0.9	-	
1994	116	S	74.1	96.6	100	100	100	Nor, Nal, Cro,
		I	25.9	3.4	-	-	-	
		R	-	-	-	-	-	
1995	125	S	44.8	76.8	99.2	99.2	100	Nor, Nal, Cxm, Kf, Caz, Net
		I	55.2	22.4	-	-	-	
		R	-	0.8	0.8	0.8	-	

<sup>a</sup>Part of the results have been published previously in Vietnamese by Ha *et al* (1996);

<sup>b</sup>S, sensitive; I, intermediate; R, resistant;

<sup>c</sup>Am, ampicillin; Caz, ceftazidime; Cxm, cefuroxime; Cm, chloramphenicol; Cro, ceftriaxone; Gm, gentamicin; Kf, cephalothin; Km, kanamycin; Nal, nalidixic acid; Net, neltimicin; Nor, norfloxacin; Su, sulfamethoxazole; Tc, tetracycline; Tmp, trimethoprim/sulfamethiazole.

The main measure recommended by the authorities to prevent cholera, is the provision of safe drinking water. However, currently only approximately 30% of the population have access to safe drinking water. In the coastal areas, in the Mekong delta and in some areas along the Red River in northern Vietnam, the majority of people collect rain water, water from rivers or lakes since there is no or only limited access to safe drinking water. Chemical treatment of drinking water are practiced in Hanoi and Ho Chi Minh city only, although the system of treatment appears insufficient in Hanoi.

Cholera vaccines have been produced in Vietnam by NIHE since 1950. However, vaccines were not available from 1970 to 1990. In 1990, production of an inactivated whole-cell *V. cholerae* 01 oral vaccine was initiated. The vaccine was recently tested in field trials in Hue and data are currently being analyzed. From 1995, the vaccine production is the responsibility of the Vaccine Institute in Nha Trang which has started the production of vaccines based on 01 and 0139 serotypes of *V. cholerae*. A field trial with this vaccine is planned to be conducted in Nha Trang in 1997.

We conclude that despite substantial efforts from local and national health authorities to prevent and treat cholera the number of cases appears to have increased in recent years. There is an urgent need to study the transmission and epidemiology of cholera in Vietnam in order to improve the preventive measures.

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