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Inside

ICDDR,B: Centre for Health and Population Research
GPO Box 128
Dhaka 1000
Bangladesh

Outbreaks of Encephalitis Due to Nipah/Hendra-like Viruses, Western Bangladesh

Two outbreaks of encephalitis, both caused by Nipah/Hendra-like viruses, occurred in separate areas in western Bangladesh in 2001 and 2003. Both outbreaks occurred over brief periods and had high case-fatality ratios. In contrast to previous experience with Hendra and Nipah viruses in which no human-to-human transmission had occurred in Australia, Malaysia and Singapore, epidemiologic characteristics of the outbreak in Bangladesh suggested the possibility of person-to-person transmission. Exposure to animals may have contributed to disease transmission to humans during the outbreaks but nevertheless, the ultimate source of the virus is its zoonotic reservoir.

Between 26 April and 26 May 2001, 9 deaths occurred among people with febrile illnesses and neurologic symptoms in Chandpur village of Meherpur district, 17 km from the border with India; 7 deaths occurred among people within the same family who lived within the same home or whose homes were adjacent to each other. The mean age was 40 years (range 32-60 years); 6 were males. During the same time interval, 18 other residents of the village were reported to have a similar illness and survived.

An investigation led by the Director General of Health Services (DGHS) in May 2001 was followed by a second investigation from 26 May to 1 June 2001 by a team that included staff from DGHS, the World Health Organization (WHO), and ICDDR,B. Results of antibody testing by enzyme-linked immunoassay (ELISA) done at the Centers for Disease Control and Prevention (CDC) in the United States suggested that at least 2 people in the Chandpur outbreak were infected with Nipah/Hendra-like viruses.

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Between 11 and 28 January 2003, another outbreak of severe illness including features of encephalitis was reported affecting at least 17 residents (range 4-42 years) of Chalksita and Biljoania villages (located 45 km north-east of Rajshahi) in Naogaon district; 8 people died.

In February 2003, an investigative team from ICDDR,B and CDC-Atlanta visited Chandpur to learn more about the scope and risk factors for the first outbreak. Upon concluding studies in Chandpur, the team visited Naogaon District with the objective of defining the etiology and scope of the second outbreak.

The team collected specimens of blood from 119 residents of Chandpur and 89 residents of Chalksita and Biljoania villages who reportedly had been ill and recovered and those who were contacts (family members, close acquaintances, and neighbours of cases) of residents who had died, during either of the outbreaks. Sera were not available from any of the patients who died during the outbreaks.

Four people from Chandpur had evidence of antibodies (by ELISA) to Nipah antigen; all 4 had been ill during the outbreak period and were relatives of patients who died. Similarly, in Chalksita and Biljoania, 4 residents were found to have antibodies reactive with Nipah virus antigen; all 4 had been ill and had contact with patients who died. No health care workers were identified with illness during the outbreak periods.

A case of Nipah/Hendra-like virus infection was defined as a resident of one of the villages where the outbreaks occurred, who died during the outbreak periods, or who had measurable antibodies to Nipah virus antigen. A total of 13 cases (including 9 deaths) were identified from the first outbreak (Figure 1) and 12 cases (including 8 deaths) were identified from the second outbreak (Figure 2).

Figure 1:Dates of onset of illness for cases of Nipah/Hendra illness in Meherpur, 2001

