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Visceral Leishmaniasis, Mymensingh, 2002

In Bangladesh, 20 million people live in areas with active transmission of visceral leishmaniasis, caused by the parasite *Leishmania donovani*, transmitted by infected sandflies. Community-based surveillance is ongoing in Fulbaria, Mymensingh District, to identify ways to improve prevention and treatment. Among 35 patients identified, 4 (11.8%) died; 3 had completed a course of therapy. Fever, weight loss, anorexia, abdominal pain, darkening of skin and cough were the most commonly reported symptoms, and hepatomegaly and splenomegaly were frequently documented.

In January 2002, active community-based surveillance for visceral leishmaniasis (VL) was initiated in three sections of a village in Fulbaria, Mymensingh District. These surveillance data will form the basis for an epidemiologic study to describe patterns of VL transmission, identify risk factors, and develop a community-based education and intervention programme for visceral leishmaniasis in Bangladesh. This report presents preliminary data on clinical characteristics of a series of recent cases of visceral leishmaniasis from the study site.

An initial household survey was conducted to identify past and current cases of VL in a population of 2,348 persons, and active surveillance was begun in January 2002. A current case of VL was defined by clinical findings consistent with VL and confirmation by a specific laboratory test (rK39 dipstick) (1). All patients were referred to Fulbaria Upazila Health Complex for treatment with sodium antimony gluconate (SAG) 100 mg/ml, in-

Table 1: Age and sex distribution of current clinical visceral leishmaniasis patients

Age (years)	Male (%)	Female (%)	Deaths
3-9	5 (56)	4 (44)	1
10-19	5 (63)	3 (38)	0
20-29	5 (50)	5 (50)	2
30-39	2 (50)	2 (50)	0
40+	1 (25)	3 (75)	1
Total	18 (51)	17 (49)	4

tramuscularly, for 20 days at a dosage of 20 mg/kg body weight, daily, according to national guidelines (DGHS, 1995), with a maximum daily dose of 850 mg or 8.5 ml in adults.

During 15 January to 31 December 2002, 35 active cases of VL were identified. Males (51%) and females (49%) were equally affected (Table 1). The mean age was 20 years (range 5-45). The month of onset of illness ranged from August 2000 to November 2002. The median duration of fever before diagnosis was 3 months (range 1-19 months).

Fever, weight loss, anorexia, abdominal pain, darkening of the skin and cough were the most commonly reported. Spleen and liver enlargement were frequently observed (Table 2).

Four (11.4%) patients died. One death occurred in a male child (8 years old) and three deaths occurred in adult females (20, 24 and 45 years old). Three of the four patients died after completing the recommended course of 20 doses of injection (1, 6 and 8 days after completion). The fourth patient died during the course of therapy, approximately 10 hours after her last dose of the drug. Two patients who died were reported to

Table 2: Signs and symptoms of visceral leishmaniasis patients

Symptoms	No. (%) N=34*
Fever more than 2 weeks	34 (100)
Weight loss	34 (100)
Anorexia	31 (91)
Abdominal pain	28 (82)
Darkening of skin	28 (82)
Cough	25 (74)
Abdominal swelling	22 (67**)
History of jaundice	5 (15**)
History of bleeding (gum bleeding, epistaxis, menorrhagia)	8 (25**)
Signs	**No. (%) N=33***
Enlarged spleen	33 (100)
Skin darkening	28 (85)
Hepatomegaly (enlarged liver)	26 (79)
Pallor	15 (47)
Abdominal distention (mild to moderate)	16 (48)
Jaundice	1 (3)

* Symptom data were not available from one patient, and physical examination data were not available from two patients

** Data not available for this specific symptom from 1 additional patient

have defervescence followed by recurrence of high fever, while one had severe haemorrhagic complications.

