Protecting the Health of the Americas: Moving from Child to Family Immunization

ABSTRACT BOOK

XVII Meeting of the Technical Advisory Group on Vaccine-preventable Diseases
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Pan American Health Organization
Regional Office of the World Health Organization

Immunization in the Americas: Sustaining Progress and Confronting Future Challenges

The Directing Council of the Pan American Health Organization (PAHO) in September of 2003 called for the elimination of rubella and congenital rubella syndrome (CRS) from the Americas by the year 2010. The initiative to eliminate rubella and CRS from the Western Hemisphere is a consequence of the years of field-based experience in the eradication of polio and the elimination of measles. It also represents an extraordinary national commitment to eliminate rubella, while also sustaining the gains of polio, measles, and control of other vaccine-preventable diseases in the Region.

Of the PAHO Member States, only Haiti has not introduced rubella vaccine into their national immunization program. As of 2006, only seven countries have yet to conduct rubella mass vaccination campaigns. Completion of these activities will require countries to target the most hard-to-reach and poorest populations.

The need to reach underserved communities with life-saving vaccines will persist beyond rubella elimination: this will remain a universal challenge that will never go away. Vaccination Week in the Americas has been successful in helping to maintain the commitment necessary to protect children and their families in the most underserved communities. Since 2003, with the launch of the first Vaccination Week in the Americas, more than 120 million people living in the poorest areas have been vaccinated through this initiative.

Reducing inequities in health services has long been a priority in PAHO's approach to provide immunization technical cooperation to Member States. This principle will continue to guide PAHO's future efforts to support countries in reducing inequities by prioritizing and targeting underserved communities with low immunization coverage. This is essential for sustaining measles elimination in the Americas, eliminating rubella and CRS, improving quality of routine services, and strengthening national capacity to make evidenced-based decisions for introduction of new and underutilized vaccines. PAHO places great emphasis on achieving the Millennium Development Goals and recognizes the benefit of immunization and its potential impact in reaching these targets.

PAHO acknowledges the consistent contribution of all the managers of national immunization programs who continue to break new ground in the field of public health. It has been an honor to work with them. Our immunization team at PAHO is highly committed to assisting countries in providing the best immunization services possible to all children and families of the Americas. I am proud to announce that during this meeting, you will receive among other things, PAHO's new series of immunization field guides and training modules, the 2nd edition of *Recent Advances in Immunization,* recent editions of the *Immunization Newsletter,* and the abstract book of the proceedings of the Technical Advisory Group. Let us re-commit ourselves to continue to work together to improve the health of children and their families in the Americas!

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Director, Pan American Health Organization
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About Our Cover…

Roberto Mamani Mamani, born in Cochabamba in 1962, has become one of Bolivia's foremost painters. Through his work, Mamani Mamani seeks to preserve the lifestyle and culture of the Aymara Indians of Bolivia's altiplano. Committed to his indigenous roots, the Bolivian painter strives to portray the values and principles of the traditional Aymara culture.

Protecting the Family [1], featured on our cover, reflects Mamani Mamani's distinctive style. The painting was inspired by his collaboration with the Pan American Health Organization and his desire to have a positive impact on the situation of the people of the Americas. The theme of *Protecting the Family* reflects the role of each individual family member, along with the support from the community, to attain high immunization coverage and protect the health of the Americas.

XVII Meeting of the Technical Advisory Group on Vaccine-preventable Diseases

Abstract Book

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Preface

Protecting the Health of the Americas: Moving from Child to Family Immunization

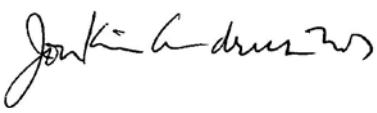
"In the 27 years since the Expanded Program on Immunization was launched in the Americas, polio has been eradicated and measles has been eliminated. Perhaps more importantly, thousands of health workers working at the point of service have been trained in the principles of good public health practice 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."

The above was written for the 2004 TAG Abstract Book. In two years, nothing has changed. What has become more obvious for everyone are the enormous challenges of sustaining national immunization programs to accomplish the following:

- Complete the unfinished agenda. This includes eliminating rubella and congenital rubella syndrome, sustaining the gains achieved with polio eradication and measles elimination, and improving coverage and services in communities with low coverage;
- Introduce new and underutilized vaccines to reach new disease reduction targets, such as the Millennium Development Goals. Such vaccines include those against influenza, rotavirus, pneumococcus, and human papilloma virus (HPV) infections; and
- Finish the transition from child to family immunization.

The Revolving Fund remains a cornerstone of technical and operational support that PAHO provides Member States. Building on past successes with the introduction of MMR (measles-mumps-rubella), pentavalent and influenza vaccines, the Revolving Fund has begun to focus on accelerating sustainable access to new generation vaccines for all vulnerable children and adults in the Region. PAHO must position the Fund to complete the unfinished agenda and to achieve the other disease reduction targets. A strong Revolving Fund can help ensure that new technologies are made available in a sustainable fashion to those who need them most, in concordance with the overall priorities of the country.