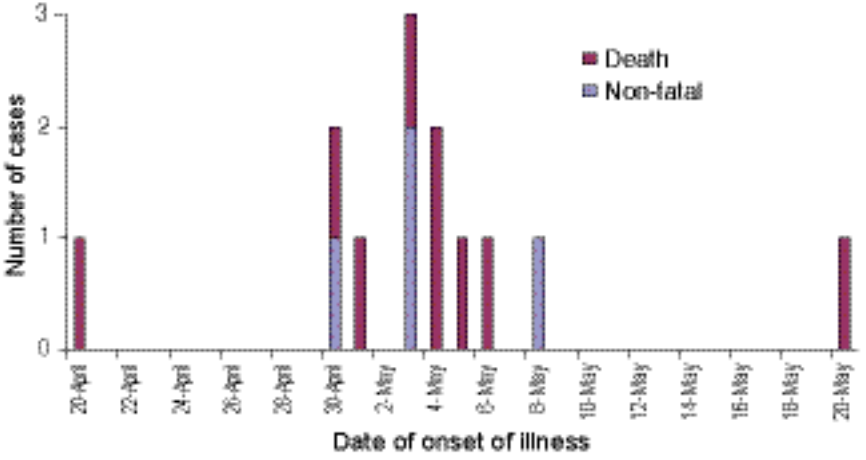
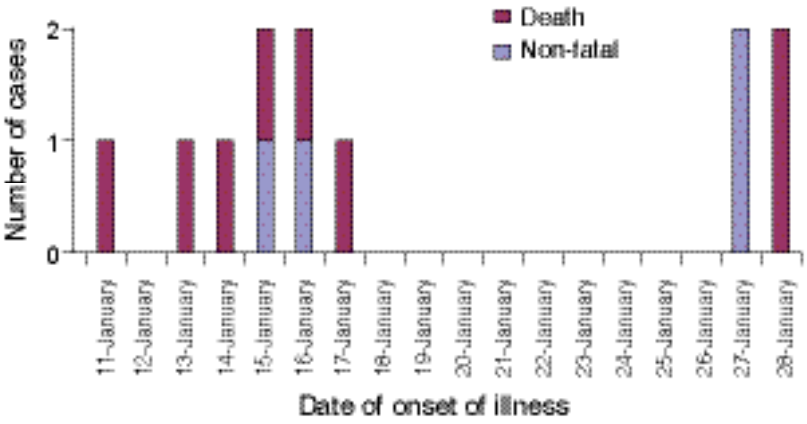


Figure 2: Dates of onset of illness for cases of Nipah/Hendra illness in Naogaon, 2003



In Meherpur, the first case became ill on 20 April 2001 and this was followed by 11 cases through 8 May 2001 and one additional case occurred on May 20 (Figure 1). Median duration from onset of fever to death was 6 (range 3-9) days. In Naogaon, the first case occurred on 11 January and was quickly followed by a cluster of 7 cases; a second cluster of 4 cases began 10 days after the last case in the first cluster (Figure 2).

Fever, headache, and altered consciousness were the most common symptoms (Table 1). Cases in the Naogaon outbreak were more likely than non-cases to have had contact with a herd of pigs that had passed through the villages (Table 2). In the Meherpur outbreak, cases were more likely than non-cases to report contact with a cow during the two weeks before illness. Close contact with ill people in the Meherpur outbreak, including contact with patient secretions, was reported much more commonly in cases than in non-cases.

Table 1: Clinical characteristics of confirmed encephalitis cases by district

	Meherpur (n=13)	Naogaon (n=12)
Symptoms	**n (%)**	**n (%)**
Fever	13 (100)	12 (100)
Headache	8 (62)	10 (83)
Altered level of consciousness	13 (100)	10 (83)
Dizziness	n/a	4 (33)
Seizures	3 (23)	3 (25)
Cough	10 (77)	6 (50)
Difficulty in breathing	9 (69)	7 (58)
Bleeding (nose, mouth, cough/sputum)	3 (23)	4 (33)
Vomiting	7 (54)	6 (50)
Diarrhoea	2 (15)	1 (8)
Focal weakness	n/a	2 (12)
Median (range) duration of onset of illness to death	6 (3-9)	4 (2-7)

n/a = Not applicable

Sera were collected from a variety of animals with the goal of identifying the source of the virus for these outbreaks. Antibodies reactive with Nipah virus antigens were found in 2 of 44 ***Pteropus giganteus*** bats tested, while none were found in the remaining animals tested including 2 other species of bats, pigs, rodents, shrews, pigeons, and dogs in areas near case-households.

Table 2: Factors associated with Nipah virus encephalitis in the two outbreak investigations

Contact with sick patients/ animals	Meherpur				Naogaon			
	Cases n=13 %	Non-cases n=104 %	OR 95% CI	p	Cases n=12 %	Non-cases n=77 %	OR 95% CI	p
Cared for ill persons	76.9	26.9	9.0 (2.1- 38.6)	<0.001	-	n/a	n/a	n/a
Shared items with ill persons	53.8	23.1	3.9 (1.2-13.1)	0.018	27.3	27.6	1.0 (0.2-4.1)	0.980
Physical contact with ill person	76.9	26.0	9.5 (2.2-40.8)	<0.001	41.7	42.1	1.0 (0.2- 3.4)	0.977
Physical contact (n=12) with secretions	58.3	10.6	11.8 (2.8-49.6)	<0.001	8.3	13.2	0.6 (0.1-5.2)	0.641
Received a cough in the face	n/a	n/a	n/a	n/a	25.0	7.9	3.9 (0.8-19.1)	0.071
Contact with a cow	61.5	17.3	7.6 (2.1-28.3)	<0.001	0.0	8.0	-	1.000
Contact with herd of pigs	n/a	n/a	n/a	n/a	70.0	27.6	6.1 (1.3-27.8)	0.007

n/a = Not applicable

Reported by: Division of Viral and Rickettsial Disease, National Center for Infectious Diseases, Centers for Disease Control and Prevention, USA; Health Systems and Infectious Diseases Division and Clinical Sciences Division, ICDDR,B