Reported by Fulbaria Upazila Health Complex, Fulbaria, Mymensingh; Disease Control Division, Directorate General of Health Services, Mohakhali, Dhaka; Division of Parasitic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention; Parasitology Laboratory, Laboratory Sciences Division (LSD), Epidemic Control Preparedness Unit, Public Health Sciences Division (PHSD) and Infectious Diseases Unit, Health Systems and Infectious Diseases Division (HSID), ICDDR,B.

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Comment

In Bangladesh, 20 million people live in areas with active transmission of visceral leishmaniasis; 29 of 64 districts and 102 of 464 upazila report VL cases (from DGHS). The districts that reported the highest number of VL cases to the Disease Control Division, DGHS, in 2000 were Mymensingh (3,916), Pabna (758 cases), Tangail (563) and Gazipur (334). Because of limited access of impoverished patients to health care settings with appropriate diagnostics, these numbers are believed to represent a substantial underestimate.

VL is a chronic infection of the liver, spleen, bone marrow and other lymphoid tissue caused by the protozoan parasites *Leishmania donovani* (the predominant species in Bangladesh, Nepal, India, and East Africa), *L. chagasi* (in Latin America) and *L. infantum* (in North Africa and the Mediterranean basin). *Leishmania* parasites are transmitted to humans by the bite of an infected female sandfly. VL has a highly variable incubation period; time from inoculation of parasite to the beginning of symptomatic disease most commonly ranges between 2 and 6 months, but can be as long as several years (2).

Visceral leishmaniasis typically presents as a chronic systemic illness with fever, weight loss, splenomegaly, hepatomegaly, hypergammaglobulinaemia, and bone marrow suppression with pancytopenia. Visceral leishmaniasis is associated with leukopenia and defects in cell mediated immunity, causing VL patients to be at high risk for concurrent bacterial infections such as tuberculosis, bacterial pneumonia and sepsis. Patients commonly have marked anaemia, and may have thrombocytopenia. Bleeding complications are reported both before and after initiation of treatment; thrombocytopenia from antimonial agents has also been reported (3). Darkening of the skin is a common symptom in South Asian VL patients, and, together with the characteristic fever, is probably the origin of the Hindi name of the disease, kala-azar (black fever). The pathophysiologic mechanism of the pigmentation change is unknown.

Definitive diagnosis of VL requires demonstration of *Leishmania* amastigotes in bone marrow or splenic aspirate. However, facilities for parasitologic diagnosis are often difficult to access for patients living in villages. As an alternative at the upazila level, serologic testing can be highly sensitive, have an acceptable

specificity, and is the most cost-effective strategy for VL diagnosis in developing countries (4). The direct agglutination test (DAT) is a highly sensitive serologic test for VL, and has been widely used in developing countries. However, DAT antigen produced commercially is expensive, and maintenance of local DAT antigen production is challenging. The rK39 dipstick is a new immunochromatographic strip test using the recombinant *Leishmania* K39 antigen (5).

Because of its simplicity for field use and low cost of production, the rK39 dipstick has been used as the primary confirmatory test for suspected cases of VL during field surveillance in Fulbaria. This test is reported to be highly sensitive and specific as a test to confirm VL suspected on clinical grounds (1). Because serology (DAT or rK39) is also positive in recent subclinical leishmaniasis infection, the specificity of serologic testing is enhanced when the test is used in conjunction with a careful history and physical examination by an experienced clinician.

Treatment of VL currently requires at least 20 days of parenteral drug and is quite costly. In Bangladesh, the first line drug is the pentavalent antimonial drug, sodium stibogluconate (also called sodium antimony gluconate or SAG), 20 mg/kg/day intramuscularly, usually for 20 to 30 days. Drug resistance is inferred when response is incomplete at 30 days. In Bihar State, India, where the Asian epidemic began in the late 1970s, 65% of VL cases are now resistant to sodium stibogluconate, and must be treated with amphotericin, which is 5 to 10 times more expensive (6). Drug resistance is likely to spread throughout the region, due to poor compliance with the long and painful first-line treatment regimen. Pentamidine and amphotericin provide therapeutic options, but they are seldom available in Bangladesh. A new oral drug, miltefosine, has shown promising efficacy and has been well tolerated during tests conducted in India (7); it is hoped that this drug will be available in Bangladesh in the near future.

