A Culture of Prevention:

A Model for Control of Vaccine-preventable Diseases

XVI Meeting of the Technical Advisory Group on Vaccine-preventable Diseases
Mexico City - November 3-5, 2004

Abstract Book

Pan American Health Organization
Regional Office of the World Health Organization

Immunization in the Americas: Grounded in Achieving Equity and a Model for Regional Programs

The Pan American Health Organization (PAHO) traces its origin back to the First General International Sanitary Convention of the American Republics in Washington, D.C. in December 1902. A top agenda item during this meeting was the fighting of infectious diseases that killed thousands of people each year, including yellow fever. The final resolution of this first meeting stated, "It shall be the duty of the International Sanitary Bureau to lend its best aid and experience toward the widest possible protection of the public health of each of the said Republics, in order that disease may be eliminated and commerce between said Republics may be facilitated." Previously, early efforts in the 19th century for inter-American cooperation had been exclusively limited to commerce, and had nothing to do with health.

At some level, the founding leaders of the Pan American Health Organization had the foresight to understand the critical link between quality of health and economic prosperity, and that this relationship was a two-way link. More recently, research has documented that better health is linked to better economic status, and conversely, better economic status contributes to better health. In addition, the term Pan Americanism was coined to be descriptive of Member States' commitment to working together to improve the health of its citizens in areas of common interest and to supporting countries in greatest need.

One hundred years later, I am pleased to convey that the immunization program of the Americas is a Regional program that best exemplifies the original guiding principles of the Pan American Health Organization: Pan Americanism, eliminating disease, and reducing the inequities in health between resource-poor communities and resource-rich communities. It is well-recognized that immunization initiatives in the Americas have been examples to other Regions of the world in terms of recognizing that the health and public health of one's neighbor is a shared responsibility of all. Immunization programs can be Regional programs grounded in the values aimed at breaking down the barriers of health that lead to inequities. This is more relevant today than ever before and perhaps will be our greatest challenge if we are to succeed in achieving the Millennium Development Goals.

I personally want to congratulate all of you for participating in this important meeting. I wish you all the best over the next few days of hard work. You are the flag bearers of a tradition that promotes the highest standards of good public health practice! Working with all our partners, we can continue to make a difference. I am proud to be able to support you in this process.

Dr. Mirta Roses
Director, Pan American Sanitary Bureau
Washington, D.C.

Pan American Health Organization
Regional Office of the World Health Organization

Values, Vision, and Mission of the Pan American Sanitary Bureau

The Pan American Sanitary Bureau (PASB), the oldest international health agency in the world, is the Secretariat of the Pan American Health Organization (PAHO). The Bureau is committed to providing technical support and leadership to PAHO Member States as they pursue their goal of Health for All and the values therein. Toward that end, the following values, vision, and mission guide the Bureau's work.

VALUES

Equity

Striving for fairness and justice by eliminating differences that are unnecessary and avoidable.

Excellence

Achieving the highest quality in what we do.

Solidarity

Promoting shared interests and responsibilities and enabling collective efforts to achieve common goals.

Respect

Embracing the dignity and diversity of individuals, groups and countries.

Integrity

Assuring transparent, ethical, and accountable performance.

VISION

The Pan American Sanitary Bureau will be the major catalyst for ensuring that all the peoples of the Americas enjoy optimal health and contribute to the well being of their families and communities.

MISSION

To lead strategic collaborative efforts among Member States and other partners to promote equity in health, to combat disease, and to improve the quality of, and lengthen, the lives of the peoples of the Americas.

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The Immunization Unit wishes to thank CDLHN, a project of the Graduate School of Public Health at San Diego State University, for donating design services in the production of a cover for this book.

XVI MEETING OF THE TECHNICAL ADVISORY GROUP ON VACCINE-PREVENTABLE DISEASES

ABSTRACT BOOK

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Cultivating a Culture of Prevention

In the 27 years since the Expanded Program on Immunization was launched in the Americas, polio has been eradicated and measles has been eliminated. Perhaps more importantly, thousands of health workers working at the point of service have been trained in the principles of good public health practice and prevention. These same health workers have consistently executed the necessary strategies to reduce morbidity and mortality of vaccine preventable diseases. Improving management of immunization services at the district has emerged as a cornerstone of work. It is upon this foundation of good public health practice, that PAHO's vision for the future rests.

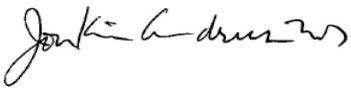
That vision is grounded in the following guiding principles: reducing inequities in health, cultivating a culture of prevention, galvanizing political commitment, and providing excellence in technical cooperation. These are the principles that will ensure public health efforts to protect families against vaccine preventable diseases will not stop with just vaccinations; those efforts will impact the extent and quality of all preventive services.

The Organization's vision is best summarized by our five priority areas of work:

- Eliminate rubella and congenital rubella syndrome;
- Protect our investment in polio;
- Sustain the achievements of measles elimination;
- Improve information management; and
- Introduce new vaccines.

While protecting and sustaining the achievements in polio and measles initiatives, the program is posed to embark on a new disease elimination initiative that will greatly impact child and maternal health, major priorities for achieving the millennium development goals. Like polio, CRS causes life-long suffering for children and their families. Efforts to reach and vaccinate adults should impact women's health by reaching those who are marginalized and otherwise do not benefit from preventive services. By improving the way we manage information should also lead to increased knowledge and behavioral practices.

Ultimately, the future of immunization will hinge upon how well we leverage our partnerships to reduce the inequities in available technologies. New vaccines must be made available to those who need them most. Within the next 10 years as many as 10 new vaccines may become available, including vaccines for human immunodeficiency and human papilloma virus infections. As these vaccines are introduced, PAHO's role will be to ensure that these vaccines are made available in a sustainable fashion to those who need them most, in particular the poor, the underserved, and the marginalized populations of our hemisphere.



Jon Kim Andrus, M.D.
Chief, Immunization Unit
Pan American Health Organization

Session 1
Disease Control and Eradication

Rubella Elimination in the Americas

Eliminating Rubella and Congenital Rubella Syndrome in the Americas: An Initiative in Progress

Castillo-Solórzano C[1], de Filippis AMB,[1], Andrus JK[1]

Introduction:

At its meeting in September 2003, the 44th Directing Council of the Pan American Health Organization (PAHO) adopted a resolution to eliminate rubella and congenital rubella syndrome (CRS) by 2010 and urged member countries to prepare national plans of action in support for that objective.

Objective:

Analyze and point out advances made in strategies to eliminate rubella and CRS.

Methodology:

A review was performed of vaccination coverage levels and the changes in the epidemiological characteristics of rubella and CRS notified by countries that conducted vaccination campaigns to eliminate rubella. Important lessons learned from adult vaccination campaigns were identified. Data from the integrated measles and rubella surveillance system were analyzed, as were indicators of the Measles Elimination Surveillance System (MESS). To consolidate a Regional plan of action for eliminating rubella and CRS, each country provided PAHO with data about their plans of action.

Status of immunization activities for rubella and CRS elimination by country, September 2004

Results:

The elimination of rubella and CRS in the Americas has been defined as the successful interruption of endemic transmission of rubella in all the countries without the emergence of CRS cases associated with endemic transmission. As of July 2004, approximately 97% of children in the Region of the Americas have had access to the combination measles, mumps and rubella vaccine (MMR). Only Haiti has yet to include the vaccine in its vaccination schedule. In 2002, all the countries of the Region that conducted follow-up campaigns (booster vaccinations for children under 4) used the measles-rubella vaccine (MR), with over 90% coverage. Currently, 72% of the countries making up 66% of the total population of the Americas have major cohorts of adult men and women who are protected as a result of the implementation of different vaccination strategies. From 1998 to July 2004, the English-speaking Caribbean, Chile, Costa Rica, Brazil, Honduras, El Salvador, and Ecuador conducted adult vaccination campaigns, achieving coverage rates of over 95%, whereas coverage in the Caribbean reached 80%. The remaining countries plan to conduct vaccination campaigns between the latter half of 2004 and 2007 (Figure). Some technical aspects associated with the difficulties posed by adult vaccination campaigns merit special attention, such as monitoring of post-vaccination reactions, the adoption of safe immunization practices, and coordination with blood banks. Since the introduction of the vaccine and the vaccination campaigns, rubella incidence has fallen 99.5%—from 135,000 reported cases in 1998 to only 923 in 2003. Achievement of the integrated measles/rubella surveillance indicators is >80%. The cost of eliminating rubella and CRS within the next 7 years has been estimated at US $181 million. Of this, approximately $35 million (20%) will come from PAHO/WHO regular funds and donors, and the remainder, on the order of US $146 million (80%), from the countries.

Conclusions:

Results demonstrate the strategies described above are very effective in eliminating rubella, and are very feasible. These strategies are backed by political will, viable financing, technical rationality, and social acceptance. In the future, it will be critical that countries collect samples for viral isolation to document endemic transmission of the genotype of the virus, and make it possible to distinguish between endemic and imported cases.

[1]*Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., U.S.A.*

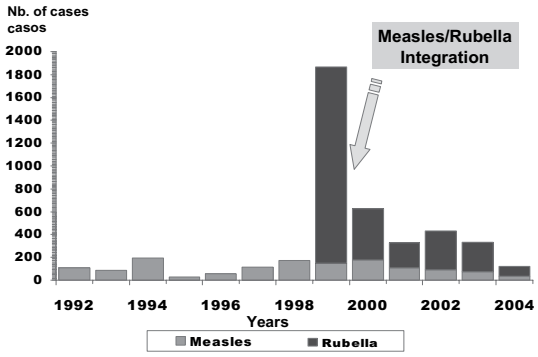
Integrated Surveillance of Measles and Rubella in Honduras

Molina IB[1]

Background:

In 1991 the National Plan for Elimination of Measles was prepared and implemented in Honduras, with establishment of surveillance of this disease through detection of suspected cases (patients with fever and eruption). In 1997 the MMR vaccine (measles, mumps, and rubella) was incorporated into the national immunization schedule for the population aged 12-23 months, and surveillance of rubella and congenital rubella syndrome was initiated at the same time. Before this integration, suspected cases of measles were detected through measles surveillance and cases of rubella were captured in another system. Starting in 2000, integration of measles and rubella surveillance was systematized at the national level, and in 2004 the National Plan for Elimination of Rubella and Congenital Rubella Syndrome was established.

Suspected measles and rubella cases recorded through the surveillance system, Honduras 1992-2004*



* Up to week #30
Source: Expanded Program on Immunization/Ministry of Health

Objective:

Demonstrate the increase in the detection of suspected cases of measles and rubella based on integration of surveillance.

Methodology:

The data obtained from surveillance of measles and rubella from July 1992 to 2004 and from integrated surveillance from July 2002 to 2004 were analyzed. The sources of the data were the Measles Elimination Surveillance System (MESS), the national warning system, and the registries of the Central Virology Laboratory. The definition of a suspected case of measles or rubella ("every case that a health worker suspects is measles or rubella") was utilized, and modifications to the flow chart for sample processing (simultaneous determination of measles IgM and rubella IgM) were established.

Results:

Starting in 1992, measles surveillance was strengthened. Up until 1998, rubella was reported as a differential diagnosis in measles surveillance. In 1999 the process of integration started and in 2000 the integration was systematized at the national level. Before that, between 1992 and 1998 the average annual number of measles cases reported was 110; after integration, between 1999 and July 2004 the average annual number of suspected cases increased to 673. The increase in the detection of cases started in 1999, a year in which a rubella outbreak was recorded. Of the total number of cases reported through the integrated surveillance system from 1999 to July 2004 (3,702), 17% (640) were registered as measles and 83% (3,062) as rubella. Of the reported cases 100% presented fever and rash; cough was the associated symptom most frequently presented (67%), followed by lymphadenopathy (62%). The investigative flow was not modified, but the processing of the samples was modified and is now centralized at the national level. Between 2002 and July 2004, 885 suspected cases of measles and rubella were reported to the integrated surveillance system, of which 36% (311) were reported as measles and the remaining 64% (574) as rubella. All cases were processed for measles IgM and rubella IgM, and seven cases of rubella, no cases of measles, and 214 cases of dengue were confirmed. Dengue continues to be the principal differential diagnosis in the integrated surveillance. To date, viral isolation has not been achieved.

Conclusions:

In accordance with the results, the integration of measles and rubella surveillance has increased the detection of suspected cases of both diseases and the sensitivity of the system. Integration has contributed to the development of rubella surveillance utilizing the infrastructure and logistics of the measles system.

[1] *Expanded Program on Immunization, Ministry of Health, Honduras*

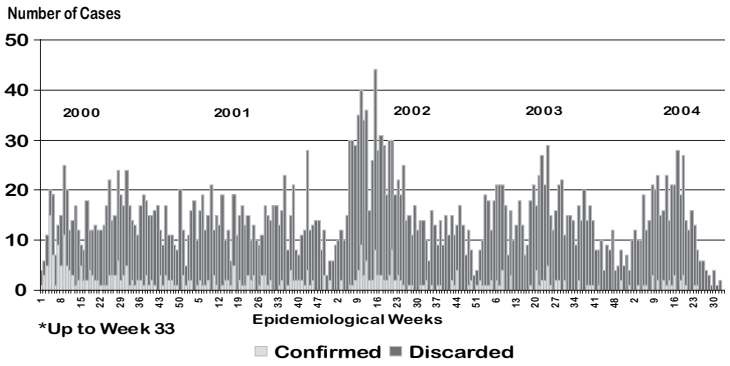
Integrated Surveillance of Measles and Rubella in Colombia, 2000-2004

Castillo JO[1], Rey GJ[1], Velandia MP[1], Pastor D[2]

Background:

In 1995 the MMR vaccine (measles-mumps-rubella) was added to the official immunization schedule, to be administered to children at 1 year of age. In 1994 the Measles Elimination Surveillance System (MESS) software was set up for measles surveillance. Today it is installed in 11 departments and four capital cities in Colombia. Before 2000, suspected cases of rubella were not recorded in the MESS database. Starting in May 2000, recommendation was made to all departments that surveillance of rubella be integrated into that of measles, using the case definition: any case with fever and generalized rash that a health worker suspects is measles or rubella. The laboratory investigation includes procedures for detection of rubella IgM and measles IgM and viral isolation from samples of urine or from the nasopharynx in every suspected case of these two diseases.

Confirmed Rubella Cases by Epidemiological Week, Colombia, 2000-2004*



Methodology:

The data from suspected and confirmed cases of rubella have been collected and analyzed at the National Institute of Health from 2000 to 2004, using MESS software.

Results:

In the period between 2000 and Week 33 of 2004 a total of 3,643 suspected cases of rubella were entered into the MESS database: 752 in 2000, 705 in 2001, 1,002 in 2002, 757 in 2003, and 427 in 2004. In the same period 9,617 suspected cases of measles were recorded: 1,301 in 2000; 920 in 2001; 5,400 in 2002; 1,382 in 2003; and 614 in 2004. Of the total, 420 cases were confirmed as rubella, 79.3% (333/420) by laboratory or epidemiological link. Of the cases confirmed as rubella, 29.3% (123/420) entered the system as suspected measles cases. During the measles outbreak in 2002, no case confirmed as measles was entered as suspected rubella. The distribution of the rubella cases by age reveals that 35% were aged <5 years, 15.5% from 5-14 years, 35% from 15-24 years, 14% from 25-34 years, and 5% >35 years old. The proportion of cases in men was similar to that of women (52.8% vs. 47.2%). In the past four years, 78% (25/32) departments and the Capital District have reported confirmed cases of rubella. The principal outbreaks occurred in departments bordering on neighboring countries (Ecuador and Venezuela). To date, it has not been possible to isolate rubella virus in the country. With respect to the sensitivity of the integrated system, in 2002 16% and in 2001 43% of the cases captured by MESS were suspected rubella cases. Furthermore, MESS captured between 45% and 62% of the cases of rubella reported by the National Public Health Surveillance System. The surveillance indicators in suspected rubella cases reveal that in the period studied, timely investigation of cases was not achieved (it ranged from 46% to 65%), nor was timely shipment of samples to the laboratory, which ranged between 71% and 76%. The proportion of cases with an adequate sample ranged from 86% to 2002 and 97% in 2004. Timely laboratory results increased from 80% in 2001 to 87% in 2004.

Conclusions:

With the integration of rubella and measles surveillance, laboratory investigation of rubella cases has improved. With the data from the integrated surveillance system, continuous rubella circulation has been verified in the country. Intensification of rubella surveillance will be developed with the Plan of Action for the Elimination of Rubella and Congenital Rubella Syndrome, which will be implemented in Colombia over 2004 to 2010.

[1] *National Institute of Health, Bogotá, Colombia*
[2] *Immunization Unit/FCH, Pan American Health Organization, Colombia*

Strengthening Congenital Rubella Syndrome Surveillance in the Americas

Castillo-Solórzano C[1], de Filippis AMB[1], Andrus JK[1]

Introduction:

Congenital rubella syndrome (CRS) is associated with high morbidity and mortality, as well as high costs. Although the clinical description of CRS was known, its reporting was passive, so data on its incidence are limited. The number of countries/territories in the Americas that report cases of CRS increased from 18 (13%) in 1998 to all (100%) in 2003, with 44 cases in 1998, 63 in 1999, 90 in 2000, 41 in 2001, 24 in 2002, and 14 in 2003. These data show that surveillance of CRS is incomplete, with reporting of less than 1% of the estimated number of cases. It was calculated that in the Americas, prior to the introduction of the vaccine, some 20,000 children were born with CRS every year. Due to the underreporting of this disease, it is probable that this figure represents only the tip of the iceberg. Until 1999, the reports concerning CRS came from the English-speaking Caribbean. Between 1997 and 1999, 33 cases of CRS were reported; in 1999 two cases were reported; and between 2000 and 2003, none were reported.

Argentina, Brazil, Costa Rica, El Salvador, and Peru have conducted operations research aimed at identifying procedures that improve surveillance of CRS. They conducted retrospective studies in hospitals for children and obstetrics, among students in special schools for the deaf and blind, and in the community, in order to identify children with probable or confirmed CRS. The goal of rubella and CRS elimination by 2010 in the Americas requires strengthening surveillance of CRS to determine the disease burden and the impact of the vaccination strategies.

Objective:

Presentation of tools that help strengthen surveillance and capture cases.

Monitoring of surveillance of CRS:

The countries that reported increased number of CRS cases were Chile (since 2001 there have been no confirmed cases); Costa Rica, 49 cases in 2000 (0.5 per 1,000 live births) (since 2001 no cases have been reported); and Brazil, 78 cases in 2000 (0.02 per 1,000 live births). Incidence rates vary by geographical location within countries. In the city of Río Branco in the northeastern part of Brazil, the incidence in 2000 was 0.6 per 1,000 live births, 30 times the national average.