Supported by: Centers for Disease Control and Prevention, USA

Comment

Findings of this report suggest that Nipah/Hendra-like viruses were the etiological agents of both outbreaks. Because diagnoses were dependent on serologic tests in both outbreaks, the precise etiological agent is not known and may be due to a pathogen that cross-reacts with Nipah virus antigens in antibody assays.

Hendra and Nipah virus-associated illness was first recognized during outbreaks in Australia in 1994 and an epidemic in Malaysia and Singapore in 1998-1999 (1,2); 105 of 276 patients with laboratory-confirmed Nipah virus in Malaysia and Singapore died with viral encephalitis. Close contact with sick pigs was highly associated with human illness (3-5) but a few patients had no direct contact with pigs (3). No person-to-person transmission was shown (6).

The reservoir for Hendra and Nipah viruses are bats of the genus ***Pteropus.*** In Australia, horses have been the domestic link to human infections, while in Malaysia and Singapore pigs were clearly the linking animal host. Antibodies to Nipah viruses were identified in other animals (dogs, cats and horses) (7-9), but transmission from these animals to humans was not documented. Subsequent studies in Cambodia have also showed that evidence of infection (antibodies) with Nipah/Hendra-like viruses can be found in apparently healthy bats (10). No cases of human illness due to Nipah viruses were identified following the mass culling of >1 million pigs in Malaysia.

In contrast to the Australia, and the Malaysia/Singapore outbreaks, no clear source of transmission was identified for either of the outbreaks in Bangladesh summarized within this report. Because of the clustering of cases among family members and neighbours, the secondary peaks of cases following a period of no illnesses, and an epidemiologic suggestion of increased risk for illness among people who had exposure to secretions of other sick patients, person-to-person transmission cannot be ruled out. However, absence of illness among health care workers creates some uncertainty about this possibility. Increased risk of illness following exposure to pigs in one outbreak and a sick cow in the other raise the potential of animal-to-human transmission but this possibility cannot be validated with the limited data available.

Systematic surveillance for encephalitis is not routinely done in Bangladesh. It is possible that other outbreaks and sporadic cases of Nipah/Hendra-like virus encephalitis have occurred or will occur. More information will be needed to

define the magnitude of the problem and to identify strategies to prevent illness and deaths. ICDDR,B is currently collaborating with Rajshahi Medical College Hospital, Mymensingh Medical College Hospital, and Dhaka Medical College Hospital in conducting hospital-based surveillance to define the epidemiology and etiologies of encephalitis in Bangladesh. This surveillance project may help to determine the role of Nipah/Hendra-like viruses in sporadically occurring disease and identify appropriate and optimal approaches to management and prevention of this serious disease syndrome.

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Mortality Due to Suicide in Rural Bangladesh

Population-based surveillance in a rural community in southwest Bangladesh revealed that suicide is a major cause of mortality, especially in young females. Mortality from suicide occurred at a rate of 39.6 per 100,000 population per year from 1983-2002. Among young people, 10-19 years old, suicide accounted for 42% of deaths; 89% of suicide-associated deaths in this age group were in females. Suicide-associated death rates from this surveillance area are substantially higher than rates reported elsewhere in Asia, warranting further studies aimed at identifying risk factors for suicide and strategies for prevention.

Suicide is one of the three leading causes of death among 15-44–year old people globally (1). Health and demographic surveillance data from 6,953 households in Abhoynagar and Keshobpur, rural and semi-urban sub districts of Jessore District in southwest Bangladesh, collected by ICDDR,B during 1983-2002, were analysed to explore the magnitude and characteristics of suicide. Surviving family members were interviewed using a standardized data collection form to define cause of death (verbal autopsy) for 3,237 deaths. Of those, 2,061 deaths were in people ≥10 years old; 161 (8%) were determined to be due to suicide, defined as a self-inflicted cause of death. Suicide was the fifth most common cause of death overall and ranked number one among adolescents (10-19 years of age).