The elimination of neonatal tetanus, expansion of seasonal influenza vaccination, and now the initiative to eliminate rubella and congenital rubella syndrome, provide countries with the unprecedented experience of adult vaccination. Bridging childhood immunization to family immunization will be critical for improving influenza coverage. Other essential by-products of this activity will be reaching more people with new life-saving vaccines for HPV and HIV when they become available. But to achieve these results, we will need extraordinary levels of Regional solidarity, expressed politically as unanimous endorsement of the transition to family immunization and practically as full participation in the Revolving Fund for vaccine purchases.



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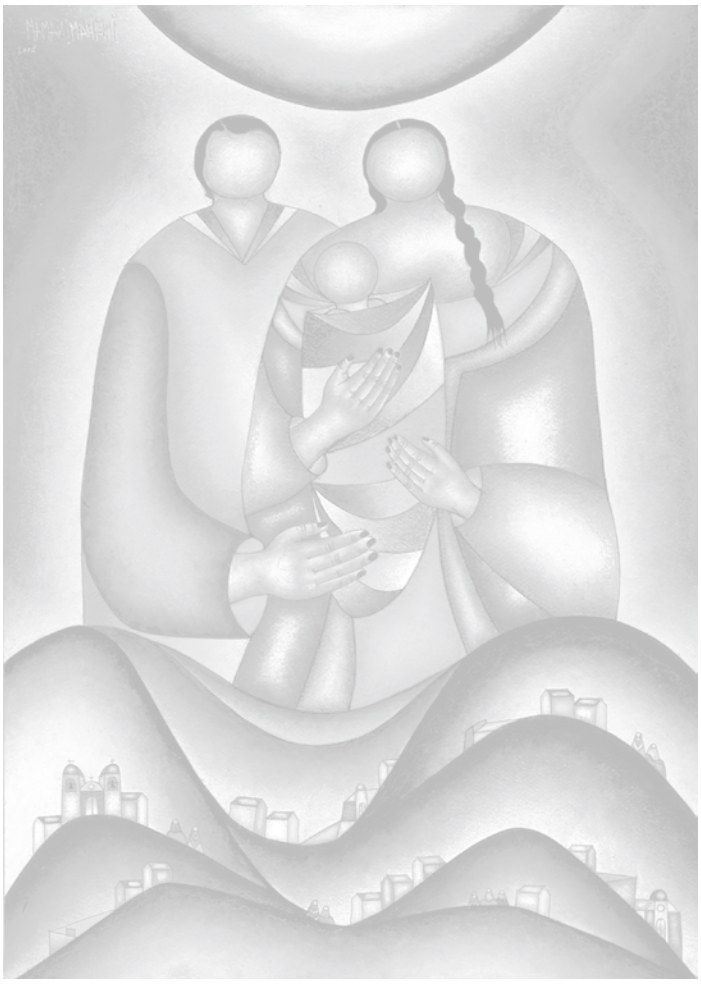
Part 1: Disease Control and Eradication

Rubella and Congenital Rubella Syndrome Elimination in the Americas



Rubella and Congenital Rubella Syndrome Elimination in the Americas: Fast Becoming A Reality

Castillo-Solórzano CJ[1], Morice A[1], Andrus JK[1]

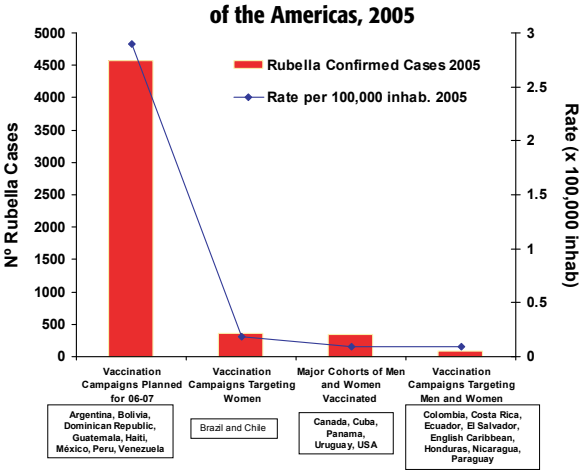
Introduction

Vaccination strategies for the elimination of rubella and congenital rubella syndrome (CRS) in the Americas have shown rapid progress to date. By June 2006, 84% of the countries and territories of the Americas had implemented vaccination plans (accounting for 75% of the population of the Region) and obtained coverages >95%. The seven remaining countries will conduct campaigns in the first six months of 2007. Countries such as Mexico and Venezuela, which faced measles outbreaks in 2006 and had not implemented vaccination campaigns against rubella, designed rapid measles-rubella (MR) vaccination strategies that were implemented by stages to control the outbreak and eliminate rubella. In this summary we review the impact of vaccination strategies on the elimination of rubella and CRS.

