only faces almost insurmountable problems as it tries to form a new government, it also faces many serious health issues including sexually transmitted diseases (STDs).

Surveillance data from the Ukrainian STD Center from January 1, 1989, through December 31, 1995, were analyzed on the basis of reports received through 1997. In western Europe, the incidence of syphilis and gonorrhea declined from 1980 to 1991 to less than 2% per 100,000 persons for syphilis and less than 20% per 100,000 persons for gonorrhea. However, in Ukraine, since 1989, the notification rate of syphilis has skyrocketed—from 5 per 100,000 persons in 1990 to 170 in 1995. In some regions, this rate exceeds 220 cases per 100,000 persons. Moreover, cases among children younger than 14 years of age are also increasing. In 1995, the syphilis rate for persons older than 30 years of age was 170 per 100,000; 600 per 100,000 girls younger than 15 years of age; and 1,550 to 2,000 per 100,000 girls 15 to 16 years of age. The large number of girls with the disease is in part due to teenage prostitution (1).

Most syphilis and gonorrhea cases are attributed to sexual transmission. Explanations of this phenomenon include the rapid growth of the sex industry, increasing numbers of homeless persons and refugees in Ukrainian cities, poor diagnostic facilities, punitive legislation that reduces the likelihood of going to treatment services, and limited or inadequate treatment (2).

The Ukrainian government is reviewing its arrangements for the control of STDs, including HIV/AIDS, to identify clear objectives and priorities. Education and treatment would be effective in preventing the spread of STDs in Ukraine, but these measures are inadequately funded (3). Evaluation and risk reduction are also great weapons in preventing the spread of STDs (4). However, the response of the local and world communities has been inadequate in stemming a major STD epidemic in Ukraine.

United Nation's Children's Fund (UNICEF) is developing a long-term program in Ukraine with a focus on STDs in adolescents and youth. This comprehensive program will tackle not only STDs but other related issues, such as HIV and teenagers' reproductive health (5).

Greater coordination of the agencies responsible for STD control in Ukraine will be sought, together with an expansion of health promotion and prevention projects for young persons and groups at high risk (6). An effective strategy for the control of STDs in Ukraine will, therefore, need to find ways to modify current programs and the way they interact to create effective control interventions.

Dmitry I. Ivanov
University of Alabama at Birmingham, Birmingham, Alabama, USA

References

1. Dittmann S, Gromyko A, Mikkelsen H, Schaumburg A, Adamian R, Khodakevich L, et al. Epidemic of sexually transmitted diseases in eastern Europe. Geneva: World Health Organization; 1996.
2. Kobyshcha Y. HIV risk-related behavior of homo and bisexual men and STD patients in Ukraine. National AIDS Committee and Center 1994;7:290-3.
3. Normand J, Vlahov D, Moses LE. Preventing HIV transmission: the role of sterile needles and bleach. The effects of needle exchange programs. Washington: National Academy Press; 1995. p. 208-55.
4. Spinhenko Y. Prevention of the spread of AIDS in the Ukrainian SSR. Lik Sprava 1988;9:1-3.
5. Usenko A, Grazhdanov N, Stepanets V, Neshcheret E, Maksiutenko E. Effective knowledge propaganda in the chief strategy for preventing HIV infection among adolescents. Lik Sprava 1994;9:192-6.
6. Tichonova L, Borisenko K, Ward H, Meheus A, Gromyko A, Renton A, et al. Epidemics of syphilis in the Russian Federation: trends, origins, and priorities for control. Lancet 1997;350:210-3.

Yellow Fever Vaccine

To the Editor: Monath et al. (1) outlined existing facilities for distribution of yellow fever vaccines in the United States and pointed to difficulties for prospective vaccinees in remote locations. Their recommendation that primary health-care providers be allowed to dispense yellow fever vaccination merits serious consideration. Acceptance of such a strategy in the United States would inevitably be emulated elsewhere. Nevertheless, before such a strategy is approved, vaccine potency should be monitored at distribution points, and a sample of vaccine recipients should be examined for vaccine-induced immune response.

In Nigeria, systematic investigation of yellow fever vaccine distribution and transportation to remote locations has found loss in vaccine potency. Vaccine in storage sites and immuniza-

tion centers in Lagos was fully potent, but potency in Osun and Oyo was 016 $\log_{10}$ to 0.22 $\log_{10}$ lower than the stipulated level (2). Furthermore, the titer of two vaccine lots that had been frozen after reconstitution from their lyophilized state dropped from the initial 3.15 $\log_{10}$ to 3.53 $\log_{10}$ to zero.