Incidence of suicide-associated death over the 20-year period was 39.6 per 100,000 population per year (annual range 10.7-119.5). The incidence was 61.0/100,000 population among persons 10-19 years old, 42.0/100,000 population among persons 20-29 years old, 24.5/100,000 population in persons 30-39 years old, and 21.7/100,000 population in persons ≥40 years old. The most common methods used for suicide included poisoning and hanging; among females, poisoning accounted for 84% of deaths and among males, poisoning accounted for 72% of deaths.

Victims tended to be young; 41% were ≤19 years of age (Table 1), including one 10-year old child; 42.3% of all deaths among persons 10-19 years old were due to suicide. Among all suicidal deaths in ≤19 years 54% were female, compared to 15% male victims (Relative Risk [RR] = 3.6; 95% confidence interval [CI]=1.8-6.9; $p<0.001$). Among the 66 victims ≤19 years old, 58 (89%) were females. Most male victims were manual labourers or farmers; females were most frequently housewives or engaged in household work.

Table 1: Gender-wise age, marital status, education and occupation of suicide-associated deaths

Characteristics	Males (n=53)	Females (n=108)	All (n=161)
Age			
≤19 years	8 (15%)	58 (54%)	66 (41%)
20-29 years	23 (43%)	36 (33%)	59 (37%)
30-39 years	6 (11%)	9 (8%)	15 (9%)
≥ 40 years	16 (30%)	5 (5%)	21 (13%)
Marital Status			
Unmarried	19 (36%)	30 (28%)	49 (30%)
Married	34 (64%)	71 (66%)	105 (65%)
Separated/Divorced/Widowed	0 (0%)	7 (7%)	7 (4%)
Education			
No education	25 (47%)	57 (53%)	82 (51%)
Primary	17 (32%)	36 (33%)	53 (33%)
Secondary and above	11 (21%)	15 (14%)	26 (16%)
Occupation			
Manual labour	22 (42%)	2 (2%)	24 (15%)
Farmer	12 (23%)	0 (0%)	12 (7%)
Student	7 (13%)	12 (11%)	19 (12%)
Business	7 (13%)	1 (0.9%)	8 (5%)
Household work*	0 (0%)	91 (84%)	91 (57%)
Dependent/Disabled	5 (9%)	2 (2%)	7 (4%)

*Includes housewives

When compared with deaths from other causes, suicide deaths were more likely to occur in people with some formal education; 49% of people who committed suicide had at least primary education, compared with 31% of people who died from other causes (RR=1.6; 95% CI=1.3-1.8; p<0.001) (Table 2). However, among people 10-19 years old, suicidal deaths were not more likely to occur in students (19.7%) than were deaths due to other causes (30%) (p>0.1).

Table 2: Education level and occupation of suicide and non-suicide deaths (≥10 years old)

Characteristics	Suicide (n=161)	Other causes (n=1,900)	All (n=2,061)
Education			
No education	82 (51%)	1,299 (68%)	1,381 (67%)
Primary	53 (33%)	387 (20%)	440 (21%)
Secondary and above	26 (16%)	214 (11%)	240 (12%)
Occupation			
Manual labour	24 (15%)	203 (11%)	227 (11%)
Farmer	11 (7%)	459 (24%)	470 (23%)
Student	19 (12%)	35 (2%)	54 (3%)
Business	8 (5%)	92 (5%)	100 (5%)
Household work*	92 (57%)	640 (34%)	732 (36%)
Others	7 (4%)	471 (25%)	478 (23%)

*Includes housewives

Reported by: Surveillance and Data Resource Unit and Field Sites Unit, Health Systems and Infectious Diseases Division (HSID), ICDDR,B

Supported by: United States Agency for International Development (USAID)

Comments

The findings of this report suggest that suicide is an important cause of death within this rural surveillance area, indicating that self-inflicted death represents a public health concern, especially for young females. The rates of suicide-associated death were 1.7 to three-fold higher within the Abhoynagar/ Keshobpur surveillance area than rates recently published from China and from Hong Kong Special Administrative Region (2,3). The reasons for the high rates are not clear and warrant further study.