Methods

The change in the incidence of rubella and CRS was analyzed by groups of countries in relation to the state of implementation of the vaccination strategy for elimination using weekly epidemiologic surveillance reports. The trend of comprehensive measles-rubella surveillance indicators, efforts to improve CRS surveillance, and the most frequent genotypes identified in the Region of the Americas are described.

Figure 1. Rubella Confirmed Cases and Rates According to Elimination Strategies Implemented by Countries, Region of the Americas, 2005



Source: Country reports to Immunization Unit, PAHO.

Results

The number of confirmed cases of rubella decreased by 98% between 1998 and 2005 (from 135,947 to 5,209). The impact in 2005 was greater in countries that vaccinated men and women (N = 51 rubella cases, rate = 0.05 per 100,000), ahead of Brazil and Chile, where only women were vaccinated (N = 201, rate = 0.1 per 100,000). Rubella incidence was greater in the group of countries that have not yet implemented vaccination campaigns (N = 4,578, rate = 2.9 per 100,000) (Figure 1). Comprehensive surveillance of measles and rubella has been strengthened. By epidemiologic week 24 of 2006, 97% of suspect cases had been discarded by laboratory. Prior to implementing the elimination strategy, less than 20% of rubella cases were confirmed by laboratory or epidemiological link; this figure rose to 96% in 2005. The percentage of cases with adequate investigation must be improved; in 2006, it was only 80%. Moreover, it is necessary to improve the timeliness of sample shipment (54% of samples reach the laboratory in 5 days) and the reporting of laboratory results (63% are reported in 4 days). The best public health practices are being identified to advance CRS surveillance at the primary care level, strengthening the capacity to diagnose health problems in health services and the implementation of consultations for congenital infections. In 2005, 1,952 suspect CRS cases were reported and 16 of them were confirmed. By epidemiological week 24 of 2006, 342 suspect CRS cases had been reported and one of them was confirmed. Important advances have been made in the development of laboratory capacity to detect and isolate rubella viruses, increasing knowledge of the endemic genotypes in the Region. The most frequent genotype is 1C, followed by 1E, and 1D. Epidemiological investigation linked to the last two to imported cases. The countries that have implemented vaccination strategies are documenting the interruption of endemic transmission as a step toward completing the verification process. This process includes the review of routine vaccination coverage, monitoring MR vaccine campaigns, evaluating the impact of vaccination on rubella epidemiology, active case-finding, monitoring compliance with surveillance indicators, and virus detection and isolation.

Conclusions

As a result of immunizing adolescent and young adult male and female populations, a significant impact in rubella and CRS incidence has been achieved. This initiative is helping to consolidate the elimination of measles in the Region. With CRS surveillance, the diagnostic capacity of health services is being reinforced to promptly detect and treat infant disabilities. Improved virus detection and isolation is contributing to the identification of circulating endemic rubella virus in the Americas.

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Outbreak of Rubella in Southwestern Ontario in 2005: Challenges for Rubella Elimination in Canada

Macey J[1], Tipples G[2], Dolman S[3], Wilson-Clark S[4]

Introduction

Despite occasional outbreaks, the incidence of rubella has continued to decline in Canada over the past two decades (Figure 1). Together with immunization of female adolescents and susceptible women of childbearing age, routine infant immunization with MMR (measles-mumps-rubella) vaccine was introduced in 1983, followed by a two-dose program in 1996-97. Outbreaks have been limited to gaps in overall population coverage (pre-1997) or under-vaccination of individuals and communities (e.g., immigrants or groups declining immunization). A 2005 outbreak in southwestern Ontario is described as an example of the latter issue, which presents a more enduring challenge to disease elimination in Canada.

Methods

Analysis of routine surveillance data for rubella in Canada (1980-2005) was conducted to describe disease trends and illustrate current challenges for disease elimination. Description of the detection, evolution, and response to the 2005 Ontario outbreak is provided as an example of occasional outbreaks that occur due to under-vaccination in individuals/communities, one of the key remaining challenges for elimination of rubella in Canada. Following an alert to an ongoing outbreak of rubella in a religious community in the Netherlands, the first confirmed case in Canada was identified on 21 April 2005 in a closely linked religious community in southwestern Ontario. Further case finding, conducted through contact tracing and outbreak investigation, identified cases occurring from as early as 1 February 2005 until 12 June 2005.

Results

With the introduction of routine infant immunization programs for MMR in 1983, the annual incidence of rubella decreased from an average of 18 cases per 100,000 (1979-1983) to less than 5 cases per 100,000 (1984-1997) (Figure 1). Nevertheless, epidemics of rubella occurred every 3 to 10 years with incidence peaking both in the spring and winter months. In the past eight years, outbreaks have largely been restricted to isolated clusters of unimmunized people. In 2005, a total of 311 cases of rubella were reported from 1 February to 12 June 2005 in association with an outbreak in a religious community (99% of cases) in southwestern Ontario. The median age of cases was 10.7 years (range 1-43 years), male to female ratio was 1.07:1.00. Thirteen percent of cases were in women of childbearing age and ten cases occurred in pregnant women. Most (98.7%) of the cases were unvaccinated. The viral genotype was determined for three cases in Canada, all of which were a newly identified genotype, 1g. Thus far there have been no cases of CRI/CRS reported in association with this outbreak.

