
MMWR. 1997;46:1168-1171
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HUMAN MONKEYPOX is a severe smallpox-like illness caused by monkeypox virus (MPV); monkeypox occurs in sporadic outbreaks, and infection is enzootic among squirrels and monkeys in the rainforests of western and central Africa.1 In 1996, cases of monkeypox were reported from villages in the Katako-Kombe Health Zone, Kasai Oriental, Zaire (i.e., Democratic Republic of Congo).2,3 The World Health Organization (WHO), in collaboration with CDC, investigated this outbreak and identified 92 suspected cases with onset during February 1996-February 1997, and isolated MPV from lesions of active cases.4 Cases continued to be reported, and a new investigation was initiated by WHO and CDC in October 1997. This report summarizes the results of the field investigation, which indicate that this is the largest human monkeypox outbreak ever recorded.

In October 1997, active case ascertainment was conducted in the Katako-Kombe and Lodja health-care zones, Kasai Oriental, Democratic Republic of Congo. A probable case was defined as the occurrence since February 1996 of fever, a vesicular-pustular rash similar to that depicted in a WHO reference photo, or five or more facial pock marks in a resident of Kasai Oriental. A possible case was defined as a history of fever and vesicular or crusty rash in a resident of Kasai Oriental. A primary case was defined as monkeypox in a person who reported no contact with another person with monkeypox; a secondary case was defined as monkeypox in a person who had contact with a person with monkeypox 7-21 days before onset of disease. Serum was collected from approximately 300 case-patients and crust ed scabs or vesicular fluid from 19 case-patients with active disease. Data and specimens are being analyzed.

In the current investigation, 419 cases have been identified: 344 in the Katako-Kombe Health Zone (attack rate (AR)=1.1 per 1000 population) and 75 in the Lodja Health Zone (AR=0.3). Of these, 304 (73%) met the probable case definition, and 115 (27%) were considered possible monkeypox cases. Most (85%) cases occurred in persons aged <16 years. Nineteen persons had active disease. Preliminary testing of lesional material identified MPV in nine cases and variella zoster virus in four.

Of the 344 cases in the Katako-Kombe Health Zone, five persons died (case fatality ratio: 1.5%) within 3 weeks of rash onset; decreed cases ranged in age from 4 to 8 years. All 339 surviving case-patients were examined and interviewed. Of these, 183 (54%) had been confined to bed rest for 3-10 days. Twenty (6%) case-patients had scar evidence of vaccinia vaccination, and 19 reported a past history of chickpox. Other reported manifestations included cervical lymphadenopathy (69%), sore throat (63%), mouth ulcers (50%), cough (41%), and diarrhea (11%).

Since February 1996, a total of 511 human monkeypox cases have been identified in the Katako-Kombe and Lodja health zones. Onsets of illness peaked in August 1996 and August 1997. Case-patients resided in 54 villages in Katako-Kombe and 24 in Lodja. The highest AR (113) occurred in Akungula (1997 population: 399), the epicenter of the outbreak in August 1996. The largest number of cases occurred in the adjacent village of Eckango (54 cases clustered in 13 housing compounds) (AR=43). Cases increased substantially in Eckango and the two nearby villages of Ombeka (21 cases; AR=22) and Dimanga (seven cases; AR=20) in March 1997. The peak in August 1997 primarily represented case-patients who resided in other villages.

Of the 419 cases identified during the investigation initiated in October 1997, 94 (22%) were primary, and the remainder were secondary; 147 (35%) reported having traveled outside their home village during the 3 weeks preceding disease onset. Of the secondary cases, 53% reported having had antecedent contact with another case-patient in the neighborhood, 48% in the housing compound, and 42% in an individual household. Primary cases with no apparent association with the clusters in the Akungula/Ekanga occurred in 49 of the 78 affected villages.