In 2004 a panel of experts on rubella and a PAHO working group established suggestions for strengthening surveillance of CRS. These encompass the following:

- Case definition: In the context of elimination it is important to have a sensitive definition for reporting a suspected case of CRS and initiate the corresponding investigation. *A health care worker at any level of the health system should suspect the presence of CRS in an infant: 1) if one or more of the following disorders are detected at birth: congenital cataracts, congenital cardiac defects, purpura, deafness, or 2) an infant's mother was known to have had laboratory-confirmed or suspected rubella infection during pregnancy.* In turn, the suspected cases of CRS should be tested serologically in order to determine the presence of IgM antibodies against rubella, and be classified in accordance with a standardized case definition as: confirmed CRS, clinically confirmed as CRS (without sample for laboratory diagnosis), congenital infection, or negative.
- Laboratory diagnosis: In the case of characteristic but nonspecific clinical signs of CRS, the laboratory diagnosis becomes critical for confirming or ruling out CRS. This diagnosis can be by serology or viral isolation.
- Indicators and information system: For monitoring progress in the surveillance the following indicators have been proposed: 1) proportion of suspected cases of CRS with samples and ruled out by laboratory, and 2) proportion of suspected cases with samples for viral isolation. An information system has been developed for surveillance of CRS and monitoring of women with rubella during pregnancy. Surveillance of CRS should be strengthened in the Americas through collaboration between the Regional Perinatal Information System of the Latin American Center for Perinatology and Human Development and the Latin American Collaborative Study of Congenital Malformations.
- Reference guides: A field guide for implementation of epidemiological surveillance and a manual for early detection of suspected cases of CRS have been prepared, as well as generic protocols for retrospective detection of cases of CRS, estimation of the burden and costs of the disease, the cost-benefit ratio, and the effectiveness of the strategy of vaccination for elimination.

Conclusions:

The initiative to eliminate rubella and CRS will continue to require strengthening of the CRS surveillance system.

[1] *Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., U.S.A.*

The Current Epidemiology of Rubella and Congenital Rubella Syndrome in the United States

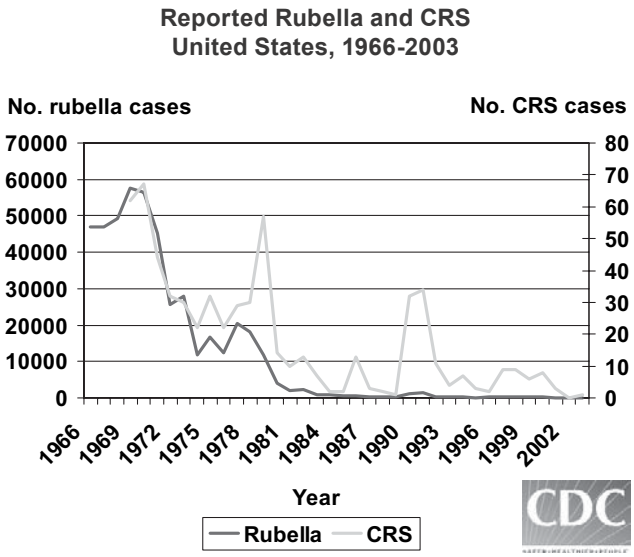
Reef S[1], Redd S[1], Abernathy E[1], Icenogle J[1]

Introduction:

The United States of America has established a goal for eliminating indigenous rubella and congenital rubella syndrome (CRS) by the year 2010. Reported rubella and CRS cases as well as laboratory data in the U.S. were analyzed to monitor progress toward disease elimination goals and to describe rubella and CRS epidemiology.

Methodology:

Data were analyzed from rubella cases classified as confirmed or unknown that were reported to the National Notifiable Diseases Surveillance System (NNDSS). Rubella cases are confirmed either by laboratory testing or epidemiological linkage. For CRS cases, data reported to the National Congenital Rubella Syndrome Registry (NCRSR), a passive surveillance system, were analyzed. Before 1997, only race/ethnicity data were collected on rubella cases. Since 1997, data were also collected on country of origin.



Results:

The number of reported rubella cases has declined significantly, from 57,600 in 1969 to the record low of eight cases in 2003. Since 2000, the annual incidence of rubella has been less than one reported case per million population. The number of reported CRS cases declined from 67 in 1970 to zero in 2002; one CRS case was reported in 2003 (0.025 per 100,000 live births). Since the start of the vaccination program, there has been a significant reduction in rubella incidence in all age groups; however, since 1994, the incidence among adults aged 15-49 years has been higher than among children aged 0–14 years. Data are available on country of origin for 75% of confirmed rubella cases reported between 1992 to 2001. Between 1998 and 1999, more than 90% of cases reporting country of origin were born in Mexico, Central America, and the Caribbean. Between 2001 and 2004, of the 44 cases with known country of origin, 23 (52%) were born outside the U.S., with only 10 cases from the Western Hemisphere (Mexico, 4; Dominican Republic, 2; Jamaica, 2; and one each from Bolivia and Trinidad and Tobago). The last confirmed case in 2004 was in week 20.

Conclusion:

Rubella and CRS have declined dramatically since the implementation of a rubella vaccination program, with the lowest number of rubella cases recorded in the U.S. occurring in 2003. With this continuing downward trend, these record low numbers of reported cases may be insufficient to support ongoing endemic transmission of rubella virus.

[1] *Centers for Disease Control and Prevention, Atlanta, USA*

Adult Vaccination: Experiences in El Salvador

Chevez AE[1], de Orellana C[1], Chipagua L[1], Castillo-Solórzano C[2]

Background:

Within the framework of the commitment to eliminate rubella and CRS, El Salvador identified the disease burden of congenital rubella syndrome (CRS) and vaccinated 2,796,301 men and women between the ages of 15 and 39. This campaign was launched as part of the second annual Vaccination Week in the Americas, ending on 31 May 2004. This summary presents the results of the campaign and the lessons learned.

Methodology:

The first two weeks of the vaccination campaign focused on captive populations (workplaces, education centers, and heavily-trafficked locations), followed by door-to-door vaccination. During the weekends of the campaign, staff was added at vaccination centers. A plan for campaign advertising and social mobilization provided campaign publicity and included a second intiative aimed at mobilizing volunteer blood donors. Responsibility for the campaign's community outreach activities fell to the 27 Basic Health Systems (SIBASI-Sistemas Básicos de Salud) operating in the country's 262 municipalities. At the end of the campaign, vaccination coverage was reviewed by age group and gender. A quality evaluation component was then applied to identify differences between child and adult vaccination campaigns. This component focused on obtaining feedback from participating campaign technical staff in all 27 SIBASI systems.

Results:

The final coverage analysis revealed 99% coverage; by gender, 99% coverage of women and 93% coverage of men; by age group, 100% coverage of the population between the ages of 15-19 years, 93% between the ages of 20-24 years, 76% between the ages of 25-30 years, 88% between the ages of 30-34 years, and 100% between the ages of 35-39 years. All SIBASIs achieved coverage levels of 95%. A total of 380 rapid coverage monitoring exercises were conducted and demonstrated coverage levels in excess of 95%. Although no serious adverse events have been reported, 909 women unaware of their pregnancy status were vaccinated during the campaign and are being monitored. Over the 30-day period of sample collection, 17% (59/341) of these women were found to be susceptible. With regard to the campaign, it was found that important differences exist between vaccination campaigns geared to children and those targeting adolescents and adults. Public service announcements through media and programs that are not traditionally used in children vaccination campaigns play a vital role in the success of adult vaccination campaigns. Moreover, messages should focus on encouraging men to get vaccinated, as there is no vaccination "culture" in this population group eventhough the disease is prevalent among men. The "door-to-door" vaccination strategy that is so effective in immunizing children must also be tailored to work for adults. These efforts need to take place when adults are at home—in the evening, at night, or on weekends.

Conclusions:

Adult vaccination is qualitatively different from child vaccination. It is feasible to achieve high coverage levels with vaccination campaigns that target adolescents and adults. Moreover, this campaign has yielded a number of lessons that can be applied to future vaccination campaigns targeting the adult population (hepatitis B, influenza, and human papilloma virus).

[1] *Ministry of Health, El Salvador*
[2] *Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., U.S.A.*

Vaccination in Men and Women for the Elimination of Rubella and Congenital Rubella Syndrome in Ecuador

Váscones N[1], Pinos J[1], Flores L[1], Escalante I[1], Grijalva MC[1], Franc F[1], Pazos M[1], Carvajal A[1], Rodríguez R[2], Castillo-Solórzano C[3]

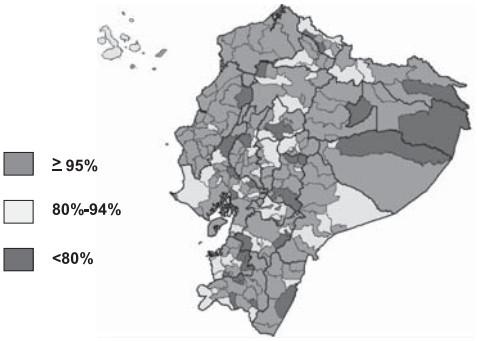
Background:

In compliance with the Resolution of the 44th Directing Council of PAHO/WHO, Ecuador has undertaken actions aimed at eliminating rubella and preventing congenital rubella syndrome (CRS). The Resolution, signed by the Ministers of Health, set the goal of elimination by 2010. The campaign's first phase, vaccination with measles-rubella (MR) vaccine of children aged <14 years as of 2002, was conducted from 3 May to 5 June 2004, within the framework of the Vaccination Week in the Americas. The goal was to vaccinate 2,469,877 men and 2,347,727 women from 16-39 years with the MR vaccine, thus also helping to consolidate the eradication of measles.

Objective:

This abstract presents the results of the campaign and the lessons learned from the organizing of adult vaccination.

Cantons per MR Coverage Range May 2004 Campaign, Ecuador



Source: Expanded Program on Immunization, Ministry of Health

Methodology:

Reports on administrative coverage tabulated by canton, gender, and age group (16-19, 20-24, 25-29, 30-34, and 35-39 years) were reviewed. The registry made it possible to assign the dose of vaccine according to the canton of origin. In 2,006 health units, 6,722 rapid coverage monitorings (RCM) were carried out; in eight provinces 3,447 surveys were collected to evaluate mass communication; and 1,009 vaccinated women who were unaware of their pregnancy status at the time of the campaign are being monitored.

Results:

National coverage reached 103.2%: 101% for men and 105% for women. The RCM showed that this percentage is elevated due to underestimation of the projection of the target population, or because of inclusion of individuals outside the target age groups. In order to avoid revaccination, it was important to insist that people carry their cards throughout May and June. Of the 22 provinces, 20 (91%) had coverage over 95%, with a disparity of 5% or more in favor of the women in 13 (59%) of the provinces. Coverages for the age groups considered were 117% (16-19 years), 91% (20-24 years), 97% (25-29 years), 93% (30-34 years), and 122% (35-39 years). In 60.8% of the cantons (132/217), coverage was 95% or more. In 10.1% of the cantons (22/217), coverage was between 90 and 94%. In accordance with the RCM, 75% of the municipalities achieved coverage over 95%. Wherever this coverage was not reached, the information collected was used to identify groups of susceptibles and to conduct mop-up operations, as well as for review of consistency with the administrative data reported. The laboratory results permitted detection and monitoring of 13% of susceptible women who were unaware of their pregnancy status at the time of vaccination. According to the mass communication evaluation, the most frequent sources of information were health units (44.5%), television (41.4%), radio (25.4%), school communication (18.4%), broadcasting via loudspeakers (17%), and newspapers (12.9%). The political support and decisiveness expressed in the presidential decree that urged the Government, the private sector, and society in general to participate in the vaccination was fundamental to the success of the campaign. Also essential are timely preparation and execution of each component programmed, financing in particular, so that the strategy of mass communication can be properly carried out. Another critical component is the establishment of partnerships that permit access to community leaders, journalists, and health professionals. These relationships facilitate dissemination of clear educational messages, and prevent distortions and distribution of confusing information. Finally, the information system should report coverage by the political unit linked to the local authority and allow assignment of the doses administered to the canton of origin.

Conclusions:

The strategy applied and the coverage attained will make it possible to interrupt endemic rubella transmission in Ecuador.

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Follow-up Study of Women Who Were Unknowingly Pregnant and Vaccinated against Rubella in Brazil, 2001–2002

Soares RC[1], Toscano C[2], Siqueira MM[3], Will RM[4], Sato H[4], Fagundes MF[4], Rodrigues RCM[4], Barbosa TC[4], Sá GRS[4], Figueiredo MF[4], Morhdieck R[4], Castillo-Solórzano C[5], Maia MLS[1], Camacho LA[6], Luna E[1]

Background:

Congenital rubella syndrome (CRS), caused by the infection of susceptible pregnant women with rubella virus, is associated with congenital defects, such as hearing deficiency, congenital cataracts, and congenital heart disease. Considering the burden and severity of CRS, the countries of the Region of the Americas decided in 2003 to pursue the goal of rubella and CRS elimination.

A countrywide vaccination campaign was conducted in Brazil in 2001 and 2002 with the goal of immunizing over 30 million women aged 12-39 years, achieving an overall coverage of 95%. The possibility of vaccinating women who were unaware of their pregnancy status prompted an initiative to identify and follow-up pregnant women inadvertently vaccinated (PWIV) against rubella.

Objectives:

This study aims to describe the immunological status of these women and ascertain vaccine virus infection in neonates born to women susceptible to rubella infection at the time of vaccination. It will also estimate the risk of congenital rubella infection (CRI) and CRS associated with the vaccine virus in neonates.

Methodology:

This was a prospective cohort study in which rates of CRI and CRS due to the vaccine virus were compared with data from a historic control group. The study was conducted in seven states of the country, which comprise 70% of the national population: Rio de Janeiro, São Paulo, Pernambuco, Minas Gerais, Bahia, Rio Grande do Sul, and Goiás. Laboratory methods included serum enzyme immunoelectrophoresis for rubella IgM and IgG detection, PCR for virus detection, and genomic sequencing for virus differentiation. A susceptible woman was defined as a PWIV who was tested for rubella within 30 days after vaccination and presented negative IgG and either positive or negative IgM. CRI associated with vaccination was defined as a newborn of a susceptible PWIV presenting with positive rubella IgM but without CRS syndrome. CRS associated with vaccination was defined as a newborn of a susceptible PWIV who fulfilled the World Health Organization criteria for CRS, presenting with positive rubella IgM and having the vaccine virus identified. All newborns were clinically evaluated following standardized protocol.

Results:

In the seven states, a total of 15,068,225 women were vaccinated during the campaign, of whom 18,669 were pregnant at the time of vaccination. Among the pregnant women, 2,263 (13%) were considered susceptible. Follow-up of 1,730 newborns (77%) was conducted. Of these, 1,667 (96%) were IgM negative, and 63 (4%) were IgM positive and had CRI associated with vaccination. Pregnancy outcomes of 1,571 pregnancies in five States included 80 abortions (5%) and 11 stillbirths (1%), significantly lower than abortion and stillbirth historical rates from national records (15% and 8%, respectively). Sixteen of 63 CRI cases (26%) were lost to initial follow-up and are currently under investigation. Clinical data were available for 47 of the 63 CRI cases (74.6%). Of these, five (11%) presented low birth weight; four (8%) were preterm; one (2%) presented inter-atrium communication, which is not compatible with CRS definitions; and one (2%) presented cardiac murmur at 35 days of life, which is also not compatible with CRS definitions. Newborns were followed until 18 months of age and no CRS cases have been identified.

Conclusions:

The rate of PWIV against rubella in Brazil was 1.27 per 1,000 women. Rates of abortion, stillbirth, preterm birth, and congenital malformations were lower than historic rates. Although further analyses are being conducted, preliminary data indicate that the rate of CRI associated with vaccination was 4% and no CRS cases were detected. This is the largest follow-up study on PWIV against rubella to date, and its results may be useful for countries planning vaccination activities with the goal of rubella and CRS elimination.

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Determination of the Cost-Benefit of MR Vaccination and Identification of Defects Associated with CRS: Pilot Study in Morelos, Mexico

Nava Frías M[1], Gasman N[1], López E[1], Ortega-Sánchez I[2], López A[1], Ramón-Rivera T[1], Bloom S[2], Castillo-Solórzano C[3], Reef S[2], Rodríguez Suárez RS[1]

Background:

Economic studies start out with the premise of a "lack of resources" and the need to optimize these resources by maximizing benefits and minimizing investment. During the period 1998-1999, several countries of the Hemisphere reported cases and outbreaks of measles, which primarily struck susceptible people in the 20-39 year age group. The risk of a reintroduction of the measles virus and the need to prevent congenital rubella syndrome (CRS) in Mexico, led the National Health System to begin vaccinating health workers against measles and rubella in May 2000. Indiscriminate vaccination of children aged <5 years, as well as military personnel and teachers was conducted. Little is known, however, about the real cost and cost-benefit of these interventions or other potential rubella vaccination strategies.

Objective:

This study aims to analyze the costs and benefits of implementing a vaccination program for accelerated rubella control and CRS prevention in Morelos, Mexico.

Methodology:

A sufficient number of events per year were analyzed to obtain a cost-benefit ratio for the vaccination of people identified by the Serological Survey as susceptible to infection. Data on medical costs, obtained through a review of the clinical files, were also examined. Treatment algorithms were designed by type of defect associated with CRS, and the estimated cost of the vaccination programs was analyzed by measuring the time-cost of vaccination. Two methodologies were used to determine the **cost of vaccination**: 1) *Prospective analysis*, through a shadow study of vaccination activity targeting health workers in 75 health service units in Morelos during the second National Health Week in 2000: 22 trained observers measured the time it took to vaccinate subjects, the waiting time to receive the vaccine, medical and nonmedical supplies, the facilities, equipment, and other resources used in vaccination activities; and 2) *Retrospective analysis,* to estimate the average historical cost of the resources used in vaccination, based primarily on resource use and productivity reports from district, municipality, and State medical and administrative authorities. The **cost of the birth defects associated with CRS** was calculated through *prospective analysis*, based on consultations with experts in the management of patients with CRS-related defects (i.e., persistence of ductus arterious/PDA, hearing loss, and cataracts) and personal interviews. Treatment algorithms were developed for each of these birth defects. For the *retrospective analysis*, a representative sample of 330 files was obtained from the different institutions of the Ministry of Health that treat patients with these defects, and a program of care, from diagnosis to treatment and rehabilitation, was designed.

Results:

Most of the simple strategies are cost-saving and prevent a substantial number of rubella and CRS cases. According to the prospective analysis, the total cost of standard vaccination was $81,502.10, and the total historical cost, $44,060.03. The number of events required to obtain an economic benefit ranged from less than one event in the case of PDA, estimated prospectively, to almost nine for rubella, calculated using the historical method (Table).

Diagnosis	Standard Cost	Sufficient Event/Year to obtain an Economic Benefit (Standard Cost)	Historical Cost	Sufficient Event to obtain an Economic Benefit (Historical Cost)
Cataracts	$16,912.44	2.32	$16,912.44	4.82
Hearing Loss	$53,323.06	0.73	$13,323.06	1.53
PDA	$67,112.49	0.58	$67,112.49	1.21
Rubella	$9,262.76	4.23	$9,262.76	8.80

Conclusions:

The financing methodologies used for the administration of the measles-rubella (MR) vaccine measure the same variables from different perspectives. The cost of vaccinating the population versus the cost of treating CRS was analyzed. The cost-benefit of investing in a vaccination strategy exceeds the cost of treating the syndrome and its complications. Both the estimated historical and prospective costs of vaccination meet the conditions for cost-effectiveness and cost-savings, especially when the MR combination vaccine is used.

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Session 1
Disease Control and Eradication

Measles Elimination in the Americas

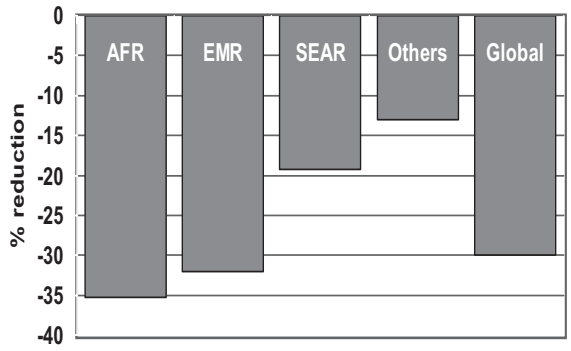
Progress Toward the 2005 Global Measles Mortality Reduction Goal

Hersh B[1], McFarland J[2], Wolfson L[1], Featherstone D[1], Hoekstra E[2], Detiger E[2], Okwo-Bele JM[2], Carrasco P[1], Bilous J[1]

Introduction:

In May 2002, the United Nations General Assembly Special Session on Children (UNGASS) established a goal to reduce global measles deaths by 50% by the end of year 2005, compared to 1999 levels. In May 2003, the 56th World Health Assembly adopted a resolution fully endorsing the UNGASS goal and recommending full implementation of the World Health Organization (WHO)/United Nations Children's Fund (UNICEF) comprehensive strategy for sustainable measles mortality reduction.