Conclusions

In Canada, routine infant and childhood catch-up immunization programs have resulted in sustained high rates of immunity in the general population. Together with CRS-specific policies to screen 100% of pregnant women for rubella and to offer immunization to all women who are susceptible postpartum, Canada is making progress towards elimination of indigenous rubella infection in pregnancy. Yet while the rarity of CRS/CRI in Canada is a reflection of the impact of these rubella elimination strategies, the risk of importation and limited transmission remains. As demonstrated by the 2005 outbreak in Ontario, rubella cases in Canada are limited to under-immunized individuals or groups within the general population (98.7% of cases in outbreak were unimmunized persons associated with a religious community). With established high MMR coverage rates, these outbreaks have not resulted in transmission outside of the affected individuals/groups. Reinforcement of standard response measures to the Ontario outbreak, including offering vaccination; implementing school exclusion, isolation and quarantine; restricting community gatherings and travel; and providing education, were used with varying success. However, unimmunized individuals including those philosophically opposed to immunization as well as those immigrating to Canada will continue to pose a risk for future outbreaks.

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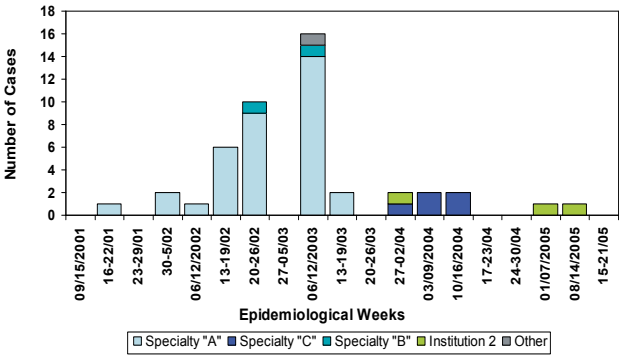
Rubella in Chile: An Institutional Outbreak in Region V, January–April 2005

Gallegos D[1], Muñoz JC[2], Chiu M[1], Diaz J[2], Fasce R[3], Torres G[3], Olea A[1], González C[1] and others [4]

Introduction

Chile introduced measles-mumps-rubella (MMR) vaccination for one year-old children in 1990. The incidence of rubella in the infant population declined, but the susceptible groups were displaced: 70% of cases reported in 1997-98 were individuals aged 10-29 years. Consequently, a national vaccination campaign was conducted targeting 1999 in women (age 10-29 years). The incidence of rubella declined from 31 to 1.9 per 100,000 population between 1998 and 2002, but isolated cases of laboratory-confirmed rubella continued to occur (one in 2003 and three in 2004). In 2005, the first post-campaign outbreak occurred, which affected 46 young men in institutions in Region V of Chile. The epidemiologic characteristics of the outbreak and effectiveness of response measures were analyzed**.**

Figure 1. Rubella Cases According to Epidemiological Week and Specialty, Valparaíso Region, Chile, January- May 2005



Source: Ministry of Health, Chile.

Methods

A descriptive study was conducted to characterize cases by gender, age, immunization history, association with the institution, symptoms, and others. A suspected case was: *"every person of any age who studies or works at the Naval Academy or lives in Region V and presents exanthema or lymph node enlargement, accompanied or not by fever or a febrile sensation, from December 2004 to May 2005.* A confirmed case was "*every suspected case that was confirmed by laboratory serology (Public Health Institute) or an epidemiologic link to a confirmed case".* Regular surveillance was intensified using an institutional active case-finding protocol throughout the country, especially at the Naval Hospital and health establishments in Region V. In every suspect case (institutional or community), a serum sample was obtained and processed by IgM capture ELISA for rubella. Pharyngeal swab samples were collected for viral isolation, PCR confirmation, and genotyping of the rubella virus.