VL, if untreated, is associated with a high case-fatality rate (up to 90%); with therapy, case-fatality rates range of 3-15% (8,9). The case-fatality rate among patients described in this report was high, particularly in light of the fact that it included three patients who had recently completed a course of SAG therapy, and one patient who had completed 70% of the course. These deaths were likely due to complications of VL, such as secondary bacterial infection and haemorrhage, but also raise the possibility of emergence of drug resistance. WHO now recommends a course of 30 injections of SAG for VL in India outside Bihar, and in Nepal (10), a recommendation that may need to be considered for Bangladesh. Supportive therapy, including transfusions when indicated, and monitoring and treatment for secondary bacterial infections, are critical to decreasing the case-fatality rate for VL in Bangladesh. Further investigation of severe and complicated cases, as well as careful monitoring of possible re-

lapses after VL treatment, will help to improve case management of visceral leishmaniasis in Bangladesh.

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Epidemiology of Gonorrhoea and Antimicrobial Susceptibility Surveillance for *Neisseria gonorrhoeae* in Bangladesh (1997-2002)

To define the epidemiology of gonorrhoea and antimicrobial drug susceptibility of *Neisseria gonorrhoeae*, 1033 gonococcal isolates from people with high risk behaviour were studied. National guidelines for empiric management of sexually transmitted infections recommend ciprofloxacin as first-line therapy for gonorrhoea. However, <5% of isolates were susceptible to ciprofloxacin, as well as to penicillin and tetracycline; ≥98% of isolates were susceptible to ceftriaxone, cefixime, and azithromycin. Availability of susceptibility data will be helpful for updating treatment guidelines and for successful intervention programmes.

Despite global health efforts, gonococcal infections still result in a substantial disease burden in the developing world, especially among women (WHO, 1995) The World Health Organization (WHO) ranks sexually transmitted infections (STI) including gonorrhoea as a leading cause of morbidity (http://www.who.int/hiv/pub/epidemiology/pubfacts/en/). Since few developing countries have routine screening programmes, gonococcal infections are significantly under-reported. This report summarizes data from STI surveillance from a variety of high-risk populations in Bangladesh since 1997. Initially, surveillance was conducted among symptomatic and asymptomatic street-based female sex workers in Dhaka; subsequently, it was expanded to other risk-behaviour groups in Dhaka, Sylhet, Chittagong and Jessore, including brothel-based and hotel-based sex workers, males who have sex with males (MSM), truck drivers and male patients with STI.

Table 1: Prevalence of gonococcal infection among street-based ("floating") sex workers in Dhaka, Bangladesh.

No. Participants (n=2117)	No. with *N. gonorrhoea** N (%)	Year
224	94 (42%)	1997
296	92 (31%)	1998
288	112 (39%)	1999
599	216 (36%)	2000
473	132 (28%)	2001
237	47 (20%)	2002

*Identification of gonorrhoea infection was based on culture of *N. gonorrhoeae* from endocervical swab or urethral swab.

With the assistance of USAID, ICDDR,B has established a state-of-the-art laboratory for microbiologic, immunologic, and molecular diagnosis of STI pathogens, and for antimicrobial susceptibility monitoring of *Neisseria gonorrhoeae* (gonococcus). ICDDR,B has also established four RTI/STI microbiology laboratories in Chittagong (two laboratories), Jessore and Sylhet.