CDC Editorial Note: This report describes the largest recorded outbreak of human monkeypox. Human-to-human transmission has continued for 2 years with peaks each August, and cases have occurred throughout large areas of the Katako-Kombe and Lodja health-care zones. The large number of cases in this outbreak may reflect an increase in the number of susceptible persons as a result of the cessation of smallpox vaccination, which is highly effective for preventing monkeypox, or changes in other factors related to MPV transmission. Clinical disease in this outbreak was milder than in previous outbreaks, when case fatality was approximately 10%.1

In this outbreak, secondary ARs were estimated to be 5% (95% confidence interval= 5%-12%), which is similar to secondary ARs estimated during monkeypox surveillance in Zaire during the early 1980s (4%-12%). Transmission has ceased at the epicenter of this outbreak and surrounding villages. The more recently detected cases have occurred in geographically distant clusters; most of these cases have not been obviously associated with cases in the epicenter. These recent cases may instead have resulted from independent introductions of the virus into the human population through animal contact. Ongoing surveillance is essential to monitor the outbreak and secondary ARs, clarify primary and secondary transmission mechanisms, and consider intervention strategies. If human monkeypox transmission is sustained without introduction from reservoir animals, vaccinia vaccination targeted to the appropriate population may be considered.
Smallpox Surveillance—Worldwide

MMWR. 1997;46:990-994
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A TOTAL of 3,234 cases of smallpox have been reported from Eastern Africa to the World Health Organization (WHO) in the period January 1-December 6, 1977. Since October 16, 1975—more than 2 years ago—when a case occurred in Bangladesh, smallpox has been detected only in Ethiopia, Kenya, and Somalia, 3 countries which together with Djibouti are linked by the Ogaden Desert to form one epidemiologic unit.

To date, the last known case of smallpox occurred in Somalia on October 26 in the Merca District. The source of this case was a known outbreak in the nearby district of Kurtuware. All 211 contacts were traced, revaccinated, and kept under surveillance. There have been no secondary cases. As of December 6, there were 6 pending outbreaks* in Somalia—the one in Merca and 5 in Bar dere.

During October and November surveillance in Somalia has been severely hampered by heavy rains that have made it difficult or impossible to travel by vehicle. Since work has had to be continued on foot, there have been some delays in reporting and incomplete search coverage in certain areas. To combat this, personnel have been concentrated in those areas considered to be at highest risk of having undetected foci or where information is most limited. Currently there are 1,670 national staff and 24 WHO epidemiologists involved in the program. Increased mobility with restoration of complete active searches will be necessary to ensure that all foci have been detected. Accordingly, intensified activities are planned during the dry season, January through April 1978.

The last known case of smallpox in Ethiopia occurred on August 9, 1976, in El Kere Region. In Kenya, the last case was on February 5, 1977, in the Mandera District.


* An outbreak is defined as one or more cases; a pending outbreak is one in which 6 weeks has not elapsed since the onset of rash of the last case.

Smallpox Surveillance—Worldwide

MMWR. 1997;46:991-994
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AS OF April 14, 1978, no cases of smallpox have been reported to the World Health Organization (WHO) from anywhere in the world since the last case had onset of rash on October 26, 1977, in Merca town, Somalia. However, a total of 2 years of effective surveillance must elapse before this last endemic area can be confirmed to be smallpox-free.

Worldwide, since January 1, 1976, smallpox cases have been detected only in certain areas of Ethiopia, Kenya, and Somalia. One year and 9 months has elapsed since cases were detected in Ethiopia; 1 year and 1 month has elapsed since 5 cases were detected in Kenya after an importation from Somalia; and 6 months has passed since the last case was found in Somalia.

With the apparent interruption of transmission of the disease on a global basis, smallpox activities are being directed toward promptly certifying and providing authoritative endorsement of this historic event. In January 1978 the Executive Board of WHO endorsed the recommendations of a consultant group on worldwide certification of smallpox eradication which met in October 1977. Recognizing that this certification is based on verifying that 2 years has elapsed with no case of smallpox being detected by a surveillance system which would have detected any case had it occurred, the recommendations called for the establishment of a Global Commission. This independent group of experts is to monitor and review the following steps to be undertaken in 1978 and 1979: certification by international commissions in the 15 countries not yet visited by commissions; special documentation or visits to be required for 16 countries; the request for statements from other countries declaring their smallpox-free status.

If no more cases of smallpox are detected, the countries of Somalia, Ethiopia, Djibouti, Kenya, Yemen, and Democratic Yemen will be eligible for certification in October 1979. These will be the last of the 15 countries to be certified by an international commission, and priority attention is being given to surveillance in these areas.