Results

The index case was a male aged 19 years and a Specialty "A" cadet of the naval institution, who exhibited his initial symptoms on 21 January 2005. During the probable exposure period, he had attended New Year festivities. Out of 1,460 people exposed to the index case in Specialty "A", 35 cases were confirmed (attack rate = 2.4%). On 21 February 2006, the outbreak spread to Specialty "B" (2 cases) and Specialty "C" (5 cases). Three rubella cases were confirmed in an academic institution of Region V that had no apparent epidemiologic link with the naval institution. Median age was 19 years (range = 18 - 31 years). Most cases had not been immunized. Ninety-six percent (n = 44/46) presented exanthema, 59% lymph node enlargement, 33% arthralgia, 30% runny nose, 26% conjunctivitis, and 20% fever. Two cases required hospitalization for widespread lymph node enlargement. Twenty-five cases were confirmed by serology, one by viral isolation, and the rest by epidemiologic link. The Public Health Institute isolated and typified the rubella virus by PCR. Genotype 1C was identified by sequencing at Fiocruz Laboratory (Brazil). During active case-finding, 473,685 records were reviewed in the country and 73 suspect cases were detected and investigated. Ring vaccination activities with MR vaccine in Specialties and classes of the affected institutions were performed. An immunization campaign was implemented in subjects aged <40 years at the Naval Institution, achieving a coverage of 96% (12,000 MR doses). Institutional quarantine measures were applied to exposed subjects, and family members (contacts) were investigated and immunized to prevent the occurrence of cases at community level.

Conclusions

Since the rubella virus in Chile has only been recently identified (1C), it is impossible to know whether the outbreak was the result of an importation or of a genotype circulating in the country. The outbreak revealed the existence of susceptible groups of young men. Therefore, the feasibility of vaccinating risk groups with MR in order to attain the goal of disease elimination in Chile and the Americas is being analyzed.

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3 Respiratory and Exantemateous Virus Laboratory, Virology Division, Public Health Institute, Chile.
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National Vaccination Campaign in Adults for Rubella and Congenital Rubella Syndrome Elimination: Lessons Learned, Colombia, 2005

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Introduction

In 2003, Colombia made the commitment to eliminate rubella and congenital rubella syndrome. As part of this effort, the largest national vaccination campaign in the history of the Expanded Program on Immunization of the country was conducted from August to November 2005. The goal was to vaccinate the entire male and female population (18,238,443) aged 14-39 years with the measles–rubella vaccine (MR). The objective of the campaign was to stop the endemic transmission of the rubella virus and maintain measles elimination. The lessons learned are described below.

Source: Ministry of Health, Chile.

Methods

The recorded vaccination information was analyzed: total for the country, departments, and towns by gender and age groups (14 years, 15-19 years, 20-24 years, 25-29 years, 30-34 years, and 35-39 years). For the duration of the campaign the expected number of pregnant women was subtracted. The key strategies of the campaign were i) social mobilization and information dissemination by mass media throughout the entire country; ii) vaccination of confined populations (schools, universities, factories, workplaces, military barracks, discotheques, etc.); iii) vaccination of the transient population using different modalities (permanent and mobile posts); iv) door-to-door vaccination on weekends, with schedules extended into the night, early morning, and holidays; and v) organizing the campaign with support from political and technical operative committees at all levels (national, departmental, and municipal), active participation of Colombian societies of pediatrics and obstetrics, and the permanent presence of international PAHO/WHO consultants in large cities of the country.

Results

Several critical obstacles occurred at the beginning of the campaign. These included the death of a young adult coinciding with post-vaccination, which almost stopped activities throughout the country, poor participation from medical insurers in vaccinating their members, and insufficient dissemination of the campaign in the mass media due to high costs, which initially led to an extension of the campaign to 31 December. However, since the minimum goals set in some cities were not reached, vaccination continued throughout the Vaccination Week in the Americas (April 2007). A campaign was implemented to provide another opportunity for vaccination on 24 June, under the slogan *"This is the Day to Catch Up!"* An innovative promotion strategy had a quick impact on the social mobilization and awareness of the community, "dressing" the main cities with rubella spots during the week of 20-24 June (Figure 1). To date, Colombia has achieved a coverage of 96.3%, (17,560,859). By gender, the coverage was 92.1% in males (8,390,755) and 99.6% (9,170,104) in females. Age groups with coverage >95% were those from 14-19 years and 20-24 years; the age group from 25-29 years had a 91% coverage and the age groups from 30-34 years and 35-39 years had coverages of 82% and 88%, respectively. Large cities such as Bogotá, Cali, and Medellín, had coverages > 95%.

Conclusions

Since the vaccination campaign, no rubella case has been reported. The lessons learned about vaccination strategies in adults are as follows:

1. It is essential to plan for crisis situations during the campaign;
2. To conduct the campaign, participation of all institutions in the sector and extensive dissemination of information for rapid impact on social mobilization and community awareness is needed;
3. Different modalities of engagement of the adult population for vaccination are required and the campaign should be conducted in short time period; and
4. The decisiveness, spirit, and commitment of health workers is needed so goals are achieved.