Surveillance for gonorrhoea, ongoing since 1997, has included 3425 symptomatic and asymptomatic subjects with high-risk behaviour including 3,000 female sex workers, 167 male patients with STI, and 258 MSM. Since 1997, the overall prevalence

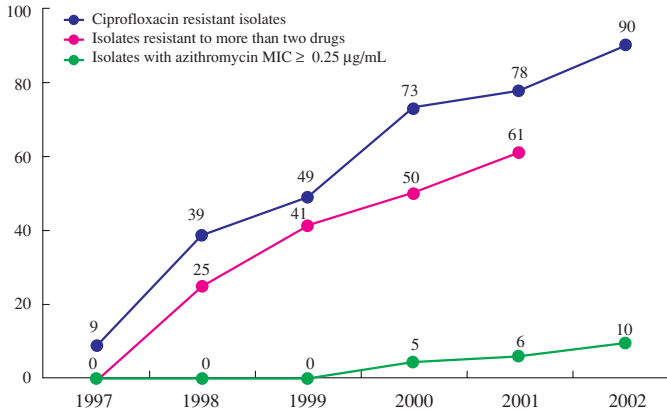
Table 2: Antimicrobial susceptibility of N. gonorrhoeae *isolated during 2002 (N=337)*

Antimicrobial agent	Susceptible (%)	Reduced susceptible (%)	Resistant (%)
Azithromycin	98	1.5	0.5
Cefixime	100	0	0
Ceftriaxone	98	2	0
Ciprofloxacin	4.4	5.1	90.5
Penicillin	1.7	36.3	62
Spectinomycin	100	0	0
Tetracycline	0.6	4.7	94.7

of gonococcal infection among 2117 street-based sex workers (sometimes referred to as "floating" sex workers) from Dhaka is 32.7%; however the prevalence of gonorrhoea among this group has dropped from 42% in 1997 to 20% in 2002 (Table 1). In contrast, the prevalence of gonorrhoea among hotel-based sex workers from Dhaka surveyed in 2002 was 36%. The prevalence of gonorrhoea among sex workers in a brothel in Jessore dropped from 29% in 1999 to 14% in 2002.

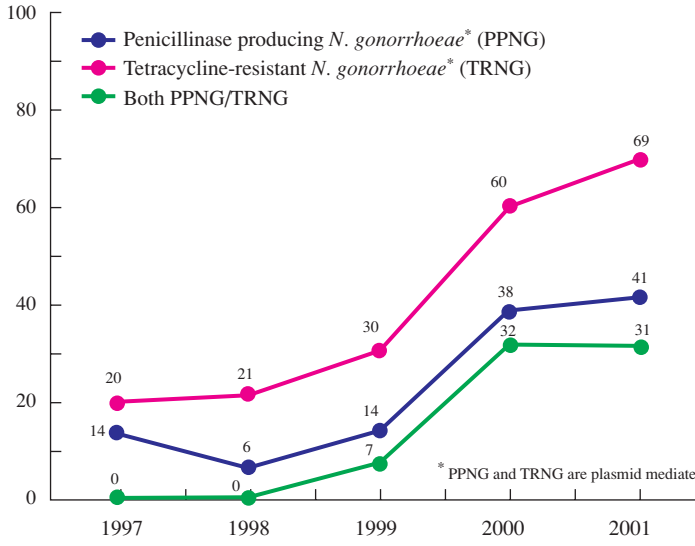
Since 1997, a total of 1033 gonococcal isolates have been tested for antimicrobial susceptibility to penicillin, tetracycline, ciprofloxacin, ceftriaxone, spectinomycin, azithromycin and cefixime. Isolates were also tested for the presence of penicillinase-producing *N. gonorrhoeae* (PPNG) and plasmid-mediated tetracycline resistance (TRNG). Isolates resistant to ≥3 drugs were defined as multiple drug-resistant *N. gonorrhoeae*.

Figure 1: Prevalence of ciprofloxacin resistance, multidrug resistance and isolates with azithromycin MIC more than 0.25 µg/mL among gonococcal isolates during 1997-2002.



