Spotlight
Cuba's National Immunization Program

By Miguel A. Galindo, MD

Cuba's National Immunization Program now effectively protects Cuban children from 13 diseases: polio, typhoid, tetanus, diphtheria, pertussis, rubella, measles, mumps, tuberculosis, hepatitis B, haemophilus influenza B, meningitis B, and meningitis C. (The meningitis B vaccine was developed in Cuba, and is considered the world's first effective vaccine against this child-killer disease.)

Conservative estimates put at some 300 million pesos Cuba's investment in vaccines, refrigeration equipment, and syringes from 1962 to 2003. During the same period, Cuba has received slightly over US$4 million dollars in donations from international agencies (PAHO and UNICEF) and non-governmental organizations, such as the Rotarians of Mexico, Doctors Without Borders of France, Doctors of the World of Spain, and the UNICEF Support Group in the Balearic Islands.

The Program's Impact

The National Program, begun in 1962, has resulted in internationally noteworthy results over the last 42 years, including the elimination of the following diseases:

Poliomyelitis (1962)
Diphtheria (1979)
Measles (1993)
Rubella and Mumps (1995)

The following severe clinical forms were also eliminated:

Neonatal tetanus (1972)
Pertussis (Whooping Cough) (1994)

Figure 1: Pertussis Morbidity Rates in Cuba
The following serious complications have been eliminated:

Congenital Rubella Syndrome (1989)

Post-Mumps Meningoencephalitis (1989)

The following diseases and severe clinical manifestations no longer constitute a health problem, since their rates are less than 0.1 x 100 000 inhabitants:

Tetanus (since 1990)

Haemophilus influenza (since 2003)

Figure 2: Morbidity Rates for Haemophilus I influenza in Cuba

CUBA 1998-2003 Rate x 100,000 INH

Morbidity rates for the following diseases have been reduced by over 95%:

Meningococcal Disease (meningitis B and C)

Hepatitis B
Typhoid Fever

Figure 3: Morbidity Rates for Meningococcal Meningitis B in Cuba

Figure 4: Morbidity Rates for Hepatitis B in Cuba

Extrapolating from the above data, we can conclude that the Program has saved 27,222 lives, which would have been lost to diseases preventable by vaccination; 12,600 people have been spared paralysis from poliomyelitis; 1,800 spared from severe heart disease and 4,000 from blindness or deafness.

These accomplishments place Cuba among the countries with the best indicators—both in terms of coverage as well as control of preventable diseases—according to the WHO’s 2003 assessment Vaccine-preventable diseases: Monitoring System. 2003 Global Summary, which summarizes results for the 214 countries and territories belonging to the organization.

Immunization in Cuba: Historical Background

Dr. Tomás Romay introduced the smallpox vaccine in Cuba on February 12, 1804. On May 26th the same year, the “Royal Vaccination Expedition” arrived in the port of Havana, sponsored by King Carlos IV of Spain. The expedition, led by Dr. Francisco Xavier y de Balmis, was to bring the smallpox vaccine to the colonies of the New World.
The Central Vaccine Administration was established on July 13th, 1804, directed by Dr. Tomás Romay, who would head the office for the next 31 years. Under his direction, some 311,342 people were vaccinated against smallpox in Cuba from 1804 through 1835.

In 1886, Dr. Santos Fernández introduced the rabies vaccine in Cuba, which was given to him by Dr. Louis Pasteur.

In 1902, the elimination of yellow fever was announced in Cuba. In 1903, Board of Health Director Dr. Carlos J. Finlay—who discovered that yellow fever was carried by the *Aedes aegypti* mosquito—pioneered the struggle against neonatal tetanus, by distributing his "sterile kits" to midwives free-of-charge.

In 1904, Dr. Bernardo Moas introduced antitoxin therapy for tetanus.

Colonel Horacio Ferrer, Chief of Military Medicine, introduced the typhoid vaccine in the army in 1916. Smallpox was declared eliminated in 1923. In 1942, the BCG vaccine was introduced in Cuba.

In the 1950’s, a ministerial decree authorized the use of the injectable polio vaccine developed by Dr. Jonas Salk.

**The Revolutionary Period**

Before the 1959 Revolution, 500 deaths annually were reported from measles, tetanus and whooping cough; 300 cases of paralysis by polio; and tens of thousands of cases of diseases that could have been prevented by vaccines.

The new government to measures early to improve the population’s health picture, including in 1960 the establishment of the Rural Social Medical Service, allowing Cuba to place doctors and nurses in the country's remotest areas, bringing medical care to the populations there—often for the first time.