While suicide represents a substantial and under-appreciated problem in South Asia (4), insufficient data are currently available to know whether high mortality rates described in this report are representative of suicide rates elsewhere in Bangladesh, particularly within urban areas where factors linked to suicide may be dissimilar from those in rural areas or occur with different frequency. In China, suicide rates appear to be three-fold higher in rural areas than in urban areas (2). Population-based data from health and demographic surveillance systems (like that in Abhoynagar and Keshobpur) elsewhere in Bangladesh will

be helpful to ascertain impact of geographic location and population density on suicide incidence and risk factors for suicide, and to make it possible to reliably estimate country-wide burden of disease for suicide.

Prevention of suicide, while potentially effective, is challenging, requiring multifaceted approaches and adaptation of strategies to locally relevant cultural factors (5). Demographic characteristics of victims suggest the need for a variety of prevention strategies. Issues that will need to be addressed are likely quite different for adolescent females, who accounted for a substantial proportion of mortality, than older, employed males. For instance, violence against women and suicide attempts may be interrelated; thus, it may be necessary to address fundamental factors responsible for the former in order to successfully prevent the latter (6,7). For cases referred to as suicide in this report, information collected during post-mortem family interviews clearly indicate self-inflicted death; however, the possibility that some deaths might represent homicide (for instance, deaths falsely described to interviewers as suicides) cannot be ruled out with available data—this complicates the interpretation of the data and broadens the scope for future studies and potential interventions.

Further studies will be needed to more closely examine underlying factors responsible for suicide and characteristics predictive of suicidal death, and to identify opportunities for contact with a physician or mental health services before suicide is contemplated or attempted (6).

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Sociocultural Explanations for Delays in Careseeking for Pneumonia

While pneumonia is a major cause of death among children in Bangladesh, few children with pneumonia receive timely therapy from trained health providers. Research was conducted to examine how illness beliefs of parents regarding pneumonia guide treatment patterns. Parents commonly described belief theories involving consumption of foods that possess cooling properties or over exposure to cold substances, causing the child to contract what is locally perceived as a "cold" condition. Most parents indicated that their first line of treatment involves the application of home remedies designed to "heat" the body; such an approach likely delays care-seeking outside the household. Care-seeking patterns appear to vary according to age-specific interpretations of the child's condition. Intervention strategies designed to reduce mortality associated with pneumonia need to recognize and address parental beliefs and constraints, which are barriers for seeking prompt and appropriate health care.

Acute respiratory infections (ARI), including pneumonia, remain a major cause of child mortality in Bangladesh, accounting for 25 percent of all childhood deaths, with an estimated 400 children dying each day (1,2). An even higher percentage of infant deaths (approximately 40 percent) are associated with ARI (1). However, only 7 percent of children with signs and symptoms of pneumonia receive care from trained health providers (Shams El Arifeen, personal communication). Failure to receive timely, appropriate care likely results in complications from illness, including death (2). While most research looks at epidemiological or clinical aspects of ARI, a few studies have also explored perceptions of and practices associated with ARI in Bangladesh (3,4).

In-depth qualitative research was conducted in Matlab to examine how illness beliefs guide household treatment strategies and influence delays in careseeking for pneumonia episodes. This included exercises to identify the terms used in the community to describe signs and symptoms associated with pneumonia. Here we can see the influence of biomedical services, as the term most commonly used is "pneumonia"; other terminology includes ***shash kashto*** ("difficult breathing") and ***hapani*** ("asthma"). The exercises generated a list of 29 illness terms. Perceptions of the severity of these signs were assessed through a rating exercise. Local understanding of the severity of pneumonia signs and symptoms coincided closely with biomedical concepts (Table 1).

Table 1: Perceptions of the severity of signs and symptoms associated with pneumonia

Order of perceived seriousness*	Signs and symptoms	Local terminology
1	Ribs more visible when breathe	Nishaser samay buker haddi gula ber hoye ashey
1	Unconscious/Eyes closed	Oggyan hoye jai/Chockh khuley na
2	Chest indrawing	Buk otha nama kare/Khachar madhey khanz parey
2	Stops taking food (semi-solid and solid)	Khawa-dawa bandho hoye jai
3	Unable to take breastmilk	Buker dudh tantey parey na
4	Deep cough	Bukey kaf jamey thaka
5	Lethargic/Extremely weak	Shab samay suey thakthey chai/ Khub durbol
6	Supra-sternal recession	Galar moddhey gharto hoi
7	High fever	Sharir aguner mato garom
8	Difficult breathing	Nishas nitey parey na/Nishas nitey kashto hoi/Shas tantey kashto hoi