Percent reduction in estimated measles deaths by WHO region between 1999 and 2002



Methodology:

Global and regional measles vaccination coverage data and regional measles mortality estimates were reviewed.

Results:

The 2002 WHO/UNICEF global estimate of measles vaccination coverage among children under 1 year of age was 73%. Coverage varied substantially by WHO region: the Americas, 91%; Europe, 89%; Eastern Mediterranean, 73%; Western Pacific, 71%; South-East Asia, 70%; and Africa, 59%. In 2002, 163 countries (85%) offered children a second opportunity for measles immunization. From 1999 to 2002, over 200 million children in the 45 African and South-East Asian countries that are a priority for WHO/UNICEF received measles immunization through supplementary immunization activities. These accelerated activities have resulted in a significant reduction in estimated global measles deaths. Overall, global measles mortality decreased by 29% during this period, from 869,000 estimated deaths to 614,000. The largest gains were seen in the Africa Region, where measles deaths decreased by 35% (from 482,000 estimated deaths to 312,000) and accounted for 67% of the global reduction.

Conclusions:

Despite the availability of a safe, effective and inexpensive measles vaccine for over 40 years, measles continues to kill hundreds of thousands of young children each year. To achieve the 2005 global measles mortality reduction goal, increased efforts are needed to prevent the accumulation of children susceptible to measles by increasing routine measles vaccination coverage, ensure that all children receive a second opportunity for measles immunization, and strengthen measles surveillance in the 45 priority countries.

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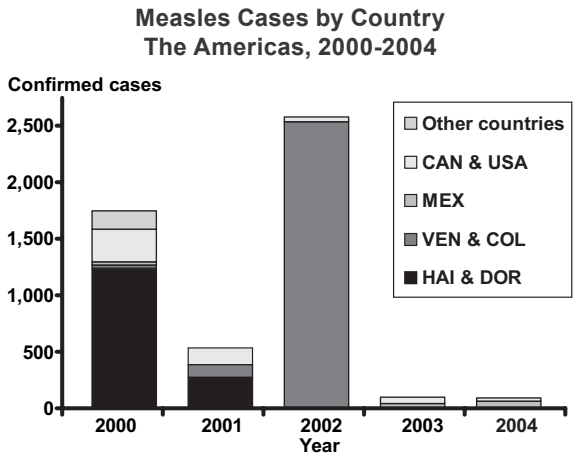
Measles Elimination in the Americas: Update and Issues Regarding Surveillance Sensitivity

Vicari A[1], *Dietz V*[2], *Andrus JK*[1]

Introduction:

In 1994, the health ministries of the countries of the Americas established the goal of measles elimination. Since 2002, measles outbreaks of more than 100 cases occurred in only three countries—Venezuela, Colombia and Mexico. Such outbreaks followed the importation of measles virus from Europe and Asia. As long as the measles virus is prevalent in other regions of the world, a highly sensitive surveillance system for identifying all cases is critical for sustaining past achievements and for providing proof of measles virus elimination in the Region of the Americas. This paper provides an update on the progress toward regional measles elimination and reports on research activities to identify an indicator of surveillance sensitivity (i.e., the capacity of a surveillance system to identify a sufficient number of suspect cases).



Methodology:

Information on suspected cases and vaccination coverage data were obtained from country reports; census data were obtained from the Pan American Health Organization's Regional Core Health Data System. Rates of patients with febrile and eruptive illnesses that were not confirmed as having measles or rubella were calculated at subregional and national levels for four different years (2000–2003), stratified by six age groups (<1 year, 1–4 years, 5–14 years, 15–44 years, 45–64 years, >65 years). A nonconfirmed suspected case is defined as a patient who met the surveillance case definition (any patient for whom a health care provider suspected either measles or rubella) and who was laboratory-negative for measles, rubella, and dengue.

Results:

Between January 2000 and August 2004, 5,078 measles cases were confirmed in the Americas (Figure). In comparison, 549,356 cases had been confirmed during the period 1990–1994, a decrease of more than 99%. Since 2000, most of the cases in the Region occurred during a 2000 outbreak on the island of Hispaniola (1,752, or 30% of cases), and during a 2001–2002 outbreak in Venezuela and Colombia (2,654, or 52% of cases). As with the outbreak in 2001–2002, the cases reported in 2003–2004 were related to the importation of measles virus from other regions of the world. As of 4 September 2004, 93 cases were confirmed in three countries: Canada, 7; Mexico, 64; and the United States, 22. In 2003, the median measles vaccine coverage at country level was 94% (range = 52%–99%). This coverage likely increased in April–May 2004, when more than 40 million people were vaccinated during follow-up campaigns in 35 countries.

Preliminary results show that age greatly influences the rate of febrile, eruptive illnesses. Annual rates were 40.6 cases per 100,000 children <1 year (infants, 95% confidence interval [CI] = 36.1–45.6), 12.1 per 100,000 children aged 1–4 years (95% CI = 10.8–13.4), 6.7 per 100,000 children aged 5–14 years (95% CI = 6.1–7.4), and less than 1.7 per 100,000 people aged ≥15 years (95% CI = 0.1–2.0). Whereas this pattern was consistent across the years, great variation existed among subregions and countries. For instance, the median annual rate for infants was 51.5 per 100,000 for the Andean countries (range = 26.5–137.0), but was 26.0 for the countries of the Southern Cone (95% CI = 6.4–67.1).

Conclusions:

Over the past decade, notable successes have been achieved towards measles elimination in the Americas. However, recent outbreaks show the omnipresent threat of virus importation from other regions of the world. In this context, in addition to maintaining high measles vaccine coverage, the surveillance of febrile and eruptive illnesses is critical for the timely detection of cases. This highlights the importance of establishing a surveillance indicator to assess the adequacy of surveillance at all levels. Preliminary results suggest that both age and place of residence greatly influence the rate of such illnesses; further analysis is required to determine if a minimum baseline rate can be identified as a surveillance indicator for standardized use in the Region.

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Mexico's Experience in Measles Elimination

Rodríguez Suárez RS[1]

Background:

Up to the early 1970's, measles in Mexico exhibited an endemic-epidemic cyclical pattern. With the implementation of the National Immunization Program in 1973, permanent vaccination efforts were expanded to include all of the nation's territory, and mass campaigns were conducted that lowered the incidence of measles. Nevertheless, in late 1989 and early 1990, Mexico was hit by a serious measles epidemic, with 80 cases per 100,000 inhabitants and 5,899 deaths. The most important lesson learned from this epidemic was the need to administer a second dose of measles vaccine. In 1991, this second dose was added to the National Vaccination Card, targeting its administration to all children aged 6 years or entering primary school. In 1993, the entire population aged <15 years was vaccinated, regardless of immunization history, to bring down the number of susceptibles, achieving a coverage of over 96%. Data from the epidemiological surveillance showed that transmission of the wild measles virus was interrupted in Mexico in 1997. Nonetheless, there were measles virus importations to Mexico on three subsequent occasions: in 2000 (30 laboratory-confirmed cases), 2001 (3), and 2003 (44). This abstract describes the characteristics of this last importation and the control measures adopted.

Methodology:

Federal, state, and local authorities took coordinated actions to control the outbreak in the affected areas, which involved all health facilities. Actions included 1) clinical and epidemiological case studies; 2) active case-finding in the vicinity of the patient's residence and the places where confirmed cases were known to have been during the 21-day transmission period, as well as workplaces, day-care centers, open-air markets, and schools; 3) retrospective case-finding in health units; 4) concentrated vaccination activities in a 49-block area around the patient's residence, and vaccination of infants aged 6-11 months and of the population aged 13-39 years; 5) vaccination of population groups at greater risk of infection, such as high school and university instructors and students, and people employed in the tourism industry; and 6) rapid coverage monitoring. The serological diagnosis was obtained in Mexico's national epidemiological reference laboratories using the ELISA technique for the detection of IgM specific to measles virus. In addition, pharyngeal swabs and urine samples were taken for culture and PCR analysis. In 1998, the MMR vaccine (measles-mumps-rubella) was added to the basic immunization schedule for children, followed by the MR vaccine (measles-rubella) in 2000 for adolescents and adults. In 1998 and the 2002-2003 period, vaccination campaigns were conducted that indiscriminately targeted the population aged 1-4 years in an effort to bring down the number of susceptibles caused by vaccine failure or deficiencies in program coverage. Vaccination campaigns were also carried out in areas with less than 95% coverage. In 2000, there was a national serological survey to determine the prevalence of antibodies against the measles virus in children aged 1-9 years (6,270 samples).

Results:

Between April 2003 and July 2004, 108 new cases of measles were reported to the Epidemiological Surveillance System for Exanthematous Febrile Diseases (EFD), 44 of which occurred in 2003 and 64 in 2004 (as of epidemiological week 30). The first known case in this outbreak appeared in Mexico City, followed by confirmed cases in the Federal District, the State of Mexico, and the State of Hidalgo. The most affected group, and the one at greatest risk, was the group of young adults and children aged <1 year. Several isolates of the virus were obtained that had 100% homologous sequences, very similar to the H1 strain currently circulating in Japan. The EFD indicators of the Epidemiological Surveillance System have been kept above the minimum threshold required. As of March 2004, ongoing immunization efforts have managed to raise MMR vaccination coverage to 95.5% in children aged 1 year, and to 98.1% in children aged 1-4 years. The vaccination of schoolchildren upon entering primary school has achieved coverage of over 95%. The intensive following-up of children aged 1-4 years has achieved coverage of over 95%. The national serological survey of 2002 found seropositivity for measles of 99% (CI_{95} 98.8-99.3), with specific results of 98.3% for preschoolers (1-4 years) and 99.5% for the 5-9 year age group. There were no significant gender or urban/rural differences.

Conclusions:

The high MMR vaccination coverage in children, the use of the MR vaccine in adolescents and adults, improvements in EFD surveillance indicators, and the few cases of measles recorded in the outbreaks lead us to conclude that the measles elimination strategies adopted by Mexico allowed to interrupt the endemic transmission of this disease.

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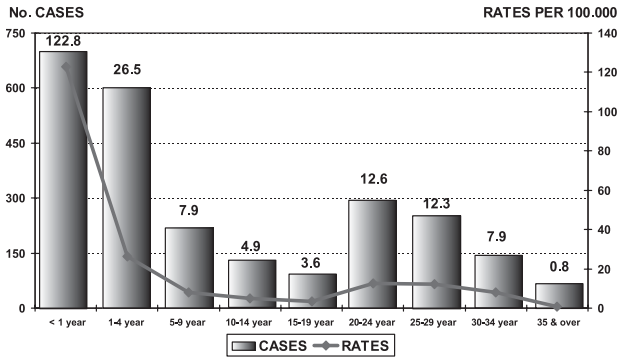
Venezuela's Experience in Measles Elimination

Narváez B[1], *Barrezueta O*[2]

Background:

Between September 2001 and November 2002, Venezuela experienced an outbreak of measles that began in the State of Falcón with the importation of a new genotype of the virus (D9) from Europe. The delay in detecting the initial case and the low levels of vaccination coverage in previous years facilitated rapid transmission of the virus to the rest of the states. Mass vaccination strategies to reach the affected age groups, together with heightened active surveillance allowed to control the outbreak. The country's last case of measles occurred on 21 November 2002.

Distribution of Confirmed Measles Cases by Age Groups and Rate per 100.000 Population Venezuela, 2001–2002



Source: EPI, Ministry of Health and Social Development

Methodology:

Active institutional and community case-finding was used for detecting and investigating cases, together with protocols for investigating outbreaks to determine the groups at risk. In November 2001, a national vaccination mop-up campaign using a combination vaccine (measles and rubella) was conducted door-to-door; the target population was children aged 6 months to 5 years. Given the behavior of the epidemic, which impacted children <1 year and >5 years, measles vaccination was expanded in March 2002 to children aged <15 years throughout the country, along with the at-risk adult population (health workers, laborers, military personnel, students, immigrants) in the affected municipalities. In 2002, joint vaccination and surveillance activities were conducted with Colombia in border areas.

Results:

During the outbreak, 8,952 suspected cases of the disease were reported, with 2,501 confirmed. Of these cases, 109 occurred in 2001 (in the States of Falcón and Zulia) and 2,392 in 2002 (in 17 of the country's 24 states). The highest incidence rate during the outbreak was seen in children <1 year, with 123 per 100,000 inhabitants, followed by the 1-4 year age group, with a rate of 27 per 100,000 (Figure). A high number of cases occurred in young adults aged 20-29 years (rate = 12). This outbreak revealed the contribution of unvaccinated health workers to the spread of measles. In January 2002, the significant commercial activity and population movements along the extensive border between Venezuela (especially the State of Zulia) and Colombia favored the export of cases to this latter country. Between November 2001 and January 2002, the national mop-up campaign vaccinated 98% of children aged 1-4 years, achieving over 95% coverage in 16 states and 65% of the municipalities. The campaign targeting children 6-11 months and 5 to 14 years, launched in March 2002, attained 100% and 81% coverage, respectively, vaccinating 71% of the at-risk population in the affected states. In addition to the vaccination activities, epidemiological surveillance was strengthened at the local levels, giving priority to the border and remote areas. While in 2001, 1,887 suspected cases of measles were investigated, in 2002 the figure soared to 7,528, or a 400% increase. The laboratory at the National Institute of Hygiene and the regional laboratories managed to process 100% of the samples from suspected measles cases.

Conclusions:

The reintroduction of measles in Venezuela and its subsequent export to Colombia is an indicator of our countries' vulnerability to importation as long as global eradication of the disease is not achieved. If importation occurs, maintaining uniform regular coverage of over 95%, strengthening local surveillance, and ensuring interinstitutional coordination for the procurement of resources will prevent transmission of the virus in the countries.

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[2] *Immunization Unit /FCH, Pan American Health Organization, Venezuela*

Colombia's Experience in Measles Elimination

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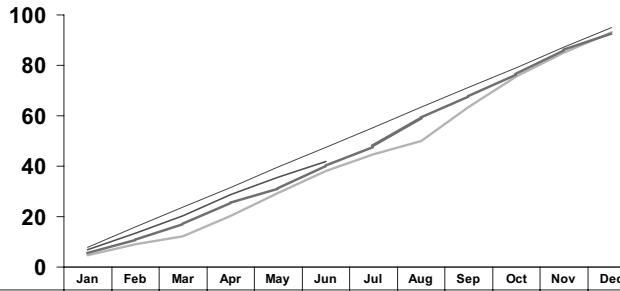
Background:

During the 1996-2001 period, less than 10 cases of measles were confirmed per year in Colombia. In 1993, a catch-up vaccination campaign was conducted, and in 1995 and 1999, several follow-up campaigns. Trivalent vaccine coverage (MMR – measles, mumps, rubella) in children under 1 year fell from 94% in 1996 to 79% in 1999, rising again to 92% in 2001. There has been no evidence of indigenous circulation of the measles virus in Colombia since 1999. However, an outbreak occurred between January and September 2002. This report describes the characteristics of this outbreak and the measures adopted.

Trivalent Vaccine Coverage Expected vs. Observed, Colombia, 2002-2004



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Expected	7.92	15.84	23.76	31.68	39.6	47.52	55.44	63.36	71.28	79.2	87.12	95.04
Observed 02	4.65	8.95	12.3	20.2	29.3	38.1	44.6	50	63.3	75.7	85	93
Observed 03	5.6	11	17.1	25.6	31.1	40.3	47.9	59.5	67.9	76.7	86.1	92.8
Observed 04	7	13.5	20.4	28.9	35.7	41.9						

Methodology:

Control of the measles epidemic in Colombia involved four broad strategies included in the containment plans of the Atlantic Coast departments and the country's 10 largest cities: i) indiscriminate vaccination of every child 6 months to 4 years of age, health workers, travelers to the Atlantic Coast border, adults up to 40 years of age in municipalities where the virus was circulating, and adults who had contacts with the tourism industry (airports, hotels, airlines, and ground transport); ii) active community and institutional searches for suspected cases of measles and rubella; iii) rapid monitoring of vaccination coverage; and iv) training and aggressive public awareness campaign to inform people about the outbreak. The data on confirmed measles cases and vaccination coverage were gathered by the National Institute of Health in the period 2002-2004 and analyzed with the Measles Elimination Surveillance System (MESS) and PAISOFT software.

Results:

Colombia experienced a measles outbreak from January to September 2002. The first case was a girl returning from a trip to Venezuela, where a measles outbreak had occurred since September 2001. In 2002, 6,404 suspected cases of measles and rubella were reported, 123 of which were laboratory-confirmed as measles, and 16 clinically confirmed. In 2003, notification declined to the anticipated levels, with reports of 2,144 suspected cases -1,378 measles cases and 766 rubella cases. As of 24 July 2004, 894 suspected cases have been reported: 527 of measles and 367 of rubella. None of the suspected cases of 2003 or 2004 was confirmed as measles. In 2004, as of week 32, 72% of the serum samples had been sent to the laboratory in a timely manner, and 55% of the cases were investigated within the first 48 hours. Trivalent vaccine coverage in children under 1 year was 93% in 2003, confirming the upward trend observed since 2000. According to the coverage report, the cumulative coverage of 42% attained as of June 2004 was lower than the expected 47% (Figure). The percentage of municipalities reporting trivalent vaccine coverage equal to or greater than 95% was 32% in 2003. The municipal coverage data have been affected by deficient population denominators, which are projections from the 1993 census and do not take into account the movements of people displaced by armed conflicts or unemployment.

Conclusions:

The strategies employed in Colombia to contain the measles outbreak imported from Venezuela in January 2002 proved effective in interrupting the circulation of the virus. Epidemiological surveillance indicates that there has been no circulation of the virus since September 2002. However, given the pattern of the disease in other regions of the world, and specifically in Mexico on the American continent, there is a risk of future imports.

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Session 1
Disease Control and Eradication

Maintaining Polio Eradication in the Americas

Polio Eradication: Major Developments and Directions

Aylward B[1]

Introduction:

By the end of 2003, the number of polio-endemic countries in the world had been reduced from over 125 to six. However, three major developments forced the Global Polio Eradication Initiative to take new directions in 2004. First, an acute funding crisis required that international support for polio campaigns be limited to endemic countries and surrounding areas. Secondly, the suspension of the use of oral polio vaccine (OPV) in Kano, Nigeria, led to a multi-country epidemic. Finally, a World Health Organization (WHO) consultative group concluded that prevention of all paralytic polio would require the cessation of the use OPV as soon as possible after interruption of wild poliovirus transmission globally.

Methodology:

A detailed analysis of eradication data, and a broad consultative process with endemic countries, polio stakeholders, and the scientific community, was undertaken to develop a comprehensive approach to the aforementioned developments.

Results:

In January 2004, a new strategic plan for the period 2004–2008 was launched, outlining 'intensified' polio immunization campaigns (negotiated in an emergency meeting with the health ministers of the endemic countries), a revised target date of 2008 for global certification, the tools required to eventually cease OPV use, and plans for mainstreaming the eradication infrastructure and its long-term functions (e.g., biocontainment, surveillance, stockpiling).