In September, 1962, the decision was made to implement a National Immunization Program. From its inception, the Program has relied on four basic principles:

- Vaccination efforts encompass the entire Cuban population.
- Vaccination is integrated into primary care services.
- The program depends on active community participation.
- Vaccination is absolutely free of charge.

The First National Polio Vaccination Drive was launched in February 1962 among youngsters under 15 years of age. The two-stage campaign was carried out in one-week periods in February and again in April. We have used the strategy of "national vaccination weeks" for the last 42 years in Cuba, a strategy that has also been applied in other countries.

Decisive is the word that best describes the participation of community organizations—such as the Committees for the Defense of the Revolution (CDRs) and the National Association of Small Farmers (ANAP). Over 80,000 members of these two organizations have actively worked in national vaccination drives.

In September of 1962, the National Vaccination Drive against Diphtheria, Tetanus and Whooping Cough was initiated among children under 15. The same year, we began to bring neonatal tetanus under control, by using the tetanus toxoid vaccine in pregnant women and increasing the number of institutional births. In the 1962-63 school year, we began vaccinating children from 6 to 14 years against diphtheria, tetanus, whooping cough and tuberculosis. In the country’s maternity hospitals, the BCG vaccine for newborns has been used widely since 1962.

A National Commission for Infectious Neurological Syndrome was organized in 1963 to investigate suspected cases of polio.
In 1964, the first comprehensive polyclinics were set up - representing the first model of community health care in Cuba. Each had a special locale for vaccinations, carrying out these activities with the population on a daily basis.

At about this same time, we established the "cold chain", an essential element for storage, conservation and preservation of vaccines.

Since 1963 and throughout the ’60s, we carried out annual investigations to detect antibodies for the three types of polio circulating among children in the country. Dr. Albert Sabin, who developed the oral polio vaccine, visited Cuba for the first time in 1967.

In 1968, the Ministry of Public Health and UNICEF carried out a joint vaccination drive in the countryside against diphtheria, tetanus, whooping cough, tuberculosis and smallpox among rural young people under 15.

By the end of the 1960s, the average coverage with OPV, BCG and DPT did not surpass 70%.

The 1970s

The decade began with the First National Measles Vaccination Drive in 1971, for the population between six months and five years old.

We launched a strategy to bring diphtheria under control, based on the following actions:

- Increased coverage of DPT and DT in the under-10 child population.
- Massive testing for *C. diphtheriae toxigen* by carrying out throat cultures every six months among grade-school teachers and staff;
- Isolation of *C. diphtheriae toxigen* carriers.
- Epidemiological "clean bill of health" after treatment and proof of negative cultures.

With the rising number of physicians and nurses, the Ministry of Public Health decided to transform the comprehensive polyclinics into community polyclinics as of 1974. Thus emerged the second model of community medicine in Cuba, which further facilitated vaccination by creating the health sectors, areas which included some 3,000 residents, served by a specific doctor and a nurse at the polyclinic.

In 1975 and 1976, massive national drives took place to vaccinate housewives with tetanus toxoid. The campaigns relied heavily on participation by another community organization - the Federation of Cuban Women (FMC).

In 1979, a national campaign was launched against meningococcal meningitis A and C in the whole population under 20 years old.

We continued serological studies in the child population to detect antibodies circulating against polio. And, for the first time in Cuba, studies were carried out in children's institutions and in sewage ditches to determine the presence of the polio vaccine virus in the environment.

At the end of the decade, average coverage with OPV, BCG, DPT and the meningococcal A-C vaccine had reached over 80%.

The 1980s

In 1980, a second Immunization Program was developed. Its most novel aspects were to change the vaccination scheme to include the typhoid vaccine in schoolchildren; and to administer DT and TT by school grade, and not by age.
In 1981, the First International Evaluation of Cuba’s Vaccination Program was carried out by experts from the Pan American Health Organization (PAHO).

From 1982 to 1986, we applied three classic strategies to prevent the congenital rubella syndrome:

- Rubella vaccination for 12, 13, and 14-year-old children in the 1982-83 school year, and subsequent years up to 17 years old, so that by the end of the 1985-86 school year, all teenagers from 12 through 17 had been vaccinated.
- In 1986, all women from 18 through 30 were vaccinated.
- In the same year, all youngsters under 15 received the MMR vaccine.

In 1984, Cuba adopted its third model of community health care with the family doctor-and-nurse program, bringing vaccination services even closer to the population.

In 1984 and 1985, two national vaccination drives were organized against tetanus in the over-60 population. The Federation of University Students (FEU) played an active role in these efforts. The Third National Tetanus Prevention Drive was carried out in 1985 among housewives.