Based on breakpoints of the National Committee on Clinical Laboratory Standards (NCCLS) <5% isolates from 2002 were susceptible to penicillin, tetracycline or ciprofloxacin (Table 2); ≥ 98% of isolates were susceptible to ceftriaxone, ce-

Figure 2: Prevalence of strains with plasmids for resistance to penicillin and to tetracycline during 1997-2002.



fixime and azithromycin. While azithromycin resistance is <1%, the MICs of the susceptible isolates have been increasing rapidly (10% of isolates in 2002 having MICs for azithromycin ≥0.25 µg/mL) (Figure 1). A rapid increase has occurred in ciprofloxacin resistance from 9% in 1997 to 90% in 2002 and in multiple drug resistance from 0% in 1997 to 61% in 2002 (Figure 1).

The prevalence of PPNG and TRNG has also been steadily on the rise (Figure 2). Particularly disconcerting has been the emergence of strains possessing both plasmids. While in 1997 no isolates tested possessed plasmid-mediated resistance to both penicillin and tetracycline, in 2002, 30% of the isolates did (Figure 2).

Reported by Reproductive Tract Infections/Sexually Transmitted Infections Laboratory, Laboratory Sciences Division (LSD) and Health Systems and Infectious Diseases Division (HSID), ICDDR,B in collaboration with Concern Bangladesh, CARE Bangladesh, Family Health International, The Salvation Army, Bandhu Social Welfare Organization, Mamata, Paricharja, Shrtisti and M.A.G Osmani Medical College, Sylhet.

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Comment

Despite a sharp decline in incidence of gonococcal infection in developed countries during the last decade (1, 2), gonorrhoea remains one of the most common sexually transmitted infections (STIs) in developing countries. An encouraging finding of this report is a reduction in prevalence of gonococcal infection among commercial sex workers over the last five years which may represent the impact of prevention programmes implemented during this period. However, emergence of resistance to antimicrobial agents in *N. gonorrhoeae* is a

major obstacle toward the control of gonorrhoea. Earlier studies have shown that treatment failures occur frequently when gonococcal infections are treated with a drug to which the infecting strain is resistant (3). Findings of this report suggest that ciprofloxacin is ineffective for use in gonorrhoea infections in Bangladesh, and that strains are rapidly acquiring reduced susceptibility to an important alternative, azithromycin.

Strategies for control of gonorrhoea have relied on the use of highly effective and often single-dose therapy administered at the time of diagnosis (4). Treatment regimens for a case of gonorrhoea and other STIs are usually based on patterns of antimicrobial susceptibility of previously collected isolates, rather than the infecting isolate, since treatment is given on site at the time of diagnosis (before culture results are available). WHO established the Gonococcal Antimicrobial Susceptibility Programme (GASP) network and data generated is used to form worldwide recommendations for treatment. In 1998, WHO recommended a single dose of ciprofloxacin (500 mg orally), ofloxacin (400 mg orally) or ceftriaxone (125 mg intra-muscularly) for treatment of gonococcal infections (5). With increased prevalence of ciprofloxacin resistance in Bangladesh and other parts of Asia, fluoroquinolones (including ciprofloxacin) are no longer recommended for use in Asia by CDC and WHO (6); instead cefixime (400 mg orally) or ceftriaxone (250 mg intramuscularly) are recommended for uncomplicated gonorrhoea in this region.

Many health care providers in Bangladesh are following currently available national guidelines for management of STI, which still recommend ciprofloxacin as the first line therapy for gonorrhoea. Findings from this report suggest that national treatment recommendations will need to be re-evaluated and modified, based on available drug susceptibility data from Bangladesh. Considering the rapidly changing pattern of gonococcal antimicrobial susceptibility, it is important to maintain antimicrobial susceptibility monitoring programmes. Periodic analysis of susceptibility data and updating treatment guidelines will be important for successful STI intervention programmes. Future issues of the *HSB* will include within the "Surveillance Update" section, updated antimicrobial susceptibility results for *N. gonorrhoeae*.