As of 1 September 2004, the intensified effort in Asia and Egypt was on track. After a marked increase in campaign quantity and quality, polio transmission in Afghanistan, India, Pakistan, and Egypt was highly focal, with just 61 cases reported since 1 January, compared with 168 over the same period in 2003. In all four countries, mop-up campaigns were introduced to interrupt polio transmission by year-end 2004. In contrast, sub-Saharan Africa experienced epidemic polio; the number of cases in Nigeria and Niger soared to 495 (compared to 111 in 2003) and the virus spread to 12 previously polio-free countries. Although immunization resumed on 31 July 2004 in Kano, a series of massive, synchronized campaigns were scheduled to begin in late 2004 in 22 countries of west and central Africa, targeting 74 million children, to get the eradication effort in Africa back on track for its year-end 2005 target.

Conclusions:

The success of this intensified polio eradication effort now depends on: (a) direct oversight by all political, traditional, religious, and community leaders in endemic areas to ensure that every child is reached during each immunization campaign, (b) action by the international community to rapidly close the US$ 200 million funding gap for intensified eradication activities during 2004–2005, and (c) continued high-quality surveillance and routine immunization coverage in polio-free areas.

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Thirteen Years Without Poliomyelitis in the Americas

Landaverde JM[1], de Filippis AMB[1], Andrus JK[1]

Background:

The Region of the Americas was declared free from indigenous circulation of wild poliovirus in 1994, after the International Commission for the Certification of Polio Eradication met in Washington D.C., at the headquarters of the Pan American Health Organization.

Methodology:

The report of the International Commission for the Certification of Polio Eradication in America, reports from the countries, the annual reports on coverage with oral polio vaccine (OPV), the report of the Commission for Containment of Wild Poliovirus in Laboratories, and the PESS (Polio Eradication Surveillance System) database, which the countries update every week with information related to the quality of surveillance and data on the cases of acute flaccid paralyses (AFP), were reviewed.

Results:

After the last recorded case in the Region of the Americas (Peru, 1991) and Certification of Eradication, vaccination coverage with OPV3 in children under 1 year has been maintained above 85%. The proportion of municipalities with OPV3 coverage under 95% in Latin America was 46% in 2000, 44% in 2001, 44% in 2002, and 48% in 2003. The annual AFP rate per 100,000 children under 15 has remained above 1 (except in 1998); the proportion of adequate stool samples from AFP cases ranged between 68% and 82%. That rate was 79% in 2001 and 2002, and 80% in 2003. In 2000 and 2001 a polio outbreak, caused by a virus derived from the vaccine, was recorded in Haiti and the Dominican Republic (21 cases). The outbreak ended after two national vaccination campaigns in each country, using OPV. Phase I of the Plan for Containment of Wild Poliovirus in Laboratories has been implemented.

Conclusions:

The Region of the Americas continues to be free from indigenous circulation of wild polio virus, and, 13 years after achievement of eradication, surveillance of AFP remains at acceptable levels. Every year since the certification of eradication, nearly 1,400 samples from AFP cases have been analyzed and no wild poliovirus has been isolated. Analyses are being conducted to identify the districts at risk and implement vaccination activities to increase coverage as necessary.

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Acute Flaccid Paralysis in Brazil: The Quality of Surveillance

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Background:

In 1994 the Region of the Americas was certified as free from indigenous circulation of wild poliovirus. After 10 years, we continue to live with the risk of reintroduction of the virus in the Region. Taking into account the commercial and economic interaction with countries of Africa and Southeast Asia, where the wild poliovirus still circulates, and given the large number of international travelers, Brazil faces the challenge of maintaining high, uniform vaccination coverage, as well as appropriate acute flaccid paralysis (AFP) surveillance. The purpose of this analysis is to evaluate the operational situation of the AFP surveillance system in the country.

Methodology:

AFP surveillance data come from the Secretariat of Health Surveillance of the Ministry of Health of Brazil. The data for the entire country corresponding to the period between 1994 and 2004 were evaluated.

Results:

The low report rates observed during the period from 1994 to 1999 demonstrate the reduction in the sensitivity of the system. The high rotation of professionals in local levels, the low degree of integration between surveillance and care, and the loss of relative importance of AFP in contrast to other emergencies with regard to public health, combined with the false safety conferred by high vaccination coverage and the certainty of regional eradication, are some of the factors that are associated with this reduction. The activities for intensification of AFP surveillance begun in 2000 include: supervision, macro-regional training meetings, identification of reference neurologists in each state of the country, and support for offices at the local levels for sensitization of health professionals. An improvement is observed in the surveillance indicators, especially beginning in 2002 (Table).

AFP Surveillance in Brazil, 1995 to 2003

INDICATOR	MINIMUM GOAL	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004*
AFP report rate	1/100.000 < 15 years	1.0	0.8	0.8	0.8	0.7	0.8	1.0	1.3	1.2	1.2	0.4
Timely investigation	80%	91	89	87	83	90	84	85	95	96	96	98
Adequate stool sampling (two samples)	80%	53	58	44	54	56	46	51	64	69	74	74
Weekly report	80%	89	93	91	91	84	81	83	94	90	97	91

Source: COVER/CGDT/DEVEP/SVS/MS, Brazil
** Data up to Epidemiological Week 22/2004*

Conclusions:

The adequate stool sample indicator continues to offer the greatest difficulty. Parallel to surveillance activities, activities in areas considered at greatest risk of reintroducing poliovirus constitute one of the strategic objectives for the period from 2004 to 2005.

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Acute Flaccid Paralisis in Mexico: The Quality of Surveillance

Kuri Morales P[1]*, Carrión Falcón V*[1]

Background:

In 1985, in response to the initiative for eradication of circulation of wild poliovirus in the American hemisphere, epidemiological surveillance was strengthened and the criteria, concepts, and operation of the surveillance systems were standardized. The National Health System of Mexico strengthened early detection of probable cases of acute flaccid paralys (AFP) and active monitoring in the priority units of the hospital network.

Methodology:

Surveillance strategies have been implemented. They include the following: weekly negative report; active surveillance in priority units, including secondary and tertiary level hospitals and rehabilitation centers; nominal case registries; organization of national and state groups of experts to certify cases that require specialized advisory services for their final classification; epidemiological surveillance of mortality; and, finally, unconventional methods for community-based information.

Results:

During the period from 1994 to July 2004, 4,663 AFP cases have been studied, and 4,549 discarded. Of the discarded cases, 76.5% corresponded to Guillain-Barré syndrome in its different variants, including asymmetrical cases and Miller Fisher syndrome; 2.9% corresponded to transverse myelitis; 2.7% to neuroinfection; 1.3% to tumors; and 9.7% to other diagnoses. Annually, an average of 466 cases have been studied; four cases associated with the vaccine were identified and 17 were classified as compatible. The indicators established by the International Commission for the Certification of Poliomyelitis Eradication (ICCPE) in the Americas continue to be utilized for evaluation of the absence of circulation of wild poliovirus with the following results: the AFP rate has been kept between 1.26 and 1.4. Except for 1998, timely study of cases has been maintained at over 90%. Since 1997, over 85% of cases have had adequate samples. The weekly negative report of the network has continued to show figures over 80%. The number of reporting units increased from 10,779 to 17,254 and the number of priority units at the second and third levels of care increased from 628 to 905. Even when the information on second neurological evaluations carried out in the states is delayed, the timely final classification of the cases in the country has been maintained at over 80%. In addition to the indicators already mentioned, Mexico considers two additional indicators: cases with at least five stool samples from contacts, and progress in compliance with indicators.

Conclusions:

Mexico maintains its commitment at the international level, which means that in recent years intensive searches for active cases have been carried out in organizations in the country to strengthen epidemiological surveillance of AFP, and high vaccination coverage has been maintained in order to keep the national territory free from importation and help worldwide eradication of poliomyelitis.

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Acute Flaccid Paralysis in Peru: The Quality of Surveillance

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Background:

In 1988, the Office of Epidemiology of Peru's Ministry of Health set up a national epidemiological surveillance system. The system currently has 5,783 reporting units that include national institutes, hospitals, health centers and health posts. These units provide immediate reporting of diseases subject to surveillance, among them acute flaccid paralysis (AFP). The country's last confirmed case of polio occurred in 1991.

Methodology:

A review was conducted of AFP cases reported in the Polio Eradication Surveillance System database (PESS) from 1999 through week 30 of 2004, in addition to international indicators on polio eradication, case-investigation reports, and active case-finding data submitted by reporting units.

Results:

The AFP reporting rate for the period in question is >1 per 100,000 children under age 15, and the percentage of negative weekly reporting of cases investigated within 48 hours and cases for which adequate stool samples were provided is >80%. On average, the isolation rate for enteroviruses other than polio was >20%, thereby attesting to the quality of the collection, handling, and preservation of samples from the moment they are collected through their arrival at the regional reference laboratory. In 2003 and 2004, reported AFP cases numbered 82 and 56, respectively. All have been ruled out, except for 18 cases in 2004 whose laboratory results are still pending. Since 1999, active institutional and community case-finding has been conducted in selected areas. In the past two years, 8,008,172 diagnoses have been reviewed, yielding two cases of AFP, one of which has since been ruled out, while the other is still under investigation. Active community case-finding efforts resulted in 35,221 home visits, but no cases were discovered. During week 52 of 2003, one AFP case was reported in a 9-month-old child living in the Ilo district of the Department of Moquegua in southwestern Peru. This child had received three doses of OPV and exhibited agammaglobulinemia, and vaccinal poliovirus (OPV P2) was isolated with 1.2% mutation. The second stool sample, which was collected a month later, was negative. The epidemiological investigation conducted at the district level in the departments of Moquegua, Arequipa, and Tacna identified the potential circulation area. Active institutional and community case-finding were conducted in these departments. Thus, 19,687 dwellings were visited and 1,434,744 diagnoses in health facilities were reviewed, but no additional AFP cases were discovered. Additionally, 150 stool samples from contacts were collected and analyzed, but vaccinal poliovirus was not isolated. At the same time, rapid monitoring of OPV coverage in children under 5 was conducted, which revealed coverage levels of over 90%. Nevertheless, an OPV mop-up campaign was conducted in the Ilo district where the case was found.

Conclusions:

Thanks to the political and technical commitment of Peru, there has been no evidence of wild poliovirus circulation in the past 13 years. This commitment is reflected in OPV coverage rates that have remained consistently above 90%, the high quality and sensitivity of AFP surveillance as supported by indicators, the institutionalization of active case-finding and rapid coverage monitoring, and the training efforts to raise awareness among professional and non-professional health workers. The surveillance system facilitated timely detection of the AFP case in question, which was classified as vaccine-associated paralytic polio with isolation of a mutated vaccinal virus.

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Immunogenicity of the IPV Vaccine: Study in Cuba

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Background:

In the final stage of polio eradication, once the goal is achieved, it will be necessary to make decisions about polio vaccination. Although the oral polio vaccine (OPV) has been the vaccine of choice in the eradication stage, numerous considerations regarding its adverse effects necessitate the evaluation of other alternatives once the target of eradication is achieved—among them, immunization with inactivated polio vaccine (IPV). This research was conducted since there are no studies that clearly demonstrate the immunogenicity of IPV in tropical developing countries.

Methodology:

A multicenter randomized phase III trial was conducted to compare the serological immunity conferred by two vaccination series with 2 and 3 doses of IPV and to determine the immunity of the intestinal mucous membrane, using a challenge dose of trivalent oral polio vaccine (TOPV) in all study participants. A cohort of 266 infants born in Havana in 2001 was assembled. Some of the 266 children included in the study dropped out for various reasons (i.e., illness, serious adverse events, parents' unwillingness to continue participating in the study), resulting in the following groups: the first group (IPV administered at 2-4 months of age) consisted of 72 children; the second (IPV administered at 6, 10, and 14 weeks) consisted of 52 children; and the third group (no IPV administered at 6, 10, and 14 weeks) consisted of 54 children. A total of 178 children participated in the study and were randomly assigned to these three groups. Blood samples were taken to check for the antibody immediately before the first dose of vaccine was administered, and again one month after the final dose. The resulting seroconversion was determined by comparing polio antibody titers recorded before and after immunization. In order to determine how well the IPV vaccine contained the circulation of poliovirus, three serotypes of poliovirus were isolated in stool samples from the 178 children participating in the study 7 days after the challenge dose of OPV-T was administered; prior to the challenge dose, a stool sample was collected to verify that the children were not shedding poliovirus.

Results:

The seroconversion rate was 94.2%, 82.7%, and 100.0% for poliovirus 1, 2 and 3, respectively, in the group of 52 children with IPV administered at 6, 10, and 14 weeks, as opposed to 0.0%, 0.0% and 0.0% for poliovirus 1, 2 and 3, respectively, in the group of 54 children that received the doses without IPV. The seroconversion rate was 90.3%, 88.9%, and 90.3% for the polio virus 1, 2 and 3, respectively, in the group of 72 children that received doses of IPV between 2-4 months. Comparison of the seroconversion rates of the groups with 2 and 3 doses of IPV did not yield statistically significant differences ($p > 0.05$). Intestinal immunity, measured by the shedding of vaccinal poliovirus in stool indicated that samples taken prior to administering the challenge dose of OPV were negative in 100% of cases. The results of stool samples taken 7 days after the challenge dose were 96.2% positive for the group with 3 doses of IPV, 98.6% for the group with 2 doses of IPV, and 90.7% for the control group, respectively. No statistically significant differences ($p > 0.05$) were found among the three groups.

Conclusions:

The study showed a high level of seroconversion after administering 2 doses of IPV to children between 2-4 months of age, and 3 doses of IPV to children at 6, 10, and 14 weeks of age. The resulting intestinal immunity after administering IPV, evaluated indirectly through the shedding of poliovirus after a challenge dose, showed no differences with the control (unvaccinated) group.

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Containment of Wild Poliovirus in Laboratories of the Region of the Americas

Landaverde JM[1], de Filippis AMB[1], Andrus JK[1]

Background:

The world will be declared free of the transmission of wild poliovirus when the Global Commission for the Certification of the Eradication of Poliomyelitis verifies that all regions of the World Health Organization (WHO) have documented the absence of circulation of wild poliovirus for at least the last three years, and when all the wild virus in laboratories is stored under adequate conditions of biosafety (containment).

Methodology:

The resolutions adopted by the Governing Bodies of the Pan American Health Organization were reviewed, together with the report from the First Meeting of the American Regional Commission for Certification of Poliovirus Laboratory Containment and Verification of Polio-free Status (AMR RCC), held in Washington, D.C. from 22 to 23 March 2004. The reports submitted by the national committees of the countries of the Americas on the certification of wild poliovirus laboratory containment were also reviewed.

Results:

During its 126th session on 27 June 2000, the Executive Committee of the Pan American Health Organization adopted Resolution CE126.R4, recommending that the Directing Council urge the Member States to initiate "activities related to the containment of any laboratory material that may harbor specimens of wild poliovirus," in order to ensure global certification of polio eradication. The report submitted in March 2004 by the national committees for the containment of wild poliovirus, which was analyzed by the Regional Commission, indicated that 39 of the 47 countries of the Americas had submitted reports. Eight countries reported that their inventory had been completed, and the remainder reported significant progress in the preparation of the list of laboratories and in their efforts to finalize the inventory of laboratories that have or may have stored wild poliovirus or potentially infectious material.

Conclusions:

The American Regional Commission for Certification of Poliovirus Laboratory Containment and Verification of Polio-free Status (AMR RCC) has been formed, and every country in the Americas has a national committee in place for certifying laboratory containment of wild poliovirus. The AMR RCC has asked the countries to expand the terms of reference of the national committees to include not only containment-related activities, but also those that guarantee their status as countries free of the circulation of wild poliovirus.

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Polio Immunization Policy After Certification

Andrus JK[1], Landaverde JM[1], Thompson KM[2], Duintjer Tebbens R[2]

Introduction:

Development of future polio immunization policies for the period after certification of eradication largely depends upon the analysis of actual and perceived risks after interruption of wild poliovirus transmission. In this context, the risks should be analyzed as a function of the possible policy choices. Based on an analysis of the risks and strategic options (i.e., continuing the use of oral polio virus [OPV], stopping OPV immunization without inactivated polio vaccine [IPV], or switching to IPV), in September 2003, a World Health Organization (WHO) Advisory Group recommended the cessation of OPV use for routine immunization as soon as possible after the global interruption of wild poliovirus transmission.

Methodology:

The literature and reports of international meetings on polio immunization policy options were reviewed.

Results:

After interruption of wild poliovirus transmission globally, the risks of paralytic polio are vaccine-associated paralytic poliomyelitis (VAPP), long-term excretors of vaccine-derived polioviruses among individuals with primary immunodeficiency syndromes (iVDPV) outbreaks due to circulating vaccine-derived polioviruses (cVDPV), inadvertent release of wild poliovirus from an IPV production site or a laboratory, and bioterrorism. The first three risks—VAPP, iVDPV, and cVDPV—would initially be dominant, and then would decline and eventually disappear under a policy of cessation of OPV use. We expect that the risk of VAPP would disappear almost immediately and that the small risk of cVDPV would drop rapidly over a 12–60-month period. The already rare risk of iVDPVs would diminish more slowly as these individuals either die or stop excreting. The significant reduction in these risks motivates WHO's current global policy recommendation to cease OPV use after certification of eradication. Following a decision to stop routine OPV use, countries must still decide whether or not to introduce IPV. The major long-term risks from a containment breach or bioterrorism exist with both cessation of OPV use or with IPV use, although continued IPV production may present an additional risk due to the use of wild poliovirus stocks in IPV production sites. With IPV production and laboratory use of polioviruses under enhanced biosafety level 3/polio conditions after cessation of OPV use, the risk of an accident in an IPV production site or laboratory is greatly diminished. Either policy option must consider a detailed strategy for surveillance; outbreak response for the unlikely events of leakage, accidents, or bioterrorism; and vaccine stockpiling. Policy-makers must also recognize that the potential harm that a reintroduction of polioviruses would cause will grow as the population's susceptibility increases as time since cessation of OPV use increases. Other important factors, such as perception of risk, opportunity costs, and programmatic implications, as well as several critical policy questions, must also be considered by policy-makers in deciding whether or not to introduce IPV.

Conclusions:

The WHO global policy recommendation to cease OPV use as soon as possible after the global certification of interruption of wild poliovirus transmission appears to be a reasonable option. However, the countries of Latin America and the Caribbean should continue to use OPV in routine immunization programs and to maximize population immunity until polio eradication has been achieved in all parts of the world. The Pan American Health Organization agrees with WHO's policy not to universally promote the use of IPV in developing countries after certification of eradication, and recognizes that countries should make their own policy decisions based on the opportunities to use their limited resources and other factors they may wish to consider. Recognizing that new information is constantly becoming available to help inform long-term policy decisions on polio vaccines, PAHO will continue to work with WHO to review important issues and assist member states in their decision-making.

