International Editors

update

Emerging Infectious Diseases—South Africa

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main a major cause of illness and death in South Africa. The medical infrastructure is good in major cities, primary health care is expanding in rural areas, and modern diagnostic facilities are reasonably widely available. Urban areas have a mixture of infectious disease problems encountered in developing as well as industrialized countries, and in the tropical environment of the northeast, malaria and other vector-borne diseases persist.

An aerial view of Chris Hani Baragwanath Hospital, with 3,000 inpatients the largest hospital in the world—Soweto, South Africa. Multiple-drug resistant pneumococci were found here in 1978.

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Emerging Infectious Disease Surveillance

National surveillance of emerging infections in South Africa is in its infancy. A number of infectious diseases are notifiable, but no formal laboratory-based surveillance system is in place to confirm diagnoses or to subtype microorganisms for epidemiology purposes. I have summarized infectious disease trends in South Africa, with special emphasis on the antimicrobial resistance patterns of locally circulating microorganisms.

Bacterial Diseases

Streptococcus pneumoniae

Fully resistant and multiple-drug resistant pneumococci were discovered in South Africa in 1978. The pattern of emergence of pneumococcal resistance in South Africa has been somewhat different from that observed in Western Europe (and more recently in the United States). In those countries, the emergence of resistance was explosive and associated with a limited number of clones, particularly of serotype 23F and 6B, which are associated with multidrug resistance and high-level penicillin resistance. The highly resistant strains initially isolated in South Africa belonged largely to serotype 19A and for some as yet unexplained reason, remain rare. Antimicrobial resistance to penicillin in the pneumococcus in South Africa has reached very high levels (approximately 45% in young children), but most of this resistance is caused by a large number of intermediately penicillin-resistant strains rather than a limited number of clones found internationally. Antibiotic resistance differs in the public versus private health-care sectors of South Africa. The most important difference may be the relative scarcity of macrolide resistance among strains of pneumococci in public hospitals, where these drugs are less often used. Recently, the incidence of pneumococcal disease in both adults and children has doubled as a result of the increased incidence of HIV infection. HIV infection is specifically associated with antibiotic resistance and with childhood serotypes of the pneumococcus (6A, 6B, 9V, 14, 19F, 19A, 23F).

Haemophilus influenzae

In contrast to the United States and Western Europe, South Africa has a low incidence of betalactamase-producing *H. influenzae* (±10%). The reason for the contrast between the low incidence of betalactamase-producing *H. influenzae* and the high incidence of penicillin resistance in the pneumococcus is not known.

Neisseria meningitidis

Over the past few years, the distribution of meningococcal serogroups has been fairly even between groups A, B, and C. An epidemic in Cape Town of group B in the 1980s provided an opportunity to attempt to use an outer membrane protein vaccine, but the epidemic ceased before enough cases could be enrolled in the vaccine trial. An epidemic of group A meningococcal meningitis is ongoing in the countries immediately to the north of South Africa, particularly in Mozambique, and an increasing number of group A strains are being identified, largely in adult refugees from Mozambique. These group A strains have been typed by the World Health Organization Meningococcal Reference Center in Oslo, Norway, and represent a unique South African clone. The epidemic clone associated with the Haj (III-1) in the 1980s was, however, discovered for the first time in South Africa in 1997.

Staphylococcus aureus

The incidence of methicillin-resistant *S. aureus* in South Africa is alarming, with up to 50% of nosocomial isolates being methicillin-resistant. No vancomycin-intermediate *S. aureus* strains as have been reported in the United States and Japan have been identified in South Africa to date. The incidence of methicillin resistance among S. *epidermidis* strains in hospitals is, as expected, even higher.

Enterococcus

The first strains of enterococci resistant to vancomycin (VRE) and teicoplanin, which were due to the presence of the *van* A resistance gene, were described in South Africa only in 1996. These strains were likely imported. The incidence of VRE in South Africa remains low but is expected to increase.

Diarrheal Pathogens

Endogenous transmission of cholera has not been observed in South Africa for the past decade. Epidemics of cholera have occurred in countries to the north, particularly in

Mozambique, and a number of imported cases have been identified each summer in South Africa. The potential for an epidemic in rural areas with poor sanitation and contaminated water exists. *Shigella dysenteriae* type I producing Shiga toxin and associated with hemolytic uremic syndrome was first identified in an epidemic in adults on the South African/ Mozambican/Swaziland border in 1993. Subsequently, the same strain has become quite common among children and adults, particularly in KwaZulu-Natal province, and has spread down the east coast to the western Cape. Disease in adults as well as children suggests that this strain has not been endemic in South Africa, at least during the past generation. The strains are resistant to ampicillin and cotrimoxazole but are generally susceptible to nalidixic acid and the fluoroquinolones. Occasional imports of multidrug-resistant typhoid have been identified in KwaZulu-Natal, where there is a large Indian community; these strains likely come from Southeast Asia.