1 Ministry of Public Health, Colombia.
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Lessons Learned from Rubella Vaccination, Nicaragua, 2005

Malespin O[1], Pedreira C[2]

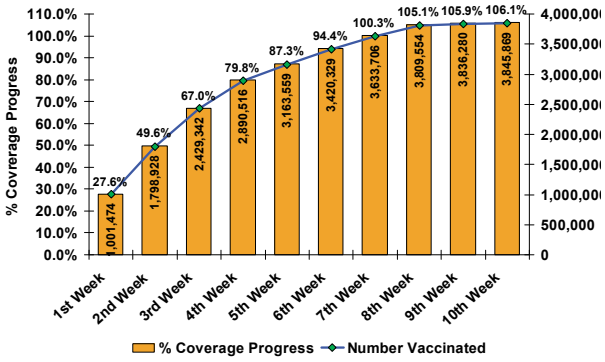
Introduction

As a result of the commitment of countries of the Region to eliminate rubella and congenital rubella syndrome (CRS) by 2010, Nicaragua implemented a national rubella vaccination campaign in October and November 2005. What was innovative about the campaign was the objective of vaccinating adolescents and adults, which required a double effort in planning and organizing. The goal was to vaccinate all male and female aged 6-39 years, equivalent to a total of 3,623,606 people or 67% of the Nicaraguan population. The purpose of this abstract is to share Nicaragua's experience with mass vaccination of adolescents and adults. The key points to the success of the campaign are described, with emphasis on the lessons learned from vaccinating adolescents and adults.

Methods

Data compiled in daily reports were used, as well as records from SIVAC (Spanish acronym for Information System on Vaccines Applied in Campaigns) developed by the Ministry of Health of Nicaragua.

Figure 1. Weekly Progress of Vaccination Coverage During 2005 Campaign up to 15 December, Nicaragua, 2005



Source: SIVA, Ministry of Health, Nicaragua, 2005.

Results

Planning and organizing of the campaign required intense efforts to obtain the necessary resources and to secure agreements and commitments from various stakeholders. The agreement signed with the owners of the main television and local radio stations was noteworthy as it allowed the simultaneous broadcast of a telethon for 4 hours at the beginning of the campaign throughout the country. The communication strategy included a jingle and colorful materials, attractive to different age groups. During the campaign, an operations center was used that remained open seven days a week to receive data and issue daily bulletins to authorities, partners and news media. Different strategies were used to facilitate community access to the vaccine. Twenty thousand soldiers joined health workers to support vaccination efforts in their communities. By the end of the campaign, 3,845,869 people had been vaccinated. The goals were met in every age group. Coverage was confirmed by rapid coverage monitoring. Thirty-nine percent of the population was vaccinated in vaccination posts located in health services or in high-traffic locations, 36% in workplaces or educational institutions, and 25% in door-to-door visits. Nicaragua managed to reach its goal despite confronting an epidemic of dengue, intense rain that isolated communities, a strike by medical workers, and hurricane Beta, consistently finding a way out of the crisis and identifying opportunities to advance.

Conclusions

Many lessons were learned about vaccinating adolescents and adults. Among them were the importance of having political backing at key moments, intense work during planning and organizing, solid partnerships with the mass media, suitable tools for dissemination and promotion, well-designed vaccination strategies, the commitment of health workers and as many organizations, institutions, and sectors of the community as possible, investment in staff training to strengthen the EPI, permanent communication to reinforce the feeling that everyone is taking part in the campaign and that success is the result of a joint effort; and taking advantage of opportunities to strengthen the campaign when faced with emergencies and crises. The percentage of vaccinated differs from the percentages reported by other countries, which could be attributed to the intense mobilization efforts developed in Nicaragua and the commitment of the population visiting the vaccination posts. However, it could also be the result of the social characteristics of the country, which has a high number of occasional workers or unemployed, thus reducing the number of people recruited in the workplace. Motivation and hard work were the keys to success. Implementation of this campaign demonstrated that even under difficult socioeconomic and epidemiologic conditions, opportunities can be found and short-term targets can be met.

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Lessons Learned from the Rubella Vaccination Campaign, Paraguay, 2005

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Introduction

Paraguay estimated that 751 cases of congenital rubella syndrome (CRS) would occur from 2002 to 2016. To avoid them, a mass vaccination campaign was implemented with the objective to eliminate rubella and CRS and consolidate measles elimination. From 23 April to 31 May 2005, Paraguay planned to vaccinate 3,724,355 men and women aged 5-39 years (65% of the population) in three stages, each with specific modalities of capture and goals: the majority of captive population in four weeks (80%), national door-to-door vaccination day or "D-Day" (15%), and a combination strategy or "Additional Chance" (5%). The lessons learned are described in this abstract.

Figure 1. Vaccinated Population by Age Group and Gender, National Immunization Campaign, Paraguay, 2005

Source: Minister of Health, Paraguay.

Methods

In order to analyze the results, describe the lessons learned, and determine the real coverage in every district, we reviewed the information system. This system included the name registry by age and gender, the registry of unvaccinated for follow-up, the registry of vaccinated from other municipalities or "outside the area", and the results of the process for certification of compliance with the goal through Rapid Coverage Monitoring (RCM) (external verification). We also analyzed reports from the supervisory teams, the director of promotion, local support committees, graphic materials, and the report of the national meeting for campaign evaluation.