CDC Editorial Note—1997: Some things need be done only once in the entire history of the world. The development of smallpox vaccine and the eradication of smallpox disease are on the list. Perspective is elusive, even when one contemplates 20 years without a single case of smallpox in the world. Part of the reason is that we all begin our reading “in the middle of the book.” Although the full story that went before can never be known, smallpox eradication became possible, and then inevitable, when Edward Jenner, using his clinical powers of observation over a 25-year period during the 18th century, became convinced that an infection with cowpox could protect against smallpox. He then took the next step, inducing immunity by transferring cowpox from the hand of Sarah Nelmes to the arm of James Phipps—creating a tool that would change the health of entire populations.1

In a real sense, the history of modern public health started on that day, May 14, 1796. Word spread quickly, despite communication barriers. By 1806, Jefferson was able to visualize the last case of the disease when he wrote to Jenner, “future generations will know by history only that this loathsome disease has existed.”2

It is a sad commentary that it took 170 years to finally organize to accomplish
Jefferson’s vision. But when it happened, it brought out the best in science and public health. The resolution at the World Health Assembly in 1965 was unanimous and led to excellent cooperation between the United States and the Soviet Union, even in the midst of Cold War politics. The value of WHO, which represented the health needs of every person in the world, was demonstrated. Workers and resources from around the world were organized for use in the areas of greatest need. The public health situation, rather than political concerns, dictated how the program was to be executed. The United States can be proud of its role in this exciting program, contributing hundreds of workers and millions of dollars for the eradication of a disease that no longer involved our nation.

Twenty years have passed since the last naturally acquired case of smallpox occurred, as reported in the January 6 and May 5, 1978, issues of MMWR. Smallpox has not re-emerged from an unrecognized human or animal reservoir, from a variola store’s infected scabs, or infected cadaver, either unearthed or thawed. There continues to be no evidence to support the theory of a “niche” for human pathogens that, when vacated, will be filled by another. Although speculation increased when monkeypox was recognized as causing human disease, fears decreased when monkeypox was shown to have a low secondary attack rate among unvaccinated humans. In addition, monkeypox virus, probably arising from a squirrel reservoir, is not ancestral to smallpox virus based on genomic studies.

The issue of monkeypox again emerged with outbreaks in 1996 and 1997 in the eastern Democratic Republic of the Congo with speculation about the need for smallpox vaccine to provide cross-protection for the populations at highest risk. Such recommendations must be considered carefully because of the adverse risks of the vaccine, particularly in persons who may be immunocompromised by human immunodeficiency virus infection. A better understanding of the current epidemiology/epizology of monkeypox is needed.

Smallpox has been eradicated, but the etiologic agent is not extinct. The virus continues to exist in freezers in secure facilities at one institution in the United States and another in the Russian Federation. During the past 10 years, various individuals and three WHO committees have recommended destruction of virus stocks on the grounds that the world needs to be assured that smallpox will never again be a threat to human kind. In opposition to virus destruction are equally strong views that laboratory stocks serve as a counterbalance to terrorism and a source of unknown future benefits to humankind. In May 1996, the World Health Assembly recommended, subject to further review, that all stocks be destroyed in June 1999.

The legacy of the smallpox program, beyond eradication, has been enduring and includes the Expanded Program on Immunization (with its remarkable reductions of measles and other vaccine-preventable illnesses), the impending eradication of Guinea worm disease and poliomyelitis, and improved global disease surveillance and public health logistics systems. The growing interest in eradication as a global health strategy led to the creation of the International Task Force for Disease Eradication, which reviewed >80 potential candidate diseases and concluded in 1993 that six were eradicable. The science of infectious diseases eradication was the subject of a multidisciplinary Dahlem Workshop in Berlin in March 1997. As a follow-up to the Dahlem Workshop, a conference is scheduled in Atlanta in early 1998 on Global Disease Elimination/Eradication as Public Health Strategies; this conference will explore the potential synergistic relations between disease elimination/eradication and primary health-care programs throughout the world.

The health benefits of smallpox eradication have been enormous and the economic benefits satisfying. Because of smallpox eradication, the United States saves >$1 billion each year than its annual dues to WHO. For the first time, social justice in public health has been achieved, with everyone benefiting from a body of scientific knowledge and experience. The benefits will continue to be enjoyed by every person who will ever be born. “Future generations will know by history only” that world cooperation reached an unprecedented level in the 20th century, making this bequest possible.

CDC 1997 Editorial Note by William F. Foege, MD, Rollins School of Public Health, Emory University, and Director Emeritus, CDC. Walter R. Dowdle, PhD, Director Emeritus, CDC.