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Session 1
Disease Control and Eradication

PAHO Laboratory Network

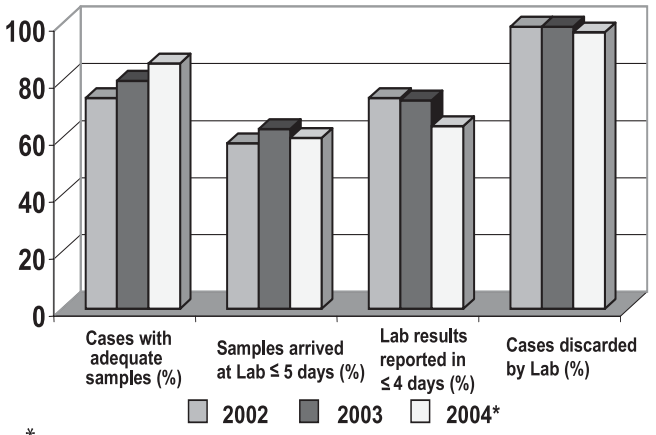
The Role of the Laboratory in Rubella/Measles Surveillance

de Filippis AMB[1], Castillo-Solórzano C[1], Pacis CL[1], Andrus JK[1]

Introduction:

To eliminate rubella, rather than developing a new specific surveillance system for the disease, an expansion of the existing measles surveillance was recommended in 1999 at the XIII Meeting of the PAHO Technical Advisory Group (TAG) on Vaccine-preventable Diseases. Rubella surveillance was integrated into the measles surveillance system to allow simultaneous laboratory analysis of serum samples from patients presenting with fever and generalized rash suspected of measles or rubella infection. As with measles, laboratory confirmation is the gold standard for the diagnosis of rubella. The procedure for a laboratory case confirmation is the same for both diseases: positive IgM antibody, virus isolation, and epidemiological linkage to a laboratory-confirmed case.

Rubella-Measles Laboratory Surveillance Indicators, Region of the Americas, 2003-2004*



*Data for 2004 includes only epidemiologic weeks 01 through 28

Methodology:

Laboratory performance and outcome indicators, which will be used to monitor the success of the measles/rubella elimination program at the country and regional levels, include suspected cases with laboratory testing, the completeness and timeliness of reporting, and the monitoring of virus genotypes. Measles/rubella virus isolation, or viral RNA detection by RT-PCR, is an important tool that permits molecular analysis by partial sequencing of the viral genome to identify the genotype circulating in the country, thereby differentiating endemic from imported cases, and wild-type virus from vaccine virus. The Pan American Health Organization is supporting these activities by identifying global, regional, and national laboratories, and monitoring by regular proficiency panels. It also supports lab accreditation, evaluation of performance indicators, on-site visits, training, meetings, and procurement of equipment and supplies as needed to ensure high-quality performance.

Results:

Standardized methods of IgM detection for measles and rubella were set up in almost all 22 national laboratories in the Region of the Americas. Virus isolation is only being performed routinely at global and regional levels, though some national laboratories have been trained in the technique. Most had problems in cell-culture maintenance; the low number of samples collected for virus isolation has been another limiting factor. According the Measles Elimination Surveillance System (MESS) data bank, during the period January 2003 to June 2004, 47,913 suspected cases were reported; 188 had laboratory confirmation for measles and 1,032 for rubella. Eighty-six percent of samples were adequate, 60% arrived at the lab in five days or less, 64% had lab results reported in four days or less, and 97% of the cases were discarded by laboratory. The few strains of rubella virus sequenced indicate the circulation of the intercontinental genotype, rubella genotype I, in the Region. During the last measles outbreak, in Mexico (March–April 2004), the H1 virus genotype from Eastern Asia was identified. The results of the last proficiency panels were 100% for all laboratories, with the exception of one country that did not report the results.

Conclusions:

Strengthening laboratory capacity for confirmation of suspected measles and rubella cases and the monitoring of virus genotypes are critical to enhancing epidemiological surveillance. Although the discard rate suggests good performance by the laboratories, low performance on other indicators shows the critical need to accelerate evaluation activity. As the prevalence of measles and rubella decreases with the high vaccination coverage, the positive predictive value of IgM testing also decreases, leading to a significant risk of false positive results. No laboratory test is 100% specific. Considering that cross reactions have been reported recently (rubella cross reacting with measles and dengue), a second sample should be collected from these cases in order to verify the occurrence of seroconversion. Additional tests for Parvovirus B19 and avidity tests should be made available in some national aboratories. The collection of specimens adequate for virus isolation should be expanded. Virus isolation needs to be established in more laboratories in order to understand the molecular epidemiology of measles and rubella transmission.

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Session 1
Disease Control and Eradication

Neonatal Tetanus Elimination

The Elimination of Neonatal Tetanus in the Americas

Landaverde JM[1], *Andrus JK*[1]

Background:

In 1989, the World Health Assembly adopted a resolution calling for the global elimination of neonatal tetanus (NNT) by 1995. The Directing Council of PAHO supported this resolution and, with a view to achieving that goal, the ministers of health of Member Countries undertook specific programming activities with the support of the Organization and several international organizations.

Methodology:

The data provided by countries in their morbidity reports and NNT case investigation forms were analyzed; these data had been captured by the countries' epidemiological surveillance systems.

Results:

Between 1988 and 2003, NNT cases in the Americas fell 95% due to implementation of the strategies recommended to target activities to "at-risk districts or municipalities." Surveillance has intensified in these areas, and all women of childbearing age have been vaccinated. With regard to cases in 2003 for which detailed information is available (47), these have occurred in migrants (21%), women who had never been vaccinated (53%), women with two or more children (55%), women over the age of 20 (55%), women who had received a prenatal check-up (34%), and women who had delivered at home (94%). Moreover, 8% of these cases occurred in indigenous groups.

Conclusions:

The strategies implemented in "at-risk districts or municipalities" have made it possible to achieve the proposed objective: the elimination of neonatal tetanus as a public health problem. The cases still occurring in the countries of the Region are found in remote municipalities with scattered populations and in rural areas. The profile of mothers with newborns who have contracted NNT suggests that many cases should have been prevented, especially those in mothers who had received a prenatal check-up, had given birth in an institutional setting, had two or more children, and who had contact with the health services but were never vaccinated. The prevention and eventual elimination of neonatal tetanus now requires a careful local analysis of the epidemiological profile and conditions in municipalities where cases are still reported so the most appropriate interventions can be effectively executed.

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Neonatal Tetanus in Haiti

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Background:

Over the past three years Haiti, with a population of approximately 8 million, has reported nearly 50% of all cases of neonatal tetanus (NNT) notified by the whole of Latin America (population approximately 355 million). Given Haiti's social and economic situation, its degree of health system development, and its epidemiological surveillance situation, the number of cases reported is probably much lower than the actual situation.

Methodology:

NNT cases are discovered through active case-finding or reports from primary care facilities. Health facilities of the Ministry of Health also report the doses of tetanus toxoid administered. Information from the National Plan for the Elimination of Maternal and Neonatal Tetanus in Haiti, prepared in 2003, are included.

Results:

The lack of a regularly operating epidemiological surveillance system in Haiti causes the annual number of reported NNT cases in the country to vary widely; so much so that in the years without active case-finding, the number of reported cases has been low -0 in 1996, 1 in 1998, and 4 in the 2003- whereas with active case-finding, the numbers are higher (33 cases reported in 1997, 38 in 1999, 58 in 2000, 84 in 2001, and 32 in 2002). Prior to 2003, the only national NNT campaign was conducted in 2001, vaccinating approximately 10% of women of childbearing age. In 2003, 50,000 women of childbearing age in Artibonite were vaccinated as part of the national elimination plan. Later, political and social problems caused these activities to be interrupted, and the second vaccination phase, involving the immunization of 200,000 women of childbearing age, could not proceed in five high-risk districts.

Conclusions:

Haiti has a national plan to eliminate maternal neonatal tetanus aimed at vaccinating 1.4 million women of childbearing age in 59 high-risk districts (the country has 133 districts and 2.1 million women of childbearing age). The Interagency Coordinating Committee of Haiti's Immunization Program is backing this initiative. Despite the lack of a national epidemiological surveillance system, active case-finding suggests high disease incidence.

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Session 2
Special Topics

Yellow Fever: Going from Crisis Management to Prevention

Yellow Fever in the Americas: What Should We Do to Avoid Continued Outbreaks?

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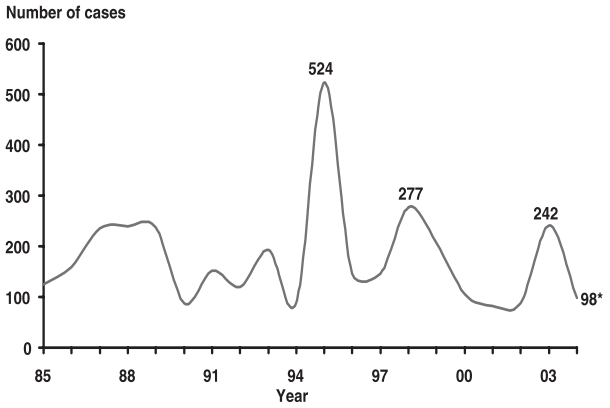
Background:

Between 1998 and 2002 the number of cases of jungle yellow fever (JYF) reported in the Americas decreased. That period coincides with the strengthening of disease surveillance and the incorporation of the vaccine into the national immunization programs in most of the countries in enzootic areas.

In 2003 an increase in incidence was observed, with 242 confirmed cases reported (three times the number for the previous year) and a case-fatality of 44%. Over 80% of the cases came from outbreaks in Brazil, Colombia, Peru, and Venezuela. The outbreak that affected Brazil occurred in an area that was not considered enzootic and, as a result, was not subject to vaccination. On the other hand, the outbreaks in Colombia, Peru, and Venezuela corresponded to traditionally enzootic areas. In 2004 outbreaks of yellow fever in Bolivia, Colombia, and Peru have been reported, as have isolated cases in Brazil, Colombia, and Peru. Brazil, Colombia, and Peru have also reported epizootics.

Number of Yellow Fever Cases
Region of the Americas,1985–2004*



*** Provisional data up to Epidemiological Week 37**

Methodology:

The analysis of the situation of JYF is centered on the emergence of intense and extensive outbreaks in areas historically enzootic, where effective measures for prevention and control of outbreaks have been systematically recommended by the TAG. Among these measures are the following:

Prevention of the jungle form:

- Vaccination of all residents in the enzootic areas.
- Introduction of the vaccine in the Expanded Program on Immunization (EPI) for high coverage maintenance.
- Vaccination of all those traveling to enzootic areas, such as migrants and ecotourists.
- Early detection of the circulation of the virus in order to implement appropriate outbreak control measures (intensification of vaccination in the affected municipality and bordering municipalities, active case-finding, and expansion of the area of intensified vaccination if new cases are identified in neighboring municipalities).

Prevention of reemergence from transmission by *Aedes aegypti*:

- Prevention and control of the jungle form to avoid circulation of viremic individuals in infected areas.
- Control of the *Aedes aegypti* vector.

Results:

From application of the TAG recommendations, the following results can be expected:

- Few isolated cases of JYF;
- Outbreaks with few cases in very specific geographical areas; and
- Absence of urban cases.

In order to support countries so they achieve the expected results, training workshops in yellow fever prevention and control, directed at health workers at local levels in enzootic areas, are being held. Another objective of these workshops is to prepare or review local action plans.

Conclusions:

In the last two years there have been outbreaks of JYF in traditionally enzootic areas close to urban centers infested by *Aedes aegypti.* Furthermore, human and epizootic cases have been identified in regions where circulation of yellow fever virus was absent 50 years ago. These episodes exemplify the high risk that still exists of yellow fever reemergence in the Hemisphere. As a result, it is necessary that countries adopt the preventive measures recommended to avoid the emergence of jungle cases and prevent the reemergence of yellow fever.

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Outbreak of Jungle Yellow Fever, Colombia, 2003-2004

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Background:

In Colombia yellow fever has an endemic/epidemic pattern, with an average of 20 cases per year. During the first six months of 2003, the country experienced the largest epidemic in recent years; it first affected the Catatumbo region and then spread to Sierra Nevada de Santa Marta (SNSM). There had been no confirmed cases in the region since 1979, and the patterns of this outbreak were similar to those in that year.

Methodology:

Descriptive longitudinal study of cases captured through active community surveillance, case studies, and passive surveillance. The cases were confirmed by IgM, immunohistochemistry, and pathology. Actions were undertaken to strengthen surveillance of icterohemorrhagic fever, entomology, vectors, and epizootics, as well as to intensify immunization of susceptibles and educate the community.

Results:

During the outbreak 1,480 suspected cases of yellow fever were reported. Of these, 82 were confirmed in Catatumbo and 28 in SNSM; the case-fatalities of the outbreaks were 40% and 28%, respectively. The most affected departments were Santander (78 cases in the north), Santa Marta (14 cases), César (12 cases), and Guajira (6 cases). The most affected age group was that aged 20-24 years, with rates of 24% and 28%, respectively, in each outbreak; however, a high number of cases occurred in children <5 years in the Catatumbo outbreak. The index of infestation by *Aedes aegypti* in the area was over 20%, and the Breteau Index between 42.85 and 71.43. Entomological surveillance revealed the presence of *Sabethes* spp, among others, in Valledupar. Yellow fever coverage of the areas was under 50%. Epizootics were confirmed in three areas of the region (municipalities of Valledupar, La Paz, and Holy Marta). According to symptom onset dates, the outbreak in Catatumbo began in Week 23, peaked in Week 27, and was controlled in Week 32. The outbreak in SNSM started in Week 51 of 2003 and the peak was registered in Week 1 of 2004; the last case was confirmed in Week 2. For control, vaccination coverage was increased to approximately 95% and integrated control of vectors was carried out in the urban areas, accompanied by community education, training of physicians, and strengthening of public health surveillance.

Conclusions:

The factors that determine reemergence of vector-borne diseases like dengue and yellow fever are present in our country; they include the characteristics of the host and of the vector and social factors. Among the characteristics of the host, occupation is one of the most important; it is significant when nonimmune people penetrate jungle areas for reasons related to their work, as in the cases of armed agents and gatherers of crops, both legal and illegal. The social factors related to reemergence are especially relevant and, among them, the massive presence of illegal crops in jungle areas should be noted. Because of those illegal crops, yellow fever has spread in the last decade, facilitated by the movement of susceptible and viremic individuals from one place to another. The importance of human transit in the dissemination of yellow fever has been demonstrated in this outbreak. Given this interaction of factors, emerging diseases control, especially yellow fever, involves the health sector, which should emphasize public health surveillance, laboratory diagnosis, training of human resources, vector control, and vaccination. However, beyond such efforts, emerging diseases control implies the need to have a national security policy promoting peace, equity, work, and education as common factors for all Colombians.

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Yellow Fever Outbreak, Venezuela, 2002-2003

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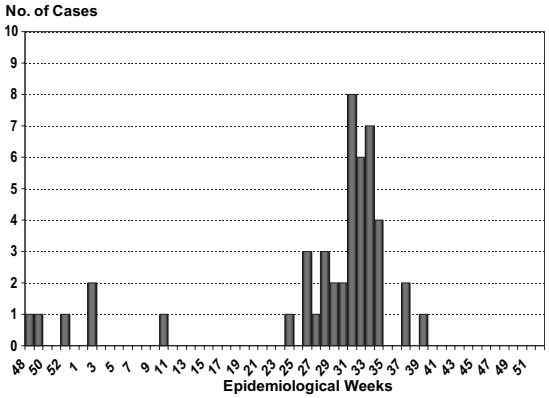
Background:

In Venezuela, yellow fever (YF) has exhibited cyclic behavior since 1941, with presentation of cases approximately every 10 to 12 years, mainly from June to November. Historically, the states with greatest numbers of cases have been Táchira, Bolivar, Mérida, Portuguesa, and Zulia. Furthermore, within this historical context the age group most affected is from 15 to 45 years, and most are men. Three large enzootic foci of YF have been delimited in Venezuela: San Camilo, Sur del Lago de Maracaibo, and Guiana.

Distribution of Confirmed Yellow Fever Cases in Venezuela, Week 48, 2002 to Week 52,2003



Source: Office of Epidemiological Surveillance, Ministry of Health and Social Development

Methodology:

The principal components of the plan for addressing YF are syndromic and laboratory surveillance of cases and deaths, vaccination at 6 months of age in risk areas, entomological and epizootic surveillance, and the mapping of risk. Through the prioritization or stratification method, utilizing a set of indicators of importance in YF, 110 municipalities in nine states of the country have been identified as at risk. Of them, 44 were classified according to this method as being at high-risk, 34 at medium-risk, and 32 at low-risk. The component emphasized was vaccination, which the Ministry of Health and Social Development considered the most effective for both control and prevention.

Results:

There were two different outbreaks in Venezuelan territory. The first began in the state of Zulia, where five cases were recorded between Epidemiological Week 48 of 2002 and Week 02 of 2003, along with three deaths, and another case in Week 10. The second outbreak occurred between Week 24 and Week 39 of 2003, with cases in the states of Táchira (11 cases and five deaths) and Zulia (18 cases and nine deaths), and two isolated cases in the state of Portuguesa. Furthermore, the surveillance system of the state of Zulia captured nine cases (with six deaths) from north of Santander. In 2003 the syndromic surveillance system (hemorrhagic, febrile, and icteric syndromes), made it possible to confirm the disease in 170 of the 1,224 captured patients: 43 cases of YF (3.51%), 66 of dengue (5.39%), 40 of hepatitis A (3.27%), and 21 of leptospirosis (1.72%). Of the 43 confirmed YF cases, 55% presented fever, jaundice, and hemorrhage; 11%, fever and jaundice; 15%, fever and hemorrhage; 15%, only fever; and 4% were asymptomatic. Males were more affected than females, and the age group with the greatest number of cases included those from 15 to 45 years. Most of the cases were working farmers (60%). With respect to prognosis, death occurred particularly in patients with two or more hemorrhagic manifestations. No patient had a vaccination history. Immunization in children aged 1 year has been conducted throughout the country since 2001, together with universal vaccination in the high-risk border municipalities. Up to 2004 it has been possible to vaccinate 100% of the residents in 43% of municipalities with enzootic areas.

Conclusions:

In Venezuela, conditions are propitious for the emergence of cases of YF in the high-risk areas. Mass yellow fever vaccination in these populations, recommended by PAHO and the TAG, has made it possible to limit the appearance of more cases in Venezuela and has mitigated the effects of the two outbreaks of this disease. In addition, due attention was also paid to the other components of the plan for addressing YF.

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Vaccination Strategies Against Yellow Fever in Peru

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Background:

Historically, Peru has had periodic outbreaks of jungle yellow fever despite the intervention measures implemented. In the last five years 151 cases have been reported, which represents 25% of the cases in the Region.

Methodology:

For the preparation of the plan for yellow fever prevention and control, the Ministry of Health convened a workshop with professionals from the central, departmental, and local levels of the endemic regions, with participation by PAHO. Representatives of epidemiological surveillance, immunization, the laboratory, and health promotion were present. The epidemiological situation of yellow fever in recent years was analyzed and the outbreaks presented were characterized. The principal problems and critical links in the areas of vaccination, epidemiological surveillance, and the laboratory were identified, along with the sociodemographic and cultural aspects.

Results:

Up to Week 33 of 2004, 56 cases (case-fatality of 51%) were confirmed in the departments of Junín (25), Huánuco (8), Madre de Dios (8), Cusco (1), and San Martín (13). Of those cases 89% were economically active, especially as farmers and day laborers, and of those, 80% were migrants toward enzootic areas and 78% did not have a history of vaccination. In light of this epidemiological situation, the country decided to implement a plan for yellow fever prevention and control at the national level for the period from 2004 to 2007.

A plan was prepared that contains national guidelines for four years, with special emphasis on vaccination strategy, aimed at protecting approximately 10 million people. The target population are all people over 1 year of age who are unvaccinated and from the endemic areas and areas that generate emigration. For the entire country the standard is to vaccinate children aged 1 year against yellow fever as part of the regular immunization schedule. A vaccination rate of 100% was reached in Huánuco, Madre de Dios, Cusco, and Junín for the first year of the plan; in Ayacucho, Huancavelica, Apurimac, Puno, and Pasco for the second year; in Ancash, Piura, San Martín, Cajamarca, Chota, Cutervo, and Amazonas for the third year; and in Ucayali, Loreto, and areas of emigration in Piura and La Libertad for the fourth year. The vaccination strategies defined were: door-to-door, captured population, mobile posts, and fixed posts. The plan made provisions for the strengthening of epidemiological and laboratory surveillance of yellow fever, especially early detection of cases and control of outbreaks, for which a reserve of vaccines will be kept. Another essential aspect of the plan is the dissemination of information on yellow fever prevention and the active participation of the community. The estimated budget for implementation is approximately US$ 13 million.