Results

Seventy-seven percent of the goal was reached during the stage targeting the majority of the population. On 7% of the goal was reached on "D-Day" due to insufficient human resources to cover the entire country on a single day. The results of the "Additional Chance" exceeded initial expectations with 15.7% of the campaign. The contributions of police forces, the additional vaccinators, and the registry of non-vaccinated were determinant factors. The campaign achieved an overall figure of 99.7% of the target population (Figure 1); 7,520 RCM confirmed that all of the municipalities (232) vaccinated ≥95% of their target population in all age groups. The name registry made it possible to certify the vaccination of those who did not have immunization cards. The organizers and the President of the country received the certificate of reaching the goal of the campaign to eliminate rubella in Paraguay. The success of the campaign was due to direct involvement in the campaign of political and community leaders, mass media, and scientific societies. These individuals and organizations made the campaign a topic of interest in many circles. Private physicians coordinated *Immediate Response Groups* to respond to possible crises. Police forces helped to get the community vaccinated. For D-Day, additional vaccinators were required and it was necessary to use regular thermos that had been certified by a temperature conservation test. For each phase of the campaign, there was a mass communication plan with participation of TV and radio celebrities.

Conclusions

The experience gained by implementing the strategies used in the campaign are evidence that:

1. The awareness and combined efforts of scientific societies and opinion makers are necessary to generate commitment to the campaign and secure the confidence of the community;
2. "D-Day" should be considered an expression of political commitment and a key social mobilization strategy to conduct door-to-door vaccination activities;
3. Goal verification at municipal level involves local authorities and stimulates healthy competition between towns;
4. A communication plan with flexibility for changes helps resolve unforeseen problems; and
5. Microplanning formats, local registries, information system graphs, maps or diagrams, and RCM are useful to identify groups of non-vaccinated.

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Progress of the Rubella and Congenital Rubella Syndrome Elimination Plan in Guatemala

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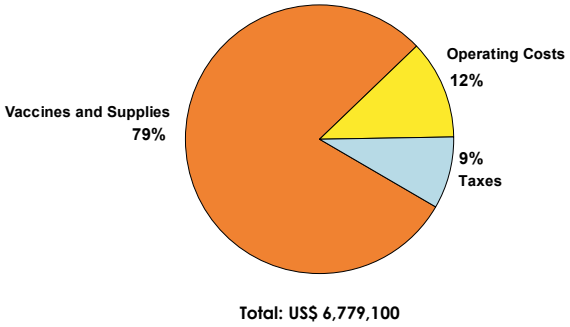
Introduction

Guatemala introduced the measles-mumps-rubella vaccine (MMR) in 2001 in the regular immunization schedule for children aged one year. Also, measles-rubella vaccine (MR) was used in the follow-up campaign for measles elimination in 2002, with a 95% coverage. In this abstract, we describe the progress in the implementation of the plan for rubella and congenital rubella syndrome (CRS) elimination that the country prepared in 2004. We particularly describe the preparation of the MR vaccination campaign targeting adolescents and young adults of both sexes to be conducted in the third 2006 quarter.

Methods

The components of the elimination plan, which was updated in 2005, are reviewed: a) comprehensive epidemiologic surveillance of measles and rubella; b) CRS surveillance in sentinel hospitals; c) campaign targeting adolescents and adults and the results of cost-benefit estimates of the intervention. Advances in the implementation of the vaccination campaign also are described.

Figure 1. Estimated Budget for the Rubella Campaign by Item, Guatemala, 2005



Source: Ministry of Health, Guatemala

Results

Starting in 2005, the definition of a suspect case was changed to febrile rash illness to improve sensitivity. The country currently satisfies international indicators for comprehensive measles/rubella surveillance except for the timely receipt of samples in the laboratory. CRS surveillance was recently implemented in two hospitals of the capital city. They have the largest number of births and greatest number of neonate consultations. Both hospitals are national reference institutions and one belongs to the social security network. The cost-benefit analysis of the campaign yielded a ratio of ~1:19; in relation to the cost of providing care for 2,225 CRS cases expected in a five-year period, with savings of US $144.5 million. The vaccination campaign in men and women aged 7-39 years, representing 64% of the total population (8.1 million), is a major challenge for the country due to the high proportion of rural residents, multiple indigenous groups, the scarcity and unequal allocation of human resources for health, and the need to seek international cooperation to ensure the financing of vaccine procurement. The Ministry of Health (MOH) paid almost all the costs of other supplies, import taxes, shipment costs, and most of the mass communication and operating expenses, disbursing a total of 27%. The MOH has developed and implemented a strategy to mobilize public opinion and financial resources through the Interagency Coordination Committee (ICC) to negotiate financing, mainly for the vaccines to be used in the campaign (Figure 1). It also has mobilized resources from national organizations, such as the Social Security Institute, to finance 33% of the supplies. The characteristics of the population have led to the design of a special mass communication strategy in which the private sector is playing a prominent role. Moreover, together with providing technical documents, efforts have been made to increase the awareness and training of health personnel and the creation of intersectoral regional committees.