If the United States were to implement an extended strategy, similar studies of vaccine lots should be conducted to determine whether every vaccinee has received a full dose of yellow fever vaccine. In Illinois during the early 1970s, weak links in maintenance of refrigeration facilities and use of outdated vaccines in vials exposed to the sun for long hours were reported for live poliovirus vaccines (3). In the Northern Territory of Australia, examination of 144 vials of hepatitis B vaccine formulations during transport to immunization centers showed that 47.5% had been exposed to temperatures of -3°C or lower (4).

Assays of the potency of yellow fever vaccine, as well as quantification of vaccine-induced neutralizing antibody, is a multistep procedure that relies on inoculation of mice or Vero or polysaccharide cells (5). The successful "take" of yellow fever vaccine can be determined starting the second postvaccination day by demonstrable viremia detected by reverse-transcriptase polymerase chain reaction and by marked increases in neopterin, beta2-microglobulin, and circulating $CD8^+$ cells (6). Alternatively, elevated levels of tumor necrosis factor and interleukin-1 receptor antagonists on day two after vaccination (7) could be used to monitor the success of vaccinations by primary-care providers in remote areas in the United States (1) and elsewhere.

During the 1990s, isolation of yellow fever virus was reported in persons with a nonspecific febrile illness that did not meet the case definition of yellow fever (8). Air travel by such persons to the United States, which has areas infested by *Aedes aegypti,* could initiate yellow fever epidemics; because these travelers would have a nonspecific febrile illness, they would escape the existing surveillance network.

In conclusion, introducing yellow fever immunizations by primary health-care providers would be ideal, only with a concurrent plan to monitor vaccine potency at immunization centers and obtain in vitro evidence of a successful vaccine take. Such a strategy would blunt yellow fever–associated deaths, illnesses, and symptomless viral carriage in the community.

Subhash C. Arya
Centre for Logistical Research and Innovation
New Delhi, India

References

1. Monath TP, Giesberg JA, Fierros EG. Does restricted distribution limit access and coverage of yellow fever vaccine in the United States? Emerg Infect Dis 1998:4:698-702.
2. Adu FD, Adedeji AA, Esan JS, Odusanya OG. Live viral vaccine potency: an index for assessing the cold chain system. Public Health 1996;110:325-30.
3. Rasmussen CM, Thomas CW, Mulrooney RJ, Morrissey RA. Inadequate poliovirus immunity levels in immunised Illinois children. Am J Dis Child 1973;126:465-9.
4. Miller NC, Harris MF. Are childhood immunization programmes in Australia at risk? Investigations of the cold chain in the Northern Territory. Bull WHO 1994;72:401-8.
5. World Health Organization. Techniques for potency evaluation of yellow fever vaccine. Technical Report Series 1998;872:67-8.
6. Reinhardt B, Jaspert R, Niedrig M, Kostner C, L'age-Stehr J. Development of viremia and humoral and cellular parameters of immune activation after vaccination with yellow fever virus strain 17D: a model of human flavivirus infection. J Med Virol 1998;56:159-67.
7. Hacker UT, Jelinek T, Erhardt S, Eigier A, Hartmann G, Nothdurft HD, et al. In vivo syntheses of tumor necrosis factor-alpha in healthy humans after live yellow fever vaccination. J Infect Dis 1998;177:774-8.
8. Sanders EJ, Maffin AA, Tukei PM, Kuria G, Ademba G, Agata NN, et al. First recorded outbreak of yellow fever in Kenya, 1992-1993. I. Epidemiologic investigations. Am J Trop Med Hyg 1998;59:644-9.

Yellow Fever Vaccine—Reply to S. Arya

To the Editor: Dr. Arya correctly points out that there have been problems with degradation of live viral vaccines, including yellow fever vaccines, that have not been properly handled and stored at the point of use. However, in the United States and western Europe, yellow fever vaccines are stabilized and require the same storage facilities at the point of use as other vaccines routinely distributed by family physicians and pediatricians. Varicella vaccine (and even measles vaccine) is less stable than yellow fever vaccine but is distributed to all registered physicians in the United States. Since vaccines and other perishable medicines are typically