Conclusions:

The plan has the political backing of the authorities in the Ministry of Health. The expected results of its implementation are a gradual reduction in the number of cases, fewer outbreaks, in limited areas, and prevention of the reurbanization of yellow fever.

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Session 2
Special Topics

Strengthening Program Management

Results of Expanded Program on Immunization National Program Reviews, January 2003–June 2004

Danovaro MC[1], Ropero AM[1], Olsen J[1,2], Serrano R[1,3]

Introduction:

Since 1996, the Pan American Health Organization has promoted evaluations of Expanded Programs on Immunization (EPIs) at the country level. Between January 2003 and June 2004, EPI evaluations were conducted in Antigua and Barbuda, Belize, Bolivia, Dominica, Jamaica, and Nicaragua to assess the current situation of all the components of the immunization program and propose recommendations for action.

Objectives:

The evaluations sought to examine the major strengths and weaknesses revealed by in the 2003–2004 EPI evaluations for these six countries; to evaluate Bolivia's progress with its EPI, based on the evaluations carried out in 1998 and 2003; and to explore how the EPI evaluation recommendations are being utilized.

Methodology:

We examined the final reports of the six EPI evaluations for January 2003–June 2004, then summarized and assessed the findings as strengths, problems, and recommendations by component in a matrix. Since Bolivia has two recent EPI evaluations, we compared the achievements and problems observed there in 1998 with those of 2003. Finally, we compared and contrasted the recommendations with the national plans of action for year 2004, where appropriate.

Results:

There is a strong political commitment to EPI and it is seen as a high priority in all six countries evaluated. In Jamaica, the EPI is perceived to be the most successful public health program. Bolivia is drastically improving the EPI organization, planning, and programming. Antigua and Barbuda, Belize, and Dominica have excelled in their efforts to reach the community, and Nicaragua has utilized its National Health Weeks as a successful platform to intensify vaccination outreach in coordination with other sectors and health activities. An urgent need to improve surveillance of vaccine-preventable diseases (VPDs) was identified in both Bolivia and Belize, and suggestions for improvements were given to Antigua and Barbuda and to Dominica. The table below summarizes the main EPI strengths and weaknesses for the countries evaluated.

Since the 1998 evaluation, Bolivia's EPI has made significant progress. Concrete activities have been implemented to improve the EPI at all levels and in almost all components. A goal to reach 100% coverage in all municipalities has been established; training, supervision, and social communication plans and actions have been implemented; new cold-chain equipment has been purchased; and evaluation and research activities, especially operational activities, have been developed. However, the EPI budget urgently needs to be increased to support the new activities, plans, and goals.

Most of the recommendations were addressed in the annual plans of action that followed the 2003 EPI evaluations for Belize, Bolivia, and Jamaica. Bolivia wrote a comprehensive plan, although some of the surveillance recommendations were not fully discussed. Belize thoroughly addressed the recommendations given. Jamaica wrote a detailed plan including actions to remove some of the barriers limiting access to vaccines.

Conclusions:

Common strengths, such as high political commitment, were observed in all six countries evaluated. Problems particular to each country were found and recommendations to improve them were made. The identification of program weaknesses and the formulation of specific recommendations seem to make the EPI evaluations a useful tool to guide EPI planning. This is suggested by both Bolivia's progress between the 1998 and 2003 evaluations, and the correspondence between the 2003 EPI evaluation recommendations and the 2004 plans of action.

Principal Strengths and Weaknesses of the Expanded Program on Immunization, Selected Countries, 2003–2004

Country	Main Strengths	Main Weaknesses
Antigua and Barbuda	• Good community participation • Vaccination registries	• Financial problems to sustain EPI • VPD Surveillance system needs to be strengthened
Belize	• Overall organization, coordination and programming	• Training and supervision • Surveillance of non-measles/rubella VPDs
Bolivia	• Efforts to improve the EPI at all levels • Operational research and laboratory	• Insufficient resources for planned programs • Weak and incomplete notification of VPDs
Dominica	• The program is well planned and executed	• VPD surveillance system needs to be strengthened
Jamaica	• Vaccination registry, coordination with schools and activities to reach defaulters	• Barriers limiting access to vaccines • Staff shortages and local coordination/organization issues
Nicaragua	• Successful National Health Weeks • Efficient local-level activities	• Data quality and information not always used for action • Some injection safety issues

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Increase in Reported Diphtheria Cases in Haiti

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Introduction:

Diphtheria is endemic in Haiti, with sporadic cases occurring almost every year. In 2002, six cases were reported, compared with two cases in 2003. In June 2004, a large cluster of cases was reported in the area surrounding Fond des Blancs, a market town in a mountainous, rural area in the southwestern part of the country. This cluster included 56 cases seen at a local hospital, with onset dates in June or July. Anecdotal reports of numerous other cases—including some deaths—in these communities were also received. In addition, isolated, sporadic cases were reported in other parts of the country. An investigation was initiated to confirm and characterize the reported diphtheria outbreak. From the beginning of the outbreak, in June 2004, to the beginning of September, 76 suspected cases of diphtheria were reported.

Methodology:

Epidemiological guidelines on diphtheria were reviewed and case definitions were established.

Suspected case

- A patient with any upper respiratory infection, such as rhinitis, pharyngitis, tonsillitis, or laryngitis, occurring in the same time period and in the same geographic area as a probable case, or
- A patient with an illness that is suspected to be diphtheria by a health care worker.

Probable case

- Any suspect case presenting a pseudomembrane or diffuse exudate in the area of the infection, or any suspected case who dies.

Confirmed case

- Laboratory-confirmed case: a probable case with positive laboratory results indicating the presence of *Corynebacterium diphtheriae*, based on culture, PCR, or histopathology.
- Clinically-confirmed case: a probable case who dies.
- Epidemiologically-confirmed case: a probable case who was in contact with a confirmed diphtheria case within two weeks of the onset of illness.

Compatible case-Any probable case if:

- The patient is lost to follow-up, or
- The patient does not receive an alternate diagnosis during the course of his illness.

A nationwide, active search of probable or confirmed cases is scheduled for September and will include visits to all the main hospitals in the country (n = 40) to assess the extent of the reported diphtheria outbreak. This search will extend to the community level, with visits to municipalities where cases have been confirmed.

Results:

Based on the established case definitions, 11 cases were confirmed; 8 were classified as probable cases and 57 as suspected cases by the beginning of September 2004. Three of the confirmed cases were laboratory confirmed, six were clinically confirmed, and two were confirmed by epidemiological link. The cases are distributed in four departments of the country: Nippes, 3 cases; Sud, 3 cases; Sud'Est, 2 cases; Nord'Ouest, 2 cases; and Ouest, 1 case. Children under 10 years of age had the highest attack rate per 100,000 population. Of the confirmed cases, all of them were females.

The active search for diphtheria cases, with the review of consultation and hospitalization diagnostics in early August at the Haitian State University Hospital (HUEH), did not identify any cases. On 30 August, a probable case from the metropolitan area of Port-au-Prince was reported by HUEH. Bacteriological culture of a throat sample was positive for *Corynebacterium diphtheriae*. During the second round of the National Immunization Days in August 2004, a dose of DPT vaccine was administered indiscriminately to children under 5 years of age in the municipalities of the five affected departments—Sud, Nippes, Sud'Est, Nord'Ouest, and Ouest.

Conclusions:

It is possible that the recent reporting of diphtheria cases represents a true epidemic in Haiti. However, the full extent of the problem will not be known until the nationwide active search, scheduled for September, is completed. Comparing the results with active searches undertaken prior to 2004 will be critical in determining whether there is a definite change in the number of cases.

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Vaccination Week in the Americas

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Background:

The initiative to establish a vaccination week was the product of a proposal from the Ministers of Health of the Andean Area. It had the backing of the Directing Council of PAHO which, through Resolution CD44.R1 of September 2003, supported the celebration of the Vaccination Week in the Americas (VWA) throughout the Hemisphere. The principles of equity, access, and Pan-Americanism stand behind this initiative. In 2003, 19 countries in South America, Central America, and the Caribbean joined efforts and participated in the first VWA. The countries vaccinated 13,583,888 children aged <5 years and approximately 2,700,000 women of childbearing age (WCBAs). The initiative has grown and included 35 countries and 7 territories in the Americas in 2004.

Methodology:

For the planning of the 2004 VWA, 27 of the 35 countries met in January in Quito, Ecuador, to set general guidelines, draft goals, and develop plans of action and strategies for every country. The goals included vaccinating 40 million people: children, WCBAs, the elderly, and other risk groups unvaccinated or located in remote areas, for which the countries utilized different strategies. The goals and the target groups were expanded beyond those for 2003. PAHO and the Centers for Disease Control and Prevention (CDC) promoted a single slogan for the Region: "Vaccination: An act of love. Love them, protect them, vaccinate them." The results were provided by the respective Ministries of Health on standard forms.

Results:

During the 2004 VWA, the goal established in Quito was exceeded, and 41,840,226 individuals were vaccinated against poliomyelitis, measles, rubella and congenital rubella syndrome, whooping cough, tetanus, diphtheria, tuberculosis, and influenza. Furthermore, many countries took advantage of this valuable opportunity to include other interventions, such as eye examinations to detect retinoblastoma, administering folic acid supplements to women and vitamin A to children, and distributing packets of oral rehydration solution. Intense coordination across borders resulted in more than 22 binational launches, in which five Heads of State, first ladies, and Ministers of Health, together with directors and representatives of different international health and donor agencies, participated. In the majority of the countries and along the U.S.-Mexico border, second and third rounds of vaccination are being carried out to complete the immunization schedule.

Conclusions:

- The VWA promoted Pan-Americanism, establishing permanent binational or trinational relationships among local and national counterparts.
- A revitalized and strengthened cooperation among national and regional organizations was fundamental for the mobilization of resources. Further efforts are recommended to involve other actors, such as the private sector and nongovernmental organizations.
- The planning of second and third rounds at local level should guarantee that the population is protected with a complete immunization schedule.
- Effective monitoring makes it possible to quantify the reduction of inequities in vaccination and other health services.
- In order to maintain the efforts of the VWA, countries should guarantee the necessary financial resources with due anticipation to ensure successful campaigns.

Target Population and Goals					
<5 years	**Adults**	**>60 years**	**WCBA**	**Other**	**Total**
16,116,497	10,517,607	11,387,862	1,575,893	1,340,025	40,937,884
Results by Target Population					
<5 years	**Adults**	**>60 years**	**WCBA**	**Other**	**Total**
15,164,852	8,156,345	13,738,481	3,368,569	1,411,979	41,840,226

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Evaluation of the Vaccination Week in the Americas, Metropolitan Area of Asunción, Paraguay, 2004

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Background:

Every year, the Immunization Program of Paraguay plans to vaccinate the entire population of children aged <2 years and those aged 2-4 years that are susceptible; however, a significant proportion of the population does not have access to the benefits of immunization, and outbreaks of diphtheria and whooping cough, as well as other vaccine-preventable diseases, have occurred in those populations. In order to reduce those inequities, the goal of the Vaccination Week in the Americas (VWA) in 2004 was to vaccinate at least 95% of children aged <5 with incomplete or uninitiated schedule, in communities in urban fringe areas and indigenous and border populations.

Methodology:

In order to verify achievement of the goal of VWA, its contribution to strengthening the regular program, and the relationship between its message and the administration of vaccines, a cluster evaluation by lot quality assurance sampling was conducted in May 2004. The study universe consisted of children under 5 from one of the excluded population group who required at least one dose of Paraguay's official immunization schedule during the VWA (eligible children). Calculation of the sample size was based on an assumed coverage level of 85%, a confidence level of 95%, and a margin of error of ±5 percentage points. Seven clusters were evaluated in the urban fringe area of Metropolitan Asunción (population 60,000 approximately). In each cluster, 552 dwellings were selected to provide a sample of 60 eligible children, whose vaccination card was used as a source of verification. In order to accept or reject each cluster as properly vaccinated, a decision value of four was utilized. With the information obtained on all the eligible children found, vaccination coverage was estimated for each biological in the area.

Results:

Visits were made to 4,201 dwellings, 40% of which contained children aged <5; 675 were eligible for the VWA. Of the eligible children, 89% were visited by the vaccinator; nevertheless, only 58% were fully vaccinated. The seven clusters were rejected as properly vaccinated when BCG vaccine was included; when BCG was excluded (preferably administered in institutions), one cluster was accepted as well-vaccinated and six were rejected.

Thanks to the VWA 74% of the children eligible for pentavalent vaccine and 75% of those eligible for OPV completed their immunization schedule. The VWA also helped with 27% of eligible children being vaccinated with BCG and 58% with MMR (measles-mumps-rubella vaccine) for the first time. Of the mothers or parents interviewed, 73% knew about VWA. Acceptance of the vaccination was greater among parents who had heard messages from any communication medium.

Conclusions:

The study demonstrated that the goal of administering all the necessary doses, including boosters during the VWA, was not achieved in the area studied. However, the estimated vaccination coverages by biologicals in the study area were higher than the coverage recorded. The study also brought to light problems with immunization quality in the regular program, such as ignorance among operational personnel of the intervals between vaccine doses and fear of simultaneous administration of vaccines.

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Evaluation of the National Health Day/Vaccination Week in the Americas in Managua, Nicaragua

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Background:

The Vaccination Week in the Americas (VWA) in Nicaragua was part of the National Health Day (NHD) that the Ministry of Health holds at least once a year. At the national level, more than 5 million interventions in children under 6 were conducted, including vaccination with the national series, additional doses of polio vaccine and MR (measles-rubella vaccine) boosters in children aged 1-5 years, and wholesale administration of parasiticides and vitamin A. With the technical and financial support of PAHO and the Centers for Disease Control and Prevention (CDC), the National Vaccination Program launched a study to analyze the impact of the VWA and some aspects of program operations. The first phase was carried out from 11 to 13 August 2004 and will be completed on 27 and 28 of that month.

Methodology:

A cluster survey with evaluation of each cluster by lot quality, developed by CDC/PAHO, was used. This surveys allows estimation of vaccination coverage by incorporating information on the clusters. For selection of the clusters from the list of neighborhoods and population of the Ministry of Health, the 396 neighborhoods of urban Managua were regrouped into 121 clusters, ensuring the presence of at least 700 children aged <5 years, and 7 clusters were selected by systematic random sampling. The instruments used in Nicaragua provide additional information to assess basic aspects of the program's operation, such as the quality of the reporting, the appropriateness of the immunization schedule, the average age at which complete schedules are achieved, NHD/VWA coverage, and missed opportunities for vaccination. The data will be processed in a database in EPI-INFO and will be analyzed with the SPSS program. The survey will include at least 7,658 dwellings (1,094 per cluster) in which at least 413 "eligible" children are expected to be found -that is, children that required one or more doses of vaccine from the Immunization Program during the NHD/VWA. All the homes of the selected clusters will be visited. If there is more than one eligible child, one of them will be selected at random. The design of the study includes a repeat visit to the homes where, for some reason, the necessary information could not be obtained in the initial interview. Thirty five brigades of interviewers and 14 supervisors, in charge of ensuring appropriate identification and selection of areas and children as well as completion of record forms, participated in the implementation of field activities. The logistical and operational coordination was carried out by staff members of the National Program, the Comprehensive Local Health System of Managua, and PAHO.

Results:

At the time this summary was prepared, not all of the dwellings included in the study had been visited and the analysis is in process.

Conclusions:

The population studies (surveys, monitoring) are an important complement to the administrative information for the evaluation and strategic planning of the Immunization Program in Nicaragua. Studies of this type make it possible to analyze program operations and determine the operational aspects that need to be strengthened. With regard to training, supervision, and evaluation, it is necessary to emphasize the recording of information and the timeliness of vaccination.

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Vaccination Safety: Progress and Challenges in the Region of the Americas

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Introduction:

One of the greatest achievements in public health has been the prevention of infectious diseases through immunization. As vaccine-preventable diseases become less visible thanks to effective vaccination programs, more attention will be paid to the events supposedly attributable to vaccination or immunization (ESAVI). These can rapidly become a serious threat to public health, because they can lead to a significant drop in vaccination coverage. Appropriate management of ESAVIs implies detection, evaluation, management, and speedy adequate prevention of such events, in addition to a solid communication plan. Consequently, immunization programs have the responsibility of addressing that concern, keeping their workers prepared with information on safe vaccination, which is a priority component of these programs, aimed at creating and strengthening mechanisms that will enable the countries to guarantee the use of quality vaccines, safe injection practices, and monitoring of ESAVIs.

Methodology:

To address this concern, health workers were trained and informative material on safe vaccination was prepared. A group of experts in several areas was formed and modules were prepared in Spanish and in English for all subjects related to vaccines and vaccination. These modules were used in subregional and national training workshops, which lasted five days on average, and at prior two-day meetings of the facilitators in preparation for each workshop. At the decentralized level, the countries also replicated the workshops on safe vaccination. There is ongoing advocacy at the political and scientific levels in regard to safe injection practices, especially in vaccination campaigns targeting adults.

Results:

Seven modules have been developed: Vaccine Quality; Laboratory Quality Control; Safe Injection Practices; Clinical and Technical Aspects of ESAVIs; Introduction to Causality and Risk-benefit Considerations; ESAVI Monitoring System; and Creating Partnerships with the Media. In 2001 and 2002, workshops on How to Work with the Media on the Subject of Immunization were held in the Southern Cone, the Andean Area, Central America, and Brazil, with a total of 200 health professionals trained. In 2003, safe vaccination workshops were held in Peru, Ecuador, and the English-speaking Caribbean, with participants from 21 countries. In all, 183 professionals from the areas of immunization, epidemiology, and communications, and from the national regulatory authorities, were trained, and more than 900 professionals participated in replications of the safe vaccination workshops at the country level. In 2004, the final review of the seven safe vaccination modules was conducted. In the EPI plans of action, the countries are adopting the safe vaccination component. Honduras and Brazil have received funds from the Global Alliance for Vaccines and Immunization (GAVI) for this component. Monitoring of the following indicators to measure progress has been proposed: percentage of serious cases investigated in the first 24 hours (80% is acceptable) and rate of cases classified as programming errors among ESAVIs reported.

Conclusions:

Teams for investigating ESAVIs have been formed in the countries; they have improved the quality and speed of the investigations and management from the clinical, laboratory, epidemiological, and communications standpoints. Monitoring of standardized indicators of safe vaccination for routine operations and immunization campaigns is a critical component of all immunization programs.

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The Prevention of Severe Tuberculosis: Use of a Single BCG Vaccination as Early as Possible in Life

Dietz V[1], *Rieder HL*[2]

Background:

The World Health Organization (WHO) estimates that there were 1.8 million deaths due to and 8.3 million new cases of tuberculosis in the year 2000. Tuberculosis is a mycobacterial disease that affects a variety of organs, with pulmonary tuberculosis being the most common form of disease. Most initial infections heal without disease manifestation. The infection then enters a latent phase, with a life-time risk of reactivation of 10%–20%, which can lead to severe disease. In approximately 5% of persons, the initial infection can progress to pulmonary or disseminated tuberculosis, which affects other organs. Control of tuberculosis includes the use of Bacillus Calmette-Guérin (BCG) vaccine as well as identifying and treating tuberculosis cases. BCG vaccination does not prevent initial infection but exerts a particularly protective effect against forms of tuberculosis that require lymphohematogenous spread of the bacilli after initial infection (e.g., disseminated, or miliary, tuberculosis, and tuberculous meningitis). Use of BCG in the Americas was reviewed by country to determine if current recommendations are being followed.