Conclusions

For the country to eliminate the two diseases caused by the rubella virus and to remain free of measles, the vaccination efforts needed require vigorous government leadership, an effective and timely response by the international community, and civil society determination. As the date of the campaign approaches, different mobilization and mass communication strategies should be applied.

1 Expanded Program on Immunization, Ministry of Health, Guatemala.

2 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., Guatemala.

Vaccination Strategies to Eliminate Rubella and Congenital Rubella Syndrome in Mexico

Rodríguez Suárez R[1], Hernández Ramos JM[1], Tapia-Conyer R[2]

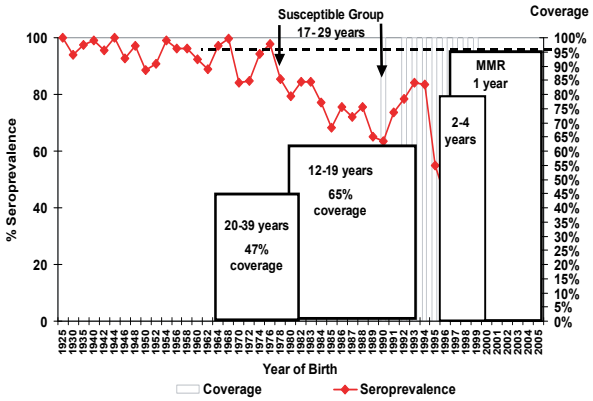
Introduction

Mexico introduced the measles-mumps-rubella vaccine (MMR) for children aged one year in 1998 and initiated vaccination of adolescents and adults with the measles-rubella vaccine (MR) in 2000. During 2000-2005, 27.3 million people age 12-39 years were vaccinated with MR (51% of the population). Although rubella incidence decreased with the introduction of the vaccine, the virus continues to circulate in the country. During 2000-2006, measles outbreaks secondary to importation continued to occur. In this abstract, we describe the elements used for decision-making and the vaccination strategies that Mexico is implementing to eliminate rubella and congenital rubella syndrome (CRS), and to consolidate measles elimination.

Methods

In order to identify the target population for vaccination, an analysis of cohorts susceptible to rubella was made using data from the 2000 National Health Survey and official reports of vaccination coverage (1998-2005) by age groups and gender. A national seroprevalence survey (2005-2006) is being conducted using a representative sampling by state, age, and gender (n = 5,000). In light of a measles outbreak in the metropolitan area, the decision was made to accelerate the vaccination strategy to immunize all susceptibles in the State of Mexico and the Federal District. Each town set a vaccination goal and prepared catchment tactics based on captive population censuses and the analysis of groups vaccinated from 2000 to 2006. The percentage of the targeted population increased due to loss of vaccination cards, as was established by rapid coverage monitoring (8 to 46%).

Figure 1. Estimate of Susceptible* Age Groups to be Vaccinated Against Rubella, Mexico, 2006



* Assuming coverage >95% in vaccinated cohorts. Results and susceptibility according to gender will be validated during the 2005-2006 national seroprevalence survey.

Source: State Immunization Committees and information from institutions.

Results

The vaccination strategy is being implemented in two stages. In the first stage, 100% of susceptible population age 13-39 years in the Federal District and State of Mexico (estimated total = 5 million people) will be vaccinated. In this stage of the campaign, the process of microprogramming began by defining the size and location of captive populations living in the Basic Geostatistic Areas, ensuring total coverage by operational regionalization. Cohort analysis revealed that the group of susceptibles to rubella was concentrated in the population aged 17-29 years (Figure 1). This means that the second stage, which will encompass the rest of the states (n = 30), will include indiscriminate vaccination of the population aged 17-29 years (total = 20,312,306**)**. Interinstitutional work in the health sector (MSSI, ISSSTE, DIF, among others) was a key element of the first stage of the campaign. Training, microprogramming, and implementation of the campaign are developing comprehensively with important advances. Innovative joint work strategies have been developed as a result of attempts to strengthen resources and cover all areas of responsibility. The Ministry of Public Education, universities, and institutions of higher education are participating actively, including administrative staff, student body, and faculty members. Mass communication strategies have implemented at local level, through bulletins, broadcasting, newspaper articles, and participation of the police, municipal officials, and private enterprise. Supervision of advances in each town and jurisdiction has been essential to identify areas requiring strengthening or reorientation. Upon conclusion of the first stage, rapid coverage monitoring will be conducted in all the municipalities of the State of Mexico and the Federal District to confirm that the vaccination target has been reached. The second stage will be programmed in the second half of 2006 and implemented at the beginning of 2007.

Conclusions

Mexico had the technical resolution and political will to conduct a highly complex vaccination campaign