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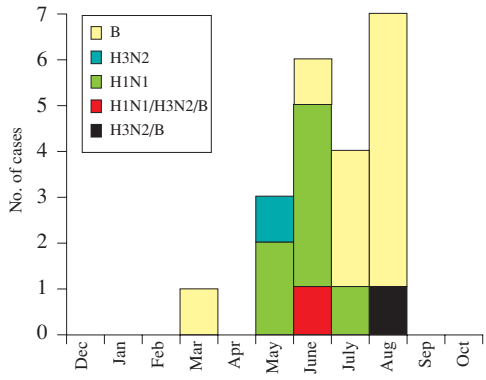
Community-based Surveillance for Influenza in a Dhaka Slum, 2001

Among 130 children <13 years of age with a febrile respiratory illness, detected during community-based surveillance for febrile illnesses at the ICDDR,B Urban Surveillance Site in Kamalapur, 21 (17.6%) had evidence of recent influenza infection. In contrast with influenza incidence patterns (peak in winter) in temperate zones, nearly all cases occurred during the summer. Infection with Influenza B, as well as influenza A were both documented. Influenza may be an important cause of respiratory infection in children in Bangladesh.

Prevention of influenza is a priority for the World Health Organization because of the annual adverse impact of epidemic disease on health globally, and the potential of a devastating, global pandemic (1). Influenza is easily transmitted from person-to-person, and can result in complications due to primary viral pneumonia, secondary bacterial pneumonia, otitis media, and worsening of underlying medical conditions, as well as in large numbers of deaths (2,3). Densely populated and impoverished Bangladesh may be particularly affected by this virus. Yet, current information on the burden of influenza is unavailable for Bangladesh and the surrounding region. Population-based epidemiologic and laboratory data on influenza would be helpful for defining the degree to which addressing influenza should integrate with other health priorities and for formulating effective public health strategies for prevention and control of influenza.

A study to estimate the contribution of influenza to febrile respiratory illness and to establish seasonality of influenza in Bangladesh was conducted using sera collected during December 2000 to October 2001 from urban children participating in a community-based surveillance system. Serum was collected as part of ongoing surveillance for dengue and other causes of febrile illness from 824 people who reside within the ICDDR,B Kamalapur Urban Surveillance Site, in southeast Dhaka. From a subset of dengue-negative patients with available acute- and convalescent-phase sera, 130 children <13 years old with cough <5 days duration and temperature $\geq$38.5°C were selected for influenza serologic

Figure 1: Cases of influenza by month, Kamalapur Urban Surveillance Site, December 2000-October 2001



testing. Their paired serum specimens were tested using influenza haemagglutination inhibition assay at the Centers for Disease Control and Prevention (CDC), Atlanta (4).

Antibodies were measured against 4 different influenza viruses: A/New Caledonia/20/99 (H1N1), A/Panama/2007/99 (H3N2), and 2 influenza B viruses (B/Victoria/504/2000 - a B/Sichuan/379/99-like virus, and B/Hong Kong/22/2001 - a B/Victoria/2/87-like virus, a virus lineage that disappeared from most of the world in about 1990 except for parts of Asia, then re-emerged in late 2001). A four-fold or greater rise in antibody titre from the acute to the convalescent serum sample was considered evidence of recent infection. A single serum titre of 40 or greater in the absence of a four-fold rise was considered evidence of a past influenza infection.

Twenty-one (17.6%) children had antibody evidence of 1 or more recent influenza infections; one of these children had sero-conversion in antibodies to two viruses and one other child to all three viruses (likely representing cross-reactivity in the case of both childrenís sera). There were 13 influenza B sero-conversions (all appeared to represent infection with B/Victoria/504/2000), 8 A(H1N1) seroconversions, and 3 A(H3N2) seroconversions. In addition, 63 (48%) children had antibody evidence of prior infection with influenza, including 52 (40%) with evidence of influenza A (H3N2) infection, the influenza subtype which predominated world-wide during several years in the 1990's (Figure 1).

Influenza occurred during the rainy season (June-August) (Figure 1) and was the predominant cause of febrile respiratory illness during that period. Extrapolations of data to a full year among all children <13 years of age in the cohort suggest an annualised incidence rate of 5.0 episodes of influenza per 1000 children.