Methodology:

WHO, the Pan American Health Organization (PAHO), and the International Union Against Tuberculosis and Lung Disease (UNION) recommendations for vaccination with BCG were reviewed, as were BCG vaccination schedules for all countries in the Americas.

Results:

To be most effective, BCG must be administered prior to a primary infection. In the developing world, the age of greatest risk for the most severe forms of tuberculosis subsequent to infection is during the first five years of life. Epidemiologically, the 5–15 years age group has low rates of disease and low rates of severe disease. WHO currently recommends that a single dose of BCG be given as early as possible after birth and within the first year of life in populations at high risk. WHO and UNION discourage repeated vaccination with booster doses of BCG, based on the lack of definitive evidence that repeated BCG vaccination confers additional protection against tuberculosis, although it may be protective against leprosy. Revaccination schemes often fall in the lowest tuberculosis risk period in life (5–14 years of age) and target a population in whom protection from BCG vaccination is dubious or variable at best. Most children who develop the severe tuberculosis that EPI programs hope to prevent with BCG vaccination become infected in the first years of life. In addition, available data indicate that BCG given after the first year of life may be less effective.

BCG vaccine is currently used throughout the Americas, with the exception of the U.S.A. and Canada. The majority of newborns are protected at birth with BCG. Four countries recommend a booster dose or revaccination after 5–6 years of age, 1 country recommends a single dose after the first year of life, and five countries recommend a single dose after the first month of life.

Conclusions:

The Pan American Health Organization recommends that countries follow WHO and UNION guidelines. Countries that use alternative schedules, including two-dose schedules, should review their rationale for such recommendations.

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Session 3
Introduction of New Vaccines in the Americas

Introduction

Overview of the Introduction of New Vaccines in the Americas

Andrus JK[1], García S[1], Fitzsimmons J[1], Tambini G[2]

Introduction:

Twenty-seven years ago, under the umbrella of the World Health Organization's Expanded Program on Immunization (EPI), immunization programs in the countries of the Americas were challenged to rapidly accelerate and expand services. At that time, vaccines for only six diseases—measles, pertussis, tetanus, diphtheria, polio, and tuberculosis—were included in the strategy to protect children against vaccine-preventable diseases. Despite the rapid introduction of four underutilized vaccines (hepatitis B, *Haemophilus influenzae* type b, rubella, and mumps) in the late 1990s, countries in Latin America and the Caribbean still lag far behind in the provision of technologies and services that countries such as Canada, the United States, the United Kingdom, and many countries of Europe provide. The objective of this presentation is to review the Pan American Health Organization's (PAHO) immunization policy for the introduction of new vaccines.

Methodology:

PAHO's immunization policy and progress to reduce the inequity gap in the provision of new vaccines was reviewed. Technical capacity to provide assistance to countries was also considered.

Results:

The major challenge for immunization programs in developing countries is to reduce existing inequities while ensuring that expanded services are sustainable. Program sustainability is best ensured when governments finance their programs, especially the purchase of vaccines. Sustainability should be a key underpinning of the design of procurement strategies for immunization programs. Procurement mechanisms should also function as a practical tool for promoting and implementing a broad program of technical assistance, covering epidemiological, financial, and logistical sustainability and not be limited solely to vaccine purchase. Ultimately, this would ensure that everyone pays, particularly the governments purchasing the vaccines.

PAHO Member States designed the Revolving Fund for Vaccine Purchase to do exactly that. The Fund provides countries with a procurement and financing mechanism for the purchase of vaccines, syringes, and needles—the basic components of their immunization programs. Countries use their own resources to buy vaccines.

With the creation of the Fund, EPI has achieved several milestones in disease control, including the eradication of polio and the elimination of indigenous measles from the Western Hemisphere. The elimination of measles revealed the tip of the iceberg of the disease burden caused by rubella virus. The program is assisting with the acceleration of the development and introduction of vaccines against rotavirus, pneumococcus, and human papillomavirus. While expanding immunization programs and goals, efforts must also continue to promote better utilization of vaccines against "old" diseases, such as pertussis and tetanus. Pertussis continues to kill approximately 12,000 children per year in the Americas. Safe, effective, and affordable vaccines must be made available to the people who need them most. To that end, PAHO conducted a successful workshop on disease prevention effectiveness for the national immunization managers in June 2004 to increase the Region's capacity make sound policy choices.

Conclusions:

The Regional Program on Immunization, developed over the last 27 years, must continue efforts to address issues of inequity and to ensure the sustainability of interventions. Safe, effective, and affordable vaccines—new or old—must be made available to the people who most need them. Vaccines against rotavirus, pneumococcus, and human papillomavirus appear to be new and underutilized vaccines that will make a significant difference to public health. Fast-tracking the introduction of new vaccines while assuring the availability of old ones will be one of the major challenges ahead.

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Session 3
Introduction of New Vaccines in the Americas

Rotavirus Vaccines
Pneumococcal and Hib Vaccines
Human Papilloma Virus Vaccines

Rotavirus Surveillance in the Region of the Americas in Preparation for Vaccine Introduction

García S[1], *Andrus JK*[1]

Introduction:

Gastroenteritis is among the main causes of infant morbidity and mortality in developing countries worldwide and rotavirus is the leading cause of this disease. Annually, this virus causes 111 million diarrheal episodes in children aged <5 years worldwide. Approximately 13% of these episodes are moderate or severe, and account for 20% of the more than 440,000 deaths that occur each year. Most deaths (82%) occur in developing countries. Rotavirus is considered to cause approximately 75,000 hospitalizations and 15,282 deaths in the Region of the Americas. Based on surveillance data available on diarrheal disease in children aged <5 years, more than 48,000 children in this age group are estimated to die annually in the Region due to this cause. However, national data on the disease burden due to rotavirus are limited or non existent and, therefore, the percentage of these deaths due to rotavirus is unknown.

Regional estimates of disease burden are important for establishing regional priorities, but for decision-making at the country level, national data based on evidence of disease burden are more meaningful when deciding to introduce a new vaccine. Two very promising safe and efficacious rotavirus vaccines will soon be available.

To address the countries' need for their own disease burden data, a joint initiative of the Program for Appropriate Technology in Health (PATH), the U.S. Centers for Disease Control and Prevention (CDC), and the Pan American Health Organization (PAHO) has been supporting countries of the Region to help them establish permanent rotavirus epidemiological surveillance systems.

Methodology:

A review of the data on rotavirus from the studies conducted to date in the Region of the Americas was performed. At least 13 countries have data available. Data from 7 of the 13 countries cover at least 12 continuous months of surveillance, including both epidemic and nonepidemic periods, and at least 100 children aged <5 years. Most of these studies come from the private sector and independent researchers.

Results:

By mid-2004, at least nine countries had begun rotavirus surveillance studies. Other countries in the region have prepared similar protocols and will be also supported through the joint initiative. These systems will generate epidemiological data in the near future.

In sentinel hospitals of selected countries the percentage of hospitalizations by diarrhea due to rotavirus was: 71% in Argentina, 47% in Chile, and 38% in Venezuela.

In most countries, outbreaks generally occur during the first half of the year, corresponding with the dry season. By the age of 2 years, 90% of children have been infected by rotavirus. The greatest proportion of hospitalizations due to rotavirus happens during the two first years of life. G1 accounts for about 50% of serotypes circulating in all countries. The G9 serotype seems to be emerging in certain countries.

Conclusions:

Available data demonstrate that rotavirus is an important public health problem in most countries of the Region. Safe, effective and affordable rotavirus vaccines will make an important contribution to the lives of children in the Region.

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Health Economics of Universal Rotavirus Vaccination in Latin America and the Caribbean

Rheingans R[1]

Introduction:

Rotavirus infection causes a significant health and economic burden in developing countries. Economic data are needed to evaluate vaccination as a cost-effective strategy for reducing this burden. For this reason, the current study was conducted to estimate the cost of rotavirus gastroenteritis and vaccine cost-effectiveness in eight Latin American countries: Argentina, Brazil, Chile, Dominican Republic, Honduras, Mexico, Panama, and Venezuela.

Methodology:

An economic model was constructed to estimate the health care costs of rotavirus and the cost-effectiveness of vaccination. Rotavirus-associated hospitalization and outpatient visits were based on published and administrative data. If country-specific data were unavailable, rates were extrapolated from other countries. Mortality estimates were obtained from published data and national vital statistics data. Costs were estimated using a standardized approach developed by the World Health Organization for its WHO-CHOICE (CHOosing Interventions that are Cost Effective) project. Vaccine effectiveness was based on Expanded Program on Immunization coverage data and clinical trial data for Rotarix™ in Latin America. A hypothetical annual birth cohort was followed for a five-year period in each country. The main outcome measures were economic burden and cost-effectiveness ratio ($/disability-adjusted life years, or DALY, and $/life saved) of vaccination. Sensitivity analyses evaluated the impact of uncertainty on estimates.

Results:

For every 1,000 children born, rotavirus infection results in 235.5 outpatient visits, 17.8 hospitalizations, and 0.6 deaths. The direct medical cost associated with rotavirus gastroenteritis ranges from US$ 3.02 to US$ 13.27 per child, resulting in an estimated US$ 77 million spent annually on treatment of outpatient and hospitalized cases in the entire region. Universal vaccination would prevent more than 64% of the associated medical visits and deaths. Using the US$ 1,000/DALY standard (based on estimates of other diarrheal interventions in Latin America), vaccination would be considered cost-effective for prices ranging from US$ 4.47 to US$ 41.31 per vaccine course. Cost-effectiveness ratios were sensitive to assumptions about vaccine price, hospitalization incidence, and per diem costs.

Conclusions:

Rotavirus gastroenteritis results in a significant health and economic burden in Latin America and the Caribbean. Vaccination can effectively reduce the disease burden and health care costs of rotavirus. From the health care system's perspective, universal vaccination of infants against rotavirus can be a cost-effective public health intervention for a range of vaccine prices, as compared with other strategies for reducing diarrheal illness and mortality.

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Presentation of Rotavirus Vaccine Development and Summary of the 6th International Rotavirus Symposium in Mexico, 7–9 July, 2004

Glass R[1], de Quadros CA[2], Andrus JK[3], Steele AD[4], Wecker J[5]

In 2003, the Global Alliance for Vaccines and Immunizations designated rotavirus as one of the two vaccines prioritized for accelerated development and global introduction. This decision was based upon the enormous burden of rotavirus diarrhea worldwide, the late stage of development of new rotavirus vaccines, and the appreciation that the impact of any new vaccine introduction could be measured within two to three years as a reduction of rotavirus deaths, hospitalizations, and economic return. In the Americas, rotavirus infects all children in the first few years of life and is responsible for an estimated 15,000–20,000 diarrheal-related deaths, 30%–45% of hospitalizations due to diarrhea, and more than one million doctor or clinic visits.

At the 6th International Rotavirus Symposium in Mexico, in July 2004, both GlaxoSmithKline (GSK) and Merck presented preliminary data on their vaccine programs. The GSK vaccine is derived from a single strain of human rotavirus serotype G1, the most common strain in circulation, that has been attenuated by repeated passage and tested in over 60,000 children in more than 10 countries in the Americas. Preliminary results from earlier studies indicated that the vaccine was safe and had an efficacy of >85% against serotypes 1 and 9. GSK anticipates that the vaccine will be licensed first in Mexico, in the fall of 2004, and the Ministry of Health of Mexico has committed to be the first country to introduce the vaccine into its immunization program.

The Merck vaccine is based on a bovine strain of rotavirus that has been reassorted to include the major neutralization antigens from the major rotavirus serotypes in circulation. The vaccine is currently completing a trial with more than 70,000 children in the United States, Finland, and four countries in Latin America. Preliminary data indicate that this vaccine will also be comparably safe and effective in preventing severe rotavirus diarrhea. It will be licensed first in the United States and is expected in two to three years.

While both groups described their clinical trials, the results from these two large trials—with data from more than 130,000 children—were not known, and the studies have not yet been unblended, analyzed, or published. Neither company has yet conducted efficacy trials in poor populations in Africa or Asia, so the global safety and efficacy of these live oral vaccines remains to be assessed.

At the meeting in Mexico, a group representing public health workers involved in immunization policy in Pan American Health Organization (PAHO) Member States recommended that PAHO recognize rotavirus diarrhea, and its prevention through the use of vaccines, as a priority. The group encouraged PAHO to work with countries in the Region, the manufacturers, and the donor community to secure the early introduction and use of these vaccines in the Americas and to seek a commitment for vaccine purchase by the PAHO Revolving Fund for Vaccine Procurement. This would involve programs to support surveillance; to ensure proper regulatory approvals; to initiate and encourage vaccine purchase through the Revolving Fund; and to lay the groundwork for broad introduction of the vaccine in the Americas. If this strategy is followed, the Americas could be the first region of the world where this most common cause of severe, dehydrating diarrhea could be prevented through the use of a vaccine, a success that would help energize similar immunization initiatives in other parts of the developing world.

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Surveillance of Bacterial Pneumonia and Meningitis in the Region of the Americas in Preparation for Pneumococcal Vaccine Introduction

García S[1]*, Andrus JK*[1]

Introduction:

Streptococcus pneumoniae is one of the leading causes of both invasive and noninvasive diseases and represents a significant public health burden worldwide. Global estimates of mortality due to *S. pneumoniae* vary from 376,109 to 568,000 deaths per year in children under 5 years old. Acute respiratory infections (ARIs) are the leading cause of morbidity and mortality in this age group in countries of the Region of the Americas, resulting in more than 44,000 deaths annually. The percentage of these deaths due to *S. pneumoniae* is unknown. Estimating the burden of an infectious disease on a country-by-country basis is a complex task hampered by the lack of reliable data. A sensitive and specific method to diagnose pneumococcal pneumonia is lacking. Global efforts to develop a generic burden assessment tool for pneumococcal disease should be helpful.

The main objective of surveillance of bacterial pneumonia and meningitis is to help countries of the Region obtain information on the burden of disease due to pneumococcus, serotype distribution, and antimicrobial susceptibility. The data generated by the surveillance system will be fundamental to help decision-makers when considering vaccine introduction. In partnership with other agencies working on a pneumococcus vaccine, the Pan American Health Organization (PAHO) has been supporting in selected countries epidemiological surveillance of invasive pneumococcal disease in children aged <5 years, at different levels and different stages of implementation. Activities include:

- Surveillance of bacterial pneumonia through a network of sentinel hospitals, using clinical diagnosis in conjunction with radiological interpretation as the basic diagnostic marker of bacterial pneumonia.
- Population-based surveillance to determine disease burden.
- Cost-benefit studies that will allow the cost of disease burden and the cost of new vaccines to be compared.

Methodology:

Since 1993, PAHO has coordinated a laboratory-based surveillance network for monitoring of bacterial pneumonia and meningitis due to *S. pneumoniae*, *Haemophilus influenzae* and *Neisseria meningitidis*. The network currently includes more than 15 countries of the Region. Data generated by this network focusing on pneumococcal disease burden for the period 1993–1999 were reviewed.

Results:

Results from six countries (Argentina, Brazil, Colombia, Chile, Mexico, and Uruguay) show that 44% of cases of invasive disease caused by pneumococcus are pneumonia and 41% are meningitis. More than 50% of these episodes occur during the first year of life. The incidence of probable bacterial pneumonias ranges from 4.9 per 1,000 children aged <5 years in Brazil, to 9.5 in Uruguay. Based on the more frequent circulating serotypes, the efficacy of conjugated vaccines for prevention of pneumonias was estimated for 7-valent vaccine = 56%, 9-valent vaccine = 79%, and 11-valent vaccine = 82%. Susceptibility studies indicate that penicillin resistance of pneumococcus isolates has increased from 14.7% in 1993 to 30.6% in 1999.

Conclusions:

Available surveillance data demonstrate the potential impact on pneumococcal disease that could be achieved with the introduction of a conjugate pneumococcal vaccine in the Region of the Americas. Determining the most frequent invasive serotypes will continue to be very essential for defining which conjugate vaccine will be most suitable.

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Surveillance of *Haemophilus influenzae* type b Following Introduction of the Hib Vaccine in Uruguay

Paparamborda MC[1]

Background:

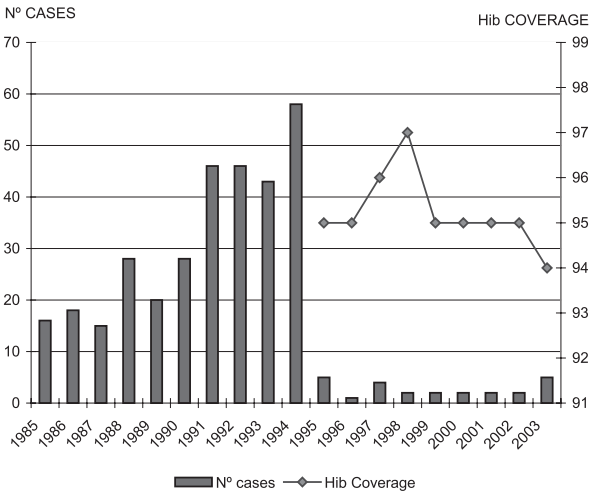
Around 1993, Uruguay witnessed a rise in the number of meningitis cases mainly caused by two microorganisms: a) meningococcus, with an incidence of 3.5 cases per 100,000 inhabitants and a case-fatality of 15.4%; and b) *Haemophilus influenzae* type b, with an incidence of 1.5 cases per 100,000 inhabitants (15.6 cases per 1,000,000 children under 5) and a case-fatality of 9.1%. In light of this situation, in August 2004 the health authorities-following the recommendation of the National Vaccination Advisory Commission, endorsed by Executive decree-added the *Haemophilus influenzae* type b (Hib) vaccine to the country's national immunization schedule. This vaccine is administered free of charge to the target population (all children aged 1-4 years), as follows:

a) Children identified at 2 months of age: three doses at 2, 4, and 6 months, with a booster between 12 and 15 months;

b) Children identified at 7-11 months of age: two doses, with a 2-month interval between them and a booster between 12 and 15 months;

c) Children identified at 1-4 years of age: one dose.

Distribution of Cases of Meningitis Due to Haemophilus Influenzae Type b And Hib Coverages, 1985-2003, Uruguay



Methodology:

A retrospective study was conducted of vaccination coverage and the number of reported cases of meningitis caused by *Haemophilus influenzae* type b from the introduction of the Hib vaccine to date.

Results:

From the introduction of the vaccine in August 1994 to 31 December 1994, 76.6% of the target population was vaccinated. Immunization of the next cohorts of children continued with four doses of monovalent vaccine at 2, 4, 6, and 12 months of age until 1999, when the pentavalent vaccine was introduced. The coverage extends to the new cohorts of newborns for which an individual record is kept and has been equal to or greater than 95% since 2003, when it was 94%. The number of Hib meningitis cases fell from 58 in 1994 to 5 in 1995. Since 1995, cases have averaged 2 per year, usually in children that have not been vaccinated at all or have not been fully vaccinated or adults (Figure). Case-fatality fell from 9.1 in 1993 to 0 in 2003.

Conclusions:

The significant reduction in the number of meningitis cases in Uruguay since the introduction of the Hib vaccine can be attributed to the intervention, demonstrating the benefits of this type of measure, which makes it possible to control important health problems while at the same time lowering the cost of care.