In 1987, field trials were carried out for the Cuban vaccine against meningococcal meningitis B and C - the world’s first vaccine against type B meningitis. In the two years that followed, the entire Cuban population under 15 was vaccinated against meningitis B and C.

In the eighties, the "cold chain" received a boost with UNICEF’s US$125,000-dollar donation of refrigerated trucks, freezers, freezer chests, thermoses and thermometers. PAHO also contributed US$150,000 dollars for 15 cold chambers and 600 thermoses. And the Ministry of Public Health itself added some 3,000 refrigerators and 300 electric autoclaves.

By the end of the ’80s eighties, coverage with BCG, DPT, OPV, MMR and meningitis B and C vaccines was slightly over 90% in the population under two years of age.

During the decade, PAHO carried out eight advisory missions in the field of vaccinations, and by virtue of a resolution from the Cuban Academy of Sciences, the Vaccine Expert Group was created.

Another accomplishment of this and the following decade was the application of three strategies to bring measles under control:

- Vaccinate the entire population under 15 with MMR (catch-up).
- Maintain over 95% coverage with MMR in the one-year-old population (keep-up).
- Vaccinate with MMR all unvaccinated, or vaccinated but unprotected, two-year-old children. This drive took place in 1992, vaccinating all children from two to six years old with MMR (follow-up).

This strategy has been applied in virtually all countries of the Western Hemisphere, and has received ample publicity worldwide.

From 1988, we implemented the Program to Eliminate Measles, Mumps and Rubella, as well as a surveillance system for suspicious, probable and confirmed cases of each. This system was mounted at the Pedro Kouri Tropical Medicine Institute, which was designated a PAHO-Collaborating Center for this purpose.

The 1990s

In 1990, field trials were carried out for the Cuban genetically engineered vaccine against hepatitis B. Thus, Cuba became the world’s first third world country to develop such a vaccine.

The same year, a national campaign was carried out among the Cuban population 15 to 19 years of age against meningococcal meningitis B and C.
In 1990, the medication surveillance system was created to detect adverse reactions, which included adverse reactions to vaccines.

The vaccine against meningococcal meningitis B and C was included in the national vaccination regime in 1991; and at about the same time the National Authority for the Control of Medications and Vaccines was set up.

In 1992, we launched the first national vaccination campaign against hepatitis B in children under one year. To date, several vaccination drives have been carried out against hepatitis B among various risk groups, such as:

- Patients receiving dialysis or who are hemophiliacs.
- Physicians, nurses and medical personnel and patients in psychiatric facilities.
- All health workers subject to risk of hepatitis B.
- All students of medicine, nursing and allied health careers.
- Students at reform schools.
- Family doctors and nurses.
- Sexual contacts or partners of acute cases and carriers of hepatitis B.
- All the Cuban population under 20 years old.
- All insulin-dependent diabetics and those with chronic renal infections.
- Cases and contacts of persons with STIs.

In 1994, documentation was presented supporting Cuba's candidacy for the Eradication of Polio Certificate, which was defended before an international commission, which found the report flawless. All of Cuba's ministers of health from the post-1959 period attended the session. The same year, the Pan American Health Organization presented the Eradication of Polio Certificate to President Fidel Castro.

Figure 5: Morbidity Rates for Poliomyelitis in Cuba

In 1996, field trials began in Holguín Province for the Cuban vaccine against leptospirosis.

Since 1997, residents of homes for the elderly have been vaccinated against influenza.

In 1998, we created the Technical Advisory Group for Immunization Practices within the Ministry of Public Health.
In the '80s and '90s, over 50 post-graduate courses in immunization have been offered throughout the country, each of 40 hours duration.

In this decade, the "cold chain" was once more reinforced, this time in the eastern provinces, by donations from two NGOs: Doctors without Borders from France, and Doctors of the World from Spain.

In the '90s, the local health sectors received the Program for Controlling Foci of Infectious Diseases, the Third Immunization Program and the Program of Adverse Events Following Immunization.

In 1999, we initiated the Vaccination Campaign against Haemophilus influenza type B in infants born in 1998, and this vaccine was introduced into the official vaccine regimen for children at two months old. Thus far, 96% of these infants have been vaccinated.

From 1999, profound changes were instituted in Cuba’s national vaccination regime, which now includes protection against 13 diseases.

From this decade forward, coverage in under-two-year-olds with OPV, BCG, DPT, anti-meningococcal B and C, Hepatitis B, MMR and H. influenza surpassed 95%.

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