Reported by Influenza Branch, Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention and Infectious Diseases Unit, Health Systems and Infectious Diseases Division (HSID) and Virology Laboratory, Laboratory Sciences Division (LSD), ICDDR,B.

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Comment

The findings of this report suggest that influenza is an important cause of respiratory infection in children in Bangladesh. Influenza has been isolated among hospitalised children with acute lower respiratory infection in Bangladesh in earlier studies (5,6), however recent data have not been available.

The disease burden estimate is likely to be markedly underestimated due to strict criteria used to select sera for testing (e.g. only persons with a measured temperature $\geq$38.5°C were included) and likely under-reporting and incomplete follow-up for paired blood sample collection among study participants. In addition, young children with influenza may be less likely than adults to sero-convert, thus underestimating the number of influenza infections. This may be even more so with moderately malnourished children, who have blunted immune responsiveness. In contrast to the influenza illness rate estimated in this study, typical yearly influenza infection rates measured among children in temperate zones range from 10-20% (7*).* Forty percent of the study population had titres = 40 to influenza A(H3N2) and influenza B/Sichuan-like viruses, indicating high levels of prior infections with influenza.

These data confirm that influenza may circulate within an urban community in Bangladesh and cause a substantial proportion of febrile respiratory illnesses. The serologic data showed evidence of infection to influenza A (H1N1), A (H3N2), and influenza B (8,9). Strains included in the 2001-02 influenza vaccine included all 3 circulating strains seen among study participants.

The peak occurrence of influenza in temperate zones of the Northern Hemisphere is generally December-March, and is June-August in the temperate zones of the Southern Hemisphere. In 2001, influenza was in active circulation in Bangladesh when it was not in circulation elsewhere in the northern temperate zone. Bangladesh is at a junction between temperate and tropical zones and it is between South and Southeast Asia which may make it a conduit for spread of new strains between two densely populated regions of high global traffic. Viruses introduced into Bangladesh from the Southern or Northern Hemispheres could rapidly circulate within densely populated areas and then to other regions.

Influenza is the prototypic emerging infectious disease, known for its ability to undergo genetic and antigenic change. New strains of influenza emerge frequently through the accumulation of point mutations during viral replication, a type of change referred to as drift. Antibodies made against earlier strains may not be effective in preventing infection against new strains of the same influenza type (A vs. B) or influenza A subtype (H3N2 vs. H1N1). Thus, influenza epidemics can occur yearly and individuals can become infected with influenza

many times during their lifetime. Influenza viruses infrequently undergo a more drastic change referred to as shift. Shift occurs when a new influenza A subtype emerges and against which the human population has little or no immunity. A new subtype may emerge directly from an animal source, particularly pigs or birds, or may arise from reassortment of an animal influenza virus with a human influenza virus. New influenza A subtypes, which can cause illness in persons and can be readily transmitted from person to person, may cause a global pandemic. Three pandemics of influenza occurred during the twentieth century, in 1918-19, 1957-58 and 1968-69. The most devastating of these pandemics, the 1918 pandemic, resulted in 20-50 million deaths worldwide. Early detection of a potential pandemic virus is an international public health priority. A new strain or new influenza A subtype could emerge in Bangladesh and circulate widely, but not be detected until it had spread to another part of the world where surveillance was in place.

Given extreme population density, Bangladesh provides an environment that could promote the rapid spread of epidemic disease caused by either a new epidemic strain of influenza or a new influenza A pandemic virus. In addition, given the close proximity of humans, fowl, and other animals in Bangladesh, the environment may also support potential reassortments of animal with human influenza viruses and the genesis of a novel, virulent influenza A subtype with pandemic potential.

During the peak influenza season in Bangladesh in 2001, the dengue season was also underway. Similar features of these two illnesses may be difficult for health providers to distinguish. Clinically defined "dengue fever" may actually be caused by influenza or other pathogens, underscoring the importance of use of reliable, affordable diagnostic tests of acceptable sensitivity and specificity to confirm dengue diagnosis.