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The Epidemiology of Human Papillomavirus Infections and the Current Status of HPV Vaccines

Lewis MJ[1]

Introduction:

Human papillomaviruses (HPV) are epitheliotropic DNA viruses that infect humans and result in a spectrum of conditions, including benign skin and genital warts, as well as cervical cancer. This paper focuses specifically on cervical carcinoma, as it is the sequela of greatest public health importance. Carcinoma of the uterine cervix remains a significant cause of morbidity and mortality among women in the Region of the Americas, where it is been estimated to cause 92,136 incident cases and 37,640 deaths annually.

Epidemiology:

Early age of first coitus, high parity, multiple lifetime sexual partners, and contact with males with multiple partners or prior partners with genital neoplasia have all been consistently identified as risk factors for cervical cancer. Clinical and molecular epidemiologic studies have confirmed the presence of HPV DNA in cervical carcinomas and their precursor lesions. High-risk HPV types have been identified in over 96% of cervical cancers worldwide, with HPV 16 being present in 50% of cervical carcinomas, and types 18, 31, and 45 in another 30% of cases. Based on a pooled analysis of 11 case-control studies from nine countries, it has been estimated that the pooled odds ratio for squamous-cell cervical carcinoma associated with HPV DNA positivity was 158.2. Although a central and necessary role for HPV has been established in the pathogenesis of cervical cancer, cigarette smoking, hormonal contraceptive use, nutritional deficiencies, and human leukocyte antigen haplotypes may be important co-factors for progression from persistent infection to cervical neoplasia.

Recent Developments in the Area of HPV Vaccines:

A series of vaccine trials using monovalent as well as quadrivalent HPV virus-like particle (VLP) L1 vaccines have been conducted in human subjects to assess safety, immunogenicity, and dose ranging. To date, all studies have demonstrated that these vaccines are well tolerated and highly immunogenic, even without adjuvant. Seroconversion rates have been very high, in many instances resulting in serum antibody levels that are significantly higher than those observed in natural infections. Robust B-cell and L1-specific T-cell responses to HPV16 VLP vaccines have also been documented among vaccinees. Additionally, no serious adverse experiences other than injection site reactions have been reported. Antibody persistence has been noted up to 36 months post vaccination.

Public Health Policy Challenges:

There are a number of questions for consideration from a public health policy perspective regarding HPV vaccines. Since the main public health goal of an HPV vaccine should be to reduce the incidence of cervical cancer and its precursor lesions, the target population for vaccination needs to be carefully selected, especially in resource-constrained settings. Vaccine acceptability and service delivery strategies would also require thoughtful review if adolescents are to constitute the target population. The need for continued secondary prevention screening programs for cervical cancer must be emphasized, as women will remain at risk for the development of cervical cancer associated with oncogenic HPV types not contained in the vaccine. Additionally, unvaccinated women, as well as women already infected with HPV, will require screening. In other words, cervical cancer prevention programs must be adjusted and realigned to ensure maximum synergy between the primary and secondary prevention arms and high overall program cost-effectiveness.

Conclusions:

Although an HPV vaccine for the prevention of cervical cancer is not immediately available, agencies such as the Pan American Health Organization, as well as its constituent Member States, need to initiate relevant preparatory discussions and commence rational planning for its introduction.

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Session 3
Introduction of New Vaccines in the Americas

Influenza

National Plans in Preparation for an Influenza Pandemic: A Public Health Priority

Oliva O[1], Ropero AM[2]

Background:

Influenza is one of the infectious diseases held responsible for the greatest annual burden of disease worldwide. Furthermore, it can cause pandemics with great social disruption and economic losses. The 20th century witnessed three influenza pandemics: Spanish flu in 1918, Asian flu in 1957, and Hong Kong flu in 1968. The most well-known of the three is Spanish flu, which caused between 20 and 50 million deaths globally. This pandemic was characterized by its rapid spread and high mortality in young adults. The other pandemics also resulted in high mortality, although not as high, and mainly affected older people and people with chronic diseases. Although it is impossible to predict when the next pandemic will strike, historical evidence and current scientific knowledge make it possible to predict that the conditions are ripe for the emergence of a pandemic strain. Furthermore, contemporary factors can favor the appearance of pandemics. Among such factors are the ease of intercontinental travel, the growth of urban populations, the aging of the population, and the increase in the number of people with chronic diseases and immunosuppressive disorders. Considering all these aspects, since 1999 WHO has provided technical guidelines for the preparation of a national Influenza Pandemic Preparedness Plan (IPPP). The recent SARS epidemics in Asia and North America and the human cases of avian flu in Asia have demonstrated the need for countries to make adequate preparations to deal with highly complex health emergencies, such as that caused by an influenza pandemic.

Methodology:

PAHO is collaborating with the countries of the Region in the promotion of training workshops on influenza surveillance and diagnosis. All the countries in the Hemisphere have participated in these workshops at least once. The Organization is also promoting the development of IPPP in political and scientific forums. In 2002, a workshop for the Southern Cone countries was held in Chile. Similar workshops have been programmed in the other subregions for the period 2004-2005. These workshops will use a model national preparedness plan for an influenza pandemic that WHO is developing and that PAHO will adapt to the characteristics of the Region.

Results:

As a result of the workshop for the Southern Cone countries, the preliminary versions of the plans of Argentina, Brazil, Chile, and Uruguay are available. The results from the surveys conducted among 35 managers of immunization programs in the Region indicated that 43% note the existence of an IPPP, but at the same time the majority of the respondents reported that there is poor coordination with the other individuals responsible for implementing the plan in their countries.

Conclusions:

Although several countries have begun preparing an IPPP, the initiative is still in the preliminary phase. Preparation and validation of such plans should become a political and financial priority. The countries that have not yet begun preparation of an IPPP should make this activity a public health priority without delay.

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Status of Influenza Vaccination in the Region of the Americas

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Background:

Influenza is a viral disease that strikes millions of people worldwide and causes fatal complications in approximately 1 million people every year. However, many of these cases and deaths can be avoided through the use of safe, highly effective vaccines. The 56th World Health Assembly, held in May 2003, urged the member countries to increase influenza vaccination coverage in all high-risk groups and to achieve 50% coverage in people over 65 years of age by 2006 and 75% coverage by 2010.

Methodology:

With the objective of determining the current status of influenza vaccination in the Region, a survey of the managers of national immunization programs was conducted and the publications on influenza in the countries were reviewed, along with information on the procurement of influenza vaccines through the PAHO Revolving Fund.

Results:

Thirty-five responses to the survey were received, 20 from Central American and South American countries and 15 from countries or territories in the English-speaking Caribbean. Influenza vaccination has been introduced in 37% of them (Table). In other countries, vaccination is carried out only in the private sector. The formulation used and the time of the year when the vaccine is administered vary with the country's geographical location.

Country	Year introduced	Target population	Coverage in 2004
Chile	1975	65+ Persons with chronic diseases Pregnant women Health workers	96.5% 100% 58% 100%
Cayman Islands	1980	More than 6 months to 5 years Over 50 years Persons with chronic diseases	n.a. *
Argentina	1993	65+ Persons with chronic diseases	n.a. *
Bahamas	1994	Over 6 months to 5 years 65+ Persons with chronic diseases	n.a. *
Uruguay	1996	Over 6 months to 2 years 55 + Persons with chronic diseases	n.a. *
Mexico	1997	Over 6 months to 2 years Over 60 years Persons with chronic diseases	n.a. *
Bermuda	1999	65+ Persons with chronic diseases	43% (2003)
Brazil	1999	60+ Persons with chronic diseases Indigenous persons	85%
Cuba	1999	65+	90% (2003)
Honduras	2003	50+, concentrated in homes and shelters, and the health workers that serve them	92%
Saint Vincent and the Grenadines	2003	6+ months to 2 years	100%
Costa Rica	2004	6+ months to 5 years 65+ with chronic diseases	70% n.a. *
El Salvador	2004	6+ months to 12 years with chronic diseases 65+	n.a. * 96%

** n.a.: Not available.*
Source: Country survey, 2004; Canada and the United States are not included.

Among the countries, 66% had epidemiological surveillance systems for influenza, based on sentinel sites. Brazil is making significant epidemiological monitoring efforts to determine viral circulation in tropical areas, basic information for issuing recommendations for vaccination in those regions. Chile is the country with the longest experience in vaccination in the Region; in the 2004 campaign, in addition to vaccinating the traditional risk groups, it included the vaccination of pregnant women and health workers. In order to introduce the vaccine properly, Costa Rica improved its epidemiological surveillance system and conducted a cost-benefit study to support its influenza vaccination plan. The countries purchase influenza vaccines from different producing laboratories, and in the last two years only six have purchased these vaccines through the PAHO Revolving Fund.

Conclusions:

Influenza vaccination is gradually being introduced in the Region, and the WHO recommendations concerning the target population are being adapted. Many countries lack data on the vaccination coverage achieved, but those that do have exceeded the goals set by WHO, which suggests that influenza vaccination is becoming increasingly important in the countries of the Region. Strengthening surveillance is key in determining the formulation and proper time for administering the vaccine in each region, especially tropical areas where more information is needed to understand the viral circulation pattern. There are successful experiences in the Region with regard to extending vaccination to other at-risk groups and support for decision-making on the systematic introduction of the vaccine at the national level. The countries could explore mechanisms for purchasing the vaccine through the PAHO Revolving Fund, which could result in quality assurance and lower prices. The best use of vaccines for seasonal epidemics will help guarantee the productive capacity to respond to a future pandemic.

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Influenza Prevention and Control Strategies in Brazil: Beyond the Basics

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Background:

In 1999, Brazil began an annual influenza vaccination campaign targeting persons aged ≥65 years. As of 2000, the target groups have included those aged ≥60 years, and individuals with underlying high-risk diseases. This has been the main strategy for influenza prevention, together with strengthening the influenza surveillance system. This paper presents lessons learned from Brazil's experiences, which have increased the effectiveness of prevention strategies. Strategies for vaccination and social mobilization, as well as enhanced surveillance activities and epidemiological studies, are also described.

Methodology:

Vaccination and surveillance data were obtained from the Brazilian Ministry of Health's Secretariat of Health Surveillance. Considering that the circulation patterns of influenza virus in equatorial areas and the impact of influenza vaccination in these regions are not well established, viral data from the city of Belém, in the Amazon region, for the period of 1983–2003, were analyzed. The principal objective was to determine the main period of circulation of influenza virus in this region. The proportion of samples testing positive for influenza virus was calculated for each 15-day period by dividing the number of samples that tested positive by the total number of positive samples for influenza collected in the period of 1983–2003.

Results:

An increasing number of influenza vaccines are administered nationwide each year. Vaccine use rose from 7.5 million doses in 1999 to 12.9 million doses in 2004, with an overall coverage of 85% among the elderly.

Since the elderly population is a hard-to-reach group, a National Committee for Social Mobilization of the Influenza Campaign was implemented in 2002. This committee includes several partners, and has worked intensively to propose and enable the implementation of innovative communication and mobilization strategies, such as community mobilization and involvement of local health authorities. The proportion of municipalities reaching the goal of 70% coverage has increased from 88.4% in 1999 to 94.9% in 2004.

Virologic surveillance for influenza was implemented in Brazil in the 1980's in three participating sites as a sentinel system, with the objective of identifying circulating strains. Since 2000, this surveillance system has incorporated 29 sentinel sites in 14 states of the country, with the additional objective of monitoring influenza morbidity. In 2004, until epidemiological week 34, a total of 1,128 specimens had been collected nationwide, of which 31.6% tested positive for respiratory virus by indirect immunofluorescence. Of the specimen testing positive for respiratory virus, 39.2% were identified as influenza A; 3.1% as influenza B; 28.8% as respiratory syncytial virus (RSV); 24.4% as adenovirus; and 4.5% as parainfluenza types 1, 2, and 3. The majority of influenza isolates matched vaccine strains. In the same period, 104,799 patients with flu-like illness were attended in the sentinel network (17.2% of the total patients seen), which represents an increase of 55% over the corresponding period of 2003. This reflects the expansion of the sentinel network and the outbreaks that were detected by the National Epidemiological System.

The epidemiological study of virus circulation in Belém metropolitan region included the analysis of 5,732 throat cultures collected at the sentinel site. The main epidemic period for influenza circulation in the tropical region of Belém was shown to be from March to May, indicating that the current vaccination period may not be ideal for equatorial regions in the country.

In 2003, Brazil instituted a National Committee for Influenza Pandemic Preparedness, which has drafted a plan of action. Main activities, including surveillance strengthening, initiating animal surveillance, planning for increased national vaccine production, drafting a communication plan, and restructuring the health system to enable adequate assistance during the pandemic, were proposed.

Conclusions:

In addition to the routine epidemiological evaluation of influenza surveillance, systematic investigations of influenza outbreaks have been conducted. This has allowed to analyze the impact of influenza vaccination and morbidity due to influenza in Brazil. In addition to ongoing activities, epidemiological studies and innovative vaccination strategies are important for the increased effectiveness of influenza control. Also, considering the global pandemic threat, pandemic preparedness activities should be prioritized.

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Impact of Influenza Vaccination on Children Aged 6-23 Months in the Departments of Salto and Paysandú, Uruguay

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Background:

A high prevalence of influenza can be seen in infants and preschool children, with figures sometimes in excess of 30% and even reaching 50% of children in day-care centers. The length of the illness and the virus' shedding period are longer in this population, making it the main transmitter of the virus in the community. Given the unusual activity of flu viruses in the northern hemisphere, the Ministry of Health of Uruguay decided to offer the flu vaccine free-of-charge to all children aged 6-23 months, therefore following the recommendations of the U.S. Advisory Committee on Immunization Practices (ACIP). Since 2001, the country has also been monitoring the impact of pneumonia on children in two departments (Salto and Paysandú, which together account for 9% of births in the country). This baseline population study was a good starting point for examining the impact of influenza vaccination to justify its use in the country.

Methodology:

A case-control study, in which cases and controls were paired by age, is currently under way, targeting children aged 6 to 23 months in all health centers in the departments of Salto and Paysandú. The cases (children hospitalized for acute lower respiratory infections) and the controls (children without respiratory conditions or infections seen in these same institutions) will be selected from 1 June to 31 October 2004, inclusive. The objective is to determine whether there are fewer hospitalizations for lower acute respiratory illnesses (ARI) in vaccinated children than in unvaccinated children. To this end, a sample size of 165 cases and 165 controls was established for each department (case-control ratio of 1:1), with 80% power, a confidence level of 95%, and an OR of 2, considering as a risk factor the lack of complete vaccination (two doses) up to 15 days prior to the recruitment of the case or control.

Preliminary data:

The preliminary results of the case-control study will be presented at the TAG meeting in November 2004. To date, one-third of the cases required for the designated sample size have been recruited. The exposed population (children aged 6-23 months) numbers 3,600 in the department of Salto and 3,150 in the department of Paysandú. The total number of children who received the first dose of vaccine is 1,172 (32.5%) in Salto and 761 (24.1%) in Paysandú; to date, 651 children in Salto (18%) and 393 (12.5%) in Paysandú have received the two doses of vaccine.

Observations:

A late start in vaccination and low coverage have been observed, in addition to a delay in the administration of the second dose. Furthermore, virologically-confirmed respiratory illnesses were also observed at the start of the study, negatively influencing the decision of pediatricians and parents to vaccinate.

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Analysis of Cost-Effectiveness of Influenza Vaccination in Risk Groups: The Perspective of the Health Services in Costa Rica

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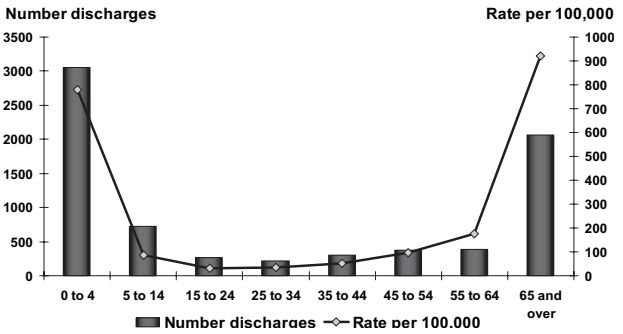
Background:

Based on analysis of the epidemiology of influenza and its complications, the health authorities of Costa Rica implemented a plan of action aimed at improving the monitoring of the influenza virus and orienting measures for the prevention and control of respiratory infections. In order to develop a vaccination strategy, a cost-effectiveness study was conducted on influenza vaccination in children under 5 years and adults 65 years and over with associated chronic diseases.

Methodology:

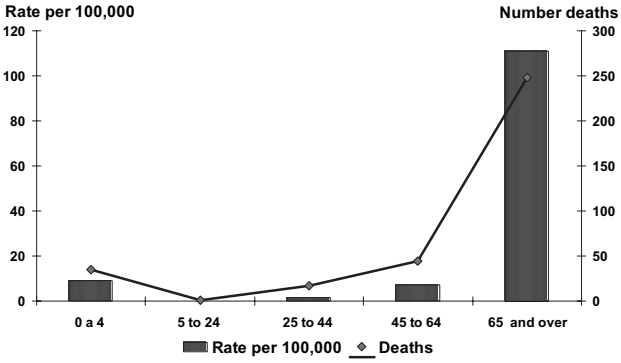
In order to determine magnitude and trends of influenza cases (ICD-9=487, 1991-1996; ICD-10=J10-J11, 1997-2002), the registry of notifiable diseases (MS, 1998-2002), and the database of hospital discharges (Costa Rican Social Security Fund, 1990-2002) were used. The reduction in the number and cost of consultations and hospitalizations resulting from the vaccination of at-risk populations (under 5 years and over 65 years with associated diseases) against influenza was estimated. The following assumptions were used: endemic scenario (IR = 15%) and epidemic scenario (IR = 25%), a 15% to 20% probability of complications, and a 70% vaccine efficacy. Population estimates were based on data from the National Institute of Statistics and Censuses. Vaccination costs included the cost of the biologicals and their administration. Direct expenses were calculated utilizing data reported by the management information system of the Costa Rican Social Security Fund for consultations and hospitalizations.

Number of hospital discharges and rates (per 100,000 population) from influenza and pneumonia* by age groups,Costa Rica, 2002



Source: *Database of hospital discharges, Caja Costarricense de Seguro Social (2002)*
** CIE10=J10-J18*

Deaths and mortality rates (per 100,000 population) from influenza and pneumonia* by age groups, Costa Rica, 2002



Source: *Death registry, Instituto Nacional de Estadísticas y Censos (2002)*
** CIE10=J10-J18*

Results:

Children and older adults presented greater risk of hospitalization (12.0 times higher in those children aged under 5 and 14.2 times higher in adults aged 65 and over) and death (4.9 times higher in children aged under 5 and 61.7 times higher in adults aged 65 and over) in comparison with the group aged 5-64. Comparing an endemic scenario with an epidemic one and estimating vaccine efficacy at 70%, vaccination of the at-risk population against influenza would result in 13,030 cases versus 18,563; 10,424 consultations versus 14,851; and 2,333 hospitalizations versus 3,258. Vaccinating 70% of the target population (79,558 individuals) would cost $4,010,014. The costs that the health services would potentially avoid ranged from $4,034,366 to $5,362,918, depending on the epidemiological scenario. The cost-benefit ratio ranged from 10 to 13, and the net savings per vaccinated person from $46 to $62.

Conclusions:

The availability of a vaccine to prevent influenza offers cost-effective intervention alternatives to the immunization programs of developing countries. On the basis of this study, Costa Rica launched a influenza vaccination campaign in 2004 targeting at-risk groups. It is important to make efforts to prevent influenza through cost-effective vaccination strategies based on an analysis of the epidemiological situation and the identification of intervention alternatives that optimize impact and equity in the allocation of health resources.

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