***** When mean scores were the same, the sign or symptom was given the same number in relation to order of perceived seriousness

Despite this, many indigenous beliefs and social factors prevent primary care providers, particularly mothers, of pneumonia cases from obtaining prompt and appropriate health care. Causal interpretations for acute respiratory illnesses are frequently linked to the mother's behaviour. Over 90% of the explanations were related to "hot"/"cold" belief theories involving over-exposure of the child to cold substances either indirectly through the pregnant mother or through direct contact, or consumption of foods that possess cooling properties, causing the child to contract what is locally perceived as a "cold" condition (Table 2). In fear of being blamed for poor caring practices, mothers are reluctant to share information about the illness with other family members until the child's condition becomes extremely serious, ultimately prolonging the administration of home remedies designed to "heat" the body, and delaying careseeking. Home management remedies include the application of mustard oil either to the child's or mother's body, as well as potentially harmful practices such as the oral or topical application of kerosene or wrapping the feverish child in a thick blanket or warm clothes. In an effort to avoid the consumption of cold foods believed to aggravate the child's condition, food restrictions are commonly placed on the breastfeeding mother and child.

Table 2: Perceived causes of pneumonia according to type of exposure

Type of exposure to cold	Perceived cause of pneumonia
Physical	*Mother during pregnancy* - Works in rice paddy - Touches cold items, particularly water - Bathes at wrong time of day - Walks in bare feet *Child* - Plays in mud or rain water - Remains on the mud floor over prolonged period - Sleeps in urine at night - Sweats and gets chilled
Food-related	*Breastfeeding mother* - Takes too many cold foods, especially at night *Child* - Consumes "cold" breastmilk due to mother's over consumption of cold foods - Drinks too much water - Eats excessive cold food
Others not related to cold	*Mother during pregnancy* - Moves in the community with hair untied and is attacked by evil spirits - Suffers from chest injury *Child* - Attacked by evil spirits - Has fallen, causing a chest injury

Even when the seriousness of the child's condition is believed to require care with a health practitioner, mothers are commonly confronted with an additional set of constraints to seeking treatment outside the household. These include an obligation on the part of the mother to remain at home and fulfill other household responsibilities, restrictions on the mother's movement within the community, absence of the husband who is the primary decision maker, absence of a substitute childcare provider for other children in the household, unavailability of someone to accompany the mother to the health provider, costs involved in seeking care, and concerns about exposing the sick child to other elements, particularly ***alga batash*** ("evil spirits"), that may cause the child additional harm.

The study also revealed distinct differences in careseeking patterns depending on a variety of factors, like age-specific causal explanations and variations in perceptions of appropriate therapeutic measures. For instance, signs and symptoms of pneumonia identified in neonates such as fast breathing and chest indrawing are commonly attributed to ***alga batash*** and, in these cases, care is first sought with a spiritual healer. Because allopathic medicines are viewed as too "powerful" for young infants, care for young infants exhibiting pneumonia signs is commonly sought with homeopaths known to prescribe slow acting medicines. Only children >6 months old are believed to be able to tolerate the perceived harsh effects of allopathic cures and, even in these cases, care is generally first sought with an untrained village "doctor" rather than a trained health provider. Respondents explained that village doctors are the first choice of health care for the following reasons: they are well known members of the community; village doctors are known to treat for signs and symptoms associated with ARI; their practice is in close proximity to the respondents' homes; village doctors provide services 24-hours a day; and they offer a less costly and flexible payment system.

Reported by: Social and Behavioural Sciences and Child Health Units, Public Health Sciences Division (PHSD), ICDDR,B

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Comment

The information illuminates a sequence of events that creates multiple layers of obstacles to seeking care outside the household. The combination of these factors contributes to a long delay before pneumonia cases are actually seen by a health practitioner. Even when treatment is sought, the data suggest that only when the child's life is perceived to be in danger do care providers attempt to obtain care from a trained practitioner. Often this is too late.

Long delays in seeking care and inappropriate choices of providers likely contribute to the persisting high rates of child death due to ARI in Bangladesh. In-depth qualitative data can give special insights into the underlying reasoning and possible solutions to the delays.