Nosocomial Infections

Extended spectrum betalactamases are endemic particularly among *Klebsiella* species in intensive-care units throughout the country. Gram-negative bacteria producing chromosomally mediated Beta-lactamase are common in all of these settings and *Acinetobacter*-related problems abound in most intensive-care units.

Tuberculosis (TB)

The incidence of TB is increasing in parallel with the HIV epidemic in South Africa. Multiple-drug resistance remains <5% and is commonly associated with noncompliance to drug regimens.

Plague

Low levels of endemic plague are present in rural South Africa, but the last epidemic was in Namibia in the 1980s.

Viral Diseases

HIV infection was not apparent in South Africa until around 1988 when endogenous cases began to emerge. The first reported cases occurred predominantly in homosexual men who had sexual contacts in the United States; in one early case, the patient presumably had heterosexual contact with a sex worker in Central Africa when the disease was first discovered there. The incidence of HIV infection among pregnant African women in South Africa in 1990 was 0.4%. The number of infected persons has doubled at approximately 9-month intervals until now when approximately 20% of adult African men and women are infected in the northern and eastern parts of the country. This number declines to less than 10% in the south, but HIV, although delayed with reference to the rest of Africa, has had and will have a staggering impact on emerging infectious diseases in South Africa. No specific diseases peculiar to South Africa have been found to be associated with HIV infection; major opportunistic infections include TB, cryptococcal disease, cytomegalovirus infections, bacterial diseases such as pneumococcal or salmonella bacteremia, and toxoplasmosis.

Viral Hemorrhagic Fevers

A case of Marburg fever was identified in the 1970s in a tourist visiting several African countries to the north of South Africa; nosocomial transmission to two persons was identified at that time. One case of nosocomial transmission of Ebola has been reported (the patient with the index case was flown down to South Africa from Gabon); however, no endemic transmission of Ebola virus occurs in South Africa. That the nosocomial transmission of Ebola virus was limited to a single person despite the fact that the diagnosis of the index case was not made until a number of weeks after the patient entered the country is a tribute to the standard of medical care in South Africa. Congo Crimean hemorrhagic fever is endemic in southern Africa, but as the vector tick rarely bites humans, not many human cases have been found. Epidemics have been associated with infections in rural communities particularly of farmers and workers who slaughtered infected cattle. An epidemic among ostriches occurred in 1997.

Parasitic Diseases

Malaria remains a serious systemic disease in South Africa. The disease is endemic in the northern and eastern parts of the country where the climate is tropical. After many years of spraying huts with DDT, malaria became rare, but the interruption of the program because of war in the 1970s and 1980s in Mozambique and Zimbabwe (and the development of drug resistance in other insects such as bedbugs, which reduced the acceptability of the program) has led to a rapid resurgence of malaria. Chloroquine-resistant strains, which were rare in the 1980s, are now common, although quinine-resistant strains have not yet been demonstrated. *Schistosoma haematobium* and *S. mansoni* are endemic in rivers along the eastern part of the country and pose a health risk to nonimmune visitors.

Fungi

Cryptococcus neoformans var gattii and var neoformans represent an increasing fraction of cerebrospinal fluid isolates in South Africa because of the HIV epidemic.

Further Reading

Additional information on emerging infectious diseases in South Africa is available from the South African Virus Laboratories Surveillance Bulletin, which is published by the National Institute for Virology (Private Bag X4, Sandringham, 2131 Johannesburg, South Africa); data can be obtained from the South African Institute for Medical Research Annual Reports (P.O. Box 1038, Johannesburg 2000, South Africa); national antimicrobial susceptibility data are published in the South African Medical Journal by the Antibiotic Study Group of South Africa; and clinically based notifiable diseases are reported to the Department of Health, which produces a free journal called Epidemiological Comments (The Director General, Department of Health, Private Bag X828, Pretoria, 0001, South Africa.) The final source of information on emerging infectious diseases in South Africa, aside from the specific reports that would appear in any international journal is the Proceedings of the Annual Meeting of the Infectious Diseases Society of Southern Africa (membership and meeting information, Dr. Lucille Blumberg, e-mail: lucilleb@mail.saimr.wits.ac.za).

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