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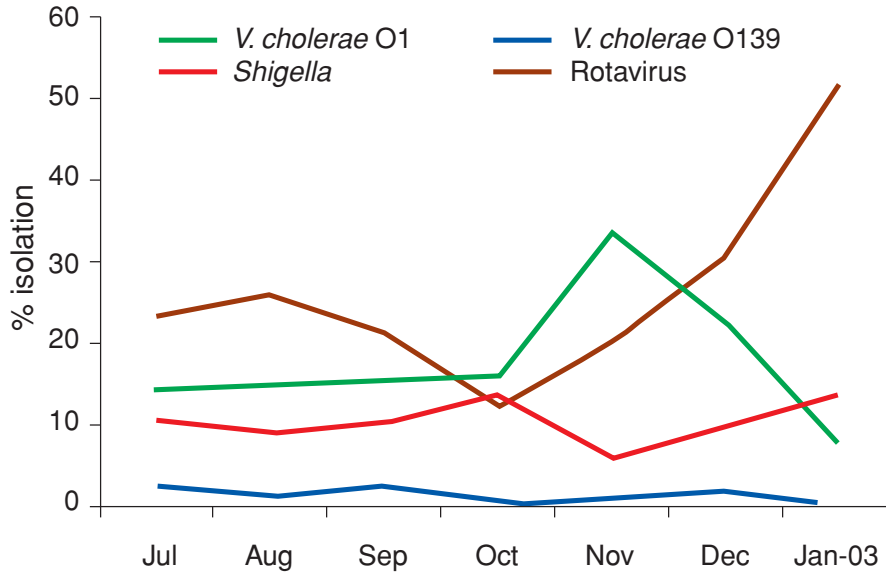
Surveillance Update

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: July 2002-January 2003

Antimicrobial agent	*Shigella* (n=192)	*V. cholerae* O1 (n=335)	*V. cholerae* O139 (n=24)
Nalidixic acid	49.0	NT	NT
Mecillinam	100	NT	NT
Ampicillin	43.0	NT	NT
TMP-SMX	41.0	0.3	100
Ciprofloxacin	100	100	100
Tetracycline	NT	100	100
Erythromycin	NT	100	100
Furazolidine	NT	0.0	100

Monthly isolations of V. cholerae O1, V. cholerae O139, Shigella and Rotavirus: July 2002-January 2003



Antimicrobial resistance patterns of 187 M. tuberculosis *isolates: January-November 2002*

Drugs	Resistance type		Total (n=187)
	Primary (n=147)	Acquired * (n=40)	
Streptomycin	52 (35.4)	18 (45.0)	70 (37.4)
Isoniazid (INH)	12 (8.2)	10 (25.0)	22 (11.8)
Ethambutol	10 (6.8)	6 (15.0)	16 (8.6)
Rifampicin	4 (2.7)	10 (25.0)	14 (7.5)
MDR (INH+Rifampicin)	2 (1.4)	8 (20.0)	10 (5.3)
Any drug	60 (40.8)	22 (55.0)	82 (43.9)

( ) column percentages

* Antituberculous drugs received for 1 month or more

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Announcements

7-9 December 2003

10th Asian Conference on Diarrhoeal Diseases and Nutrition

The 10th Asian Conference on Diarrhoeal Diseases and Nutrition (ASCODD) will be held in Dhaka. The theme of this conference will be: Saving children's lives: Advances in the control of diarrhoea, pneumonia and malnutrition.

Further details will be announced in due course. If you would like to be receive more information about the conference when it is available please send an e-mail to ascodd@icddrb.org

8-23 September 2003

ICDDR,B-Howard Hughes Medical Institute Training Course on Infectious Disease Research in Bangladesh

The aim of this training course is to promote the capacity of researchers in developing countries to apply modern laboratory techniques for infectious disease research and develop advanced research skills. The two-week training course will focus on modern molecular and immunologic techniques used for infectious disease research as well as bioinformatics (computational biology).

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Deadline for applications: 30 April 2003