The findings presented here correspond with other sociocultural research conducted over 10 years ago in rural Bangladesh (3). The researchers found that due to fear of being blamed for "careless" behaviour, mothers are reluctant to share the illness signs and symptoms of pneumonia with other family members, thus delaying careseeking. Intervention strategies designed to

reduce mortality associated with pneumonia need to recognize and address the constraints mothers face in divulging the child's condition to other household decision makers and seeking prompt care. Efforts should focus on involving family members such as the child's father or grandmother in early recognition of pneumonia cases and creating a more supportive home environment to careseeking. Specific information should be disseminated on danger signs that require immediate care with a trained provider and the possible consequences if prompt action is not taken.

The findings of this report suggest that local language exists, closely describing biomedical concepts relevant to recognition and management of pneumonia; thus, parents are knowledgeable of signs and symptoms associated with pneumonia. Appreciation of local terminology and cultural knowledge may allow health workers to communicate messages about treatment strategies more effectively. Information should also be communicated to ensure that the younger, more vulnerable children get appropriate care.

The health system in Bangladesh is pluralistic. Untrained practitioners currently have a distinct role in the management and referral of patients with ARI; it may be helpful to involve village doctors and other traditional health providers in strategies to reduce the burden of ARI, as well as other childhood illnesses.

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Alert: Evolution of Multiple Drug-resistant *Shigella Dysenteriae* type 1 in Bangladesh—Need for Continued Vigilance for a Potential Epidemic

The previous issue of the ***Health and Science Bulletin*** included an alert regarding the detection of a ciprofloxacin-resistant clone of ***Shigella dysenteriae*** type 1 ***(Sd*1*)*** in patients from Dhaka and Matlab, highlighting concern for a potential large-scale epidemic of dysentery due to ***Sd***1 (1). In the interim, an outbreak of ***Sd***1-associated illness has recently occurred among people living in northeastern Bangladesh.

During late November 2003, a 3-year old resident of a tea production estate in Sylhet division was hospitalized at the ICDDR,B: Centre for Health and Population Research Hospital (Dhaka) with bloody diarrhoea, rectal prolapse, and peripheral oedema. Fluoroquinolone-resistant ***Sd***1 was isolated from stool. The patient's family reported bloody diarrhoea among several household members, as well as among neighbours on the tea estate.

On 11 December 2003, an investigative team from ICDDR,B visited the tea estate to confirm the suspected cluster of ***Sd*1*.*** Four residents were identified with an ongoing illness, which included bloody diarrhoea. Three were children <5 years old and the fourth was 21 years old. A rectal swab from the adult patient, who had not yet received antimicrobial drugs, yielded ***Sd***1 resistant to ampicillin, co-trimoxazole, nalidixic acid, tetracycline, ciprofloxacin, norfloxacin, and ofloxacin, and susceptible to azithromycin, pivmecillinam, and ceftriaxone. Rectal swabs from the 3 children, all of whom were receiving antimicrobial drugs, did not yield a microorganism.

Two community-based care providers, who delivered treatment services for families on the same tea estate, reported treating about 50 out-patients with bloody diarrhoea between early October and mid-December 2003. Four patients, including 2 young adults and 2 children <5 old, were reported to have died after having developed symptoms of bloody diarrhoea. However, interviews of district and upazila health officials in the area did not suggest a recent increase in the number of patients admitted with bloody diarrhoea to government health facilities in the area.

The findings of this investigation suggest that there is ongoing transmission of a multi-drug resistant clone of ***Sd***1 in northeastern Bangladesh. Clinicians in Bangladesh should maintain a high degree of suspicion for ***Sd***1 when treating patients presenting with bloody diarrhoea. Stool culture, if available, should be used to determine the etiologic agent and drug susceptibility. The identification of multiple cases of culture-confirmed ***Sd***1 should be promptly reported to local

public health officials. If culture is not readily available, clinicians should report suspected clusters of bloody diarrhoea to the appropriate public health authorities for their upazila or district.

While isolates of ***Sd***1 detected in the region in 2002 and early 2003 were susceptible to ofloxacin (2,3), the isolates detected among Sylhet residents were resistant to all fluoroquinolones (2,3), suggesting continued evolution of the pathogen. Monitoring of the antimicrobial susceptibility profile of ***Sd***1 isolates in coming months will be essential, given the potential of a widespread epidemic.

The rise of this ofloxacin-resistant clone poses a significant therapeutic dilemma for clinicians. At present, the circulating clone of ***Sd***1 is susceptible to two locally available oral drugs: pivmecillinam and azithromycin. The therapeutic efficacy of azithromycin for ***Sd***1 has not been evaluated. Given that the pathogen continues to be susceptible, pivmecillinam remains the drug of choice for treatment of ***Sd***1 in Bangladesh; pivmecillinam therapy should be used for a minimum of 3 days duration. ***Sd***1 is well known to acquire resistance to antimicrobial agents rapidly; by ensuring judicious and appropriate use, clinicians and pharmacists will play an important role in delaying the development of resistance to one of the few remaining options for therapy.

