



# South Africa

## A LAND OF CONTRASTS

AN MIR RADIOLOGIST SEES FIRSTHAND THE URGENT NEED FOR MODERN EQUIPMENT AND TRAINING IN SOUTH AFRICAN PUBLIC HOSPITALS.

BY ANNE KESSEN LOWELL

Doctor Marilyn Siegel's expertise in pediatric radiology has taken her around the world as a teacher and lecturer. Yet nothing in Siegel's globetrotting could have prepared her for the **EYE-OPENING, HEART-WRENCHING VISIT TO THE REPUBLIC OF SOUTH AFRICA** this past summer. As part of the Radiological Society of North America (RSNA) International Visiting Professor program, she joined two other RSNA members, doctors Scott Pretorius of the University of Pennsylvania and Annina Wilkes of Thomas Jefferson Hospital, on a teaching trip to South Africa in August 2003. A two-time recipient of Mallinckrodt Institute of Radiology's (MIR's) Teacher of the Year award, Siegel says simply, "I love teaching. This program seemed like a natural fit for me."

Above: The two faces of Capetown, South Africa

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**RSNA's** International Visiting Professorship was established in 1986. The program selects a three-member team who then lectures at a national radiology society meeting in a developing country. They also lecture, conduct clinical teaching sessions, and observe resident teaching methods at regional hospitals. In 2003, other International Visiting Professor teams traveled to Guatemala, El Salvador, and Kenya.

During the drive from the Johannesburg airport, Siegel was struck immediately by South Africa's contrasts: great wealth alongside abject poverty, pristine waterfront neighborhoods of custom-built mansions abutting vast areas of homemade shacks. "Apartheid may no longer exist as a policy," says Siegel, "but the social and economic inequalities are still visible." The stark contrast between living conditions of the wealthy (almost all white) South Africans and the poor black majority is evident in every sector of daily life: the economy, housing, and, perhaps of most importance, in health care.

The Visiting Professor team's first several days were spent at the South African Radiology Congress at the Midrand Conference Center in Gauteng Province, located between Johannesburg and the capital city of Pretoria. About 150 radiologists, or half the radiologists in South Africa, attended the Congress. (On a per capita basis, South Africa has one radiologist per 100,000 people, or one tenth of the per capita figure in the United States.) Over two days, the RSNA team covered topics in subspecialties of radiology. Siegel, a professor of radiology and of pediatrics, focused on computed tomography (CT)/magnetic resonance (MR) imaging of pediatric pelvic masses, pediatric renal masses, pediatric mediastinum, and ultrasonography (US)/CT imaging of the acute

abdomen. She also lectured on CT of adult hepatic masses.

At the close of the Congress, the team split up and visited regional hospitals around the country. Siegel went to Chris Hani Baragwanath Hospital in Soweto (an acronym for Southwestern Township). Located just outside of Johannesburg, Soweto is home to approximately 2.5 million black residents (population estimates range from one million to three million).

Soweto was the early home of Nelson Mandela as well as the site of the 1976 student uprising against apartheid, which brought international attention to South Africa and was considered the first step toward the dismantling of the apartheid system. Living conditions vary from modest brick homes to shacks. Forty-two percent of Sowetans are unemployed. Crime is rampant. Incidence rates of human immunodeficiency



Above right: Pretorius, Siegel, and Wilkes at the South African Radiology Congress



Right: Mid 1990's ultrasound equipment

Below: Old generation nonhelical CT scanner





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### South Africa Facts and Figures

- > Area—1,219,912 square kilometers (slightly less than twice the size of Texas)
- > Population—42,800,000
- > Ethnicity—75.2% black; 13.6% white; 8.6% mixed race; 2.6% Indian
- > Infant mortality—60.84 deaths per 1,000 live births (rate in United States is 6.75/1,000)
- > Life expectancy at birth—46.56 years
- > HIV/AIDS prevalence—1 in 5 adults
- > People living with HIV/AIDS—5 million
- > HIV/AIDS orphans in Africa today—11 million
- > Population below poverty line—57%
- > World rank in TB prevalence—7th
- > Per capita government expenditures on health care—\$230 (per capita in United States is \$4,271)

*Editor's Note: Above information was excerpted from following web sites: CIA Factbook, CBS News, and the World Health Organization.*



ciency virus (HIV) and acquired immunodeficiency syndrome (AIDS) are among the highest in South Africa.

At Baragwanath Hospital, Siegel encountered the everyday medical crises devastating the South African population. “Baragwanath Hospital is an old military barracks,” she notes. “Nearly one hundred barracks house adult and pediatric patients. The facilities resemble the large wards of public hospitals years ago.”

Baragwanath Hospital is considered the largest medical facility in the southern hemisphere and one of the largest acute care hospitals in the world: In a typical year 145,000 inpatients and over a half million outpatients will be treated there. Because there are virtually no support services at the hospital, families provide everything from meals to nursing.