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Satellite Broadcast on Women With Vaginal Infection

MMWR. 1997;1207
Caring for Women with Vaginal Infections: Bacterial Vaginosis, Trichomoniasis, Vulvovaginal Candidiasis, a live interactive satellite broadcast, will be presented to sites nationwide Thursday, March 12, 1998, from noon to 2 PM eastern standard time. Cosponsors are CDC and the Baltimore and Denver Sexually Transmitted Disease/Human Immunodeficiency Virus prevention training centers.

This program will address how to perform comprehensive and productive history and pelvic examinations, testing and sampling techniques, management of patients and their partners, and “work up” of women with asymptomatic, non-specific, and recurrent vaginal infections.

Information about registration, satellite coordinates, and Continuing Medical Education and Continuing Education Units is available from the Prevention Training Center in each public health region: Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), telephone (617) 983-6945; Region II (New Jersey, New York, Puerto Rico, and Virgin Islands), telephone (518) 474-1692; Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia), telephone (410) 396-4448; Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee), telephone (205) 980-1196; Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin), telephone (513) 558-3197; Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas), telephone (214) 819-1947; Region VII (Iowa, Kansas, Missouri, and Nebraska), telephone (314) 747-0294; Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming), telephone (303) 436-7226; Region IX (Arizona, California, Hawaii, and Nevada), telephone (415) 554-9630; and Region X (Alaska, Idaho, Oregon, and Washington), telephone (206) 720-4222.
Laboratory-Based Surveillance for Rotavirus—United States, July 1996–June 1997


ROTAVIRUS INFECTIONS are the most common cause of severe gastroenteritis among infants and young children worldwide. Each year in the United States, rotavirus infections account for an estimated 3.5 million cases of diarrhea, 500,000 physician visits, 50,000 hospitalizations, and 20 deaths among children aged <5 years. In addition, rotavirus accounts for 30%-50% of U.S. hospitalizations for diarrhea among children aged <5 years, including approximately 50% of hospitalizations for diarrhea during annual seasonal peaks, and is an important cause of nosocomial gastroenteritis. Rotavirus activity in the United States is monitored by the National Respiratory and Enteric Virus Surveillance System (NREVSS), a voluntary, laboratory-based system. This report summarizes surveillance from NREVSS during July 1996–June 1997.

From July 1996 through June 1997, a total of 69 laboratories in 42 states participated in NREVSS and reported weekly to CDC the number of stool specimens tested for rotavirus by antigen-detection and electron microscopy methods and the number of positive results. Of 23,199 fecal specimens examined, 6183 (27%) were positive for rotavirus. Timing of rotavirus activity varied by geographic location; peak activity occurred first in the Southwest in autumn and ending in the Northeast in mid- to late-spring; however, the time of peak activity in the Pacific Northwest is more variable than in other regions, occurring from winter to late spring. The reasons for the sequential pattern in rotavirus activity across the United States are unknown; it is not explained by a sequential introduction and diffusion of new rotavirus strains because rotavirus activity often is caused by a mixture of common strains that may vary between cities.

NREVSS is the largest, nationally representative system for surveillance of rotavirus infections in the United States. This system uses an automated telephone reporting system to transmit reports from participating laboratories to CDC and allows timely analysis of rotavirus trends. Limitations of the system are that (1) some regions of the country are sparsely represented, and data are not reported from Alaska and Hawaii; (2) demographic or clinical data are not collected; and (3) specimens are not routinely submitted for confirmation or strain characterization.

The large disease burden and high cost associated with rotavirus infections in the United States have been the impetus for development of rotavirus vaccines. Two human-animal reassortant vaccines have been found to be safe and effective and a vaccine is under review for licensure for use among U.S. children; both the Advisory Committee of Immunization Practices and the Committee on Infectious Diseases of the American Academy of Pediatrics are considering recommendations for the use of the vaccine in children.

The prospect of a program for childhood vaccination against rotavirus in the United States highlights the need for continued surveillance for this infection. Laboratory-based surveillance has helped characterize the spatiotemporal trends of rotavirus infections and provides a baseline for monitoring changes in the epidemiology of these infections following vaccine introduction. Efforts to enhance rotavirus surveillance should include surveillance for rotavirus-associated diarrheal outcomes, particularly hospitalizations, and for rotavirus strains. These measures also will assist in assessing vaccine program effectiveness and the potential emergence of novel or unusual rotaviruses.

References