References

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3. Sur D, Niyogi SK, Sur S, Datta KK, Takeda Y, Nair GB, Bhattacharya SK. Multidrug-resistant ***Shigella dysenteriae*** type 1: forerunners of a new epidemic strain in eastern India? ***Emerg Infect Dis*** 2003;9(3):404-5

Surveillance Update

With each issue of the HSB, updates of surveillance data described in earlier issues will be provided. These updated tables and figures will represent the most recent observation period available at the time of publication. We hope these updates will be helpful to health professionals who are interested in current patterns of disease and drug resistance.

Susceptibility of diarrhoeal pathogens to antimicrobial drugs:May-October 2003

Antimicrobial agent	*Shigella* (n=176)	*V. cholerae* O1 (n=329)	*V. cholerae* O139 (n=16)
Nalidixic acid	43.2	NT	NT
Mecillinam	98.9	NT	NT
Ampicillin	44.9	NT	NT
TMP-SMX	33.5	0.0	100.0
Ciprofloxacin	98.3	100.0	100.0
Tetracycline	NT	100.0	100.0
Erythromycin	NT	100.0	100.0
Furazolidine	NT	0.0	100.0

NT=Not Tested

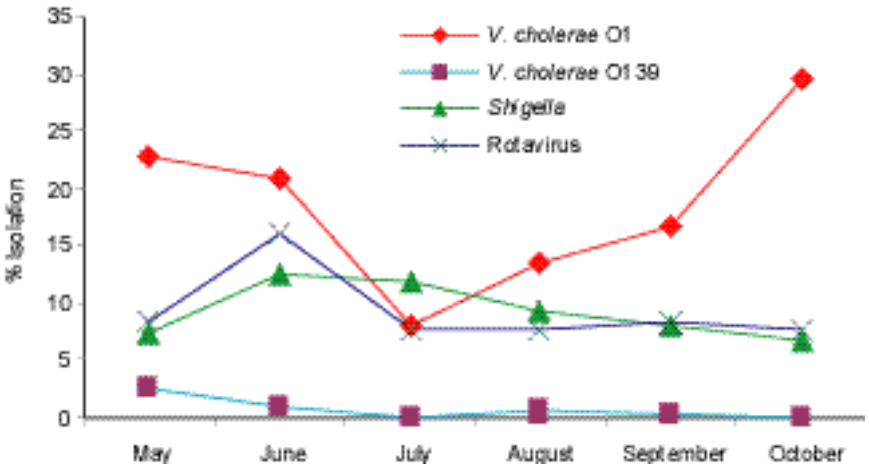
Antimicrobial resistance patterns of 153 M. tuberculosis ***isolates***: ***October 2002-September 2003***

Drugs	Resistance type		Total (n=153)
	Primary (n=120)	Acquired* (n= 33)	
Streptomycin	58 (48.3)	20 (60.6)	78 (51.0)
Isoniazid (INH)	17 (14.2)	7 (21.2)	24 (15.7)
Ethambutal	5 (4.2)	7 (21.2)	12 (7.8)
Rifampicin	4 (3.3)	4 (12.1)	8 (5.2)
MDR (INH+Rifampicin)	4 (3.3)	4 (12.1)	8 (5.2)
Any drug	60 (50.0)	20 (60.6)	80 (52.3)

( ) column percentages

* Antituberculous drugs received for 1 month or more

Monthly isolations of V. cholerae ***O1,*** V. cholerae ***O139,*** Shigella ***and Rotavirus: May-October 2003***



Antimicrobial susceptibility of N. gonorrhoeae: ***August - October 2003 (n=63)***

Antimicrobial agent	Susceptible (%)	Reduced susceptibility (%)	Resistant (%)
Azithromycin	87.3	12.7	0.0
Ceftriaxone	100.0	0.0	0.0
Ciprofloxacin	7.9	1.6	90.5
Penicillin	22.2	27.0	50.8
Spectinomycin	100.0	0.0	0.0
Tetracycline	4.8	7.9	87.3

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ICDDRB: Centre for Health and Population Research
GPO Box 128
Dhaka 1000, Bangladesh
www.icddrb.org