“Families bring their own blankets to hang up, to provide some measure of privacy. All the different patterns actually make the wards very colorful,” says Siegel. However, that cannot hide the fact that patients languish on cots. This is evident and particularly sad in the pediatric wards. “There is nothing for these children to do—no game rooms, no radios or televisions, and few toys. They stare at the walls and ask when they can go home,” she says.

Patients with AIDS occupy about 40 percent of the beds; patients with tuberculosis (TB), 20 percent. The remaining patients have a variety of diseases, including the usual diseases seen in the United States and Europe. “AIDS and TB create a huge demand for radiology services,” says Siegel. “Patients wait so long to come to the hospital that they arrive with

advanced stages of disease and numerous serious complications. There are not enough resources, radiologists, or other specialists to take care of these patients.”

Another major medical problem is the high incidence of trauma cases. In 2001, trauma-related admissions to Baragwanath Hospital included 5,049 motor vehicle accident victims, 4,995 cases of accident or injury, and 1,911 victims of gunshot wounds. As a comparison, according to the *Monthly Vital Statistics for Hospital Emergency Services* published by Buyers Guide to Hospital Emergency Services, the average number of trauma-related visits to all hospitals in Missouri during 2001 was 16,559.

At Baragwanath, Siegel lectured and taught the five staff radiologists and seven registrants. From the presentation of interesting cases, she gained a perspective on the enormous obstacles to instituting a modern radiological service at Baragwanath—or at any other regional hospital in South Africa.

Baragwanath, like virtually all of South Africa’s regional hospitals, lacks modern equipment. There are, as Siegel discovered, only 74 MRI scanners in the country, and nearly all (except one or two) are used in private practices or private hospitals. Radiologists are forced to use invasive diagnostic procedures that in the United States were long ago replaced with noninvasive methods. “Where we would use MR imaging, they do angiograms to detect vascular disease,” says Siegel. “They have to use excretory urograms to image the kidneys, because of the scarcity of sonographic and scintigraphic equipment, and myelograms for the diagnosis of disk disease. Where Mallinckrodt Institute has the sixth generation of radiology equipment,

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South African hospitals are using third-generation to fourth-generation scanners, at best."

Similar to adults, children also undergo a large number of invasive diagnostic procedures. Although relatively rare in developed countries, hypertension and vascular diseases are common in the pediatric population in South Africa and other poor countries. Due to the lack of modern equipment, catheter angiography is the diagnostic test of necessity.

Not only are the fragile resources straining health care in South Africa, but there is an additional challenge facing radiology in that country. Radiologists are joining legions of professionals in medicine and other disciplines in an exodus to better paying jobs in other countries. As Siegel explains, "The country has no money, no modern scanners, and no resources. Nearly all newly trained radiologists are leaving for the United States, Australia, or Canada."

There is a painful irony behind the country's lack of modern medical equipment. The CT scanner was co-invented by an expatriate South African, Allan Cormack, who, along with Godfrey Hounsfield of the United Kingdom, won the Nobel Prize for Medicine in 1979 for their work. Another major breakthrough in the medical imaging field was invented in the 1990s by De Beers, the world's largest diamond mining company, and was used to scan South African miners for stolen dia-



Soweto's Baragwanath Hospital: emergency room (left) and patient waiting area

monds. The Statscan Critical Imaging System is a rapid, full-body, low-dose, digital X-ray system in use at many major United States trauma centers. Statscan quickly can detect multiple injuries in victims of serious accidents, which may have taken hours or even days to find with conventional X-ray methods. This equipment is being used in two hospitals and one research center in South Africa.

Siegel is convinced that basic improvements in training and equipment will greatly improve the quality and efficiency of health care in South Africa. She feels strongly that a more creative and longer-lasting approach to training is crucial. "The radiology community, both physicians and technologists, appreciates the International Visiting Professor program. They are delighted when an expert in an area of radiology comes to teach and are eager for new information. But sending three people for two weeks doesn't make a big impact," she notes.

Hopeful that a web-based radiology training tool might help train South African radiologists, Siegel points to a program being piloted at Mallinckrodt Institute that could be translated to international training. Gilbert Jost, MD, director of Mallinckrodt Institute and chairman of the Department of Radiology at Washington University in St. Louis School of Medicine, concurs that there is excellent promise in telemedicine. "RSNA is in the early

stages of developing a web-based application to support a digital teaching file," he explains. "The idea is to create a standard way to store radiology images that are used for teaching purposes, so teaching files can be shared from institution to institution. This is just one of many ways computers can be used for medical education, and the beauty of this approach is that successful educational applications can be used around the world. In the long run, it may be one of the most effective and economical ways to provide quality teaching in underdeveloped countries and in remote regional hospitals."

Combined with donations of modern equipment and more accessible teaching programs, a new generation of radiologists—who would remain in South Africa—could be trained soon. Other RSNA programs support this approach, such as "Teach the Teachers" that has opened ultrasound education centers in Nigeria and in South Africa.

Siegel says enthusiastically, "I'd love to go back!" Her first International Visiting Professor experience is not likely to be her last. Determined to stay involved in South Africa, she remains optimistic that her continued teaching can make a difference in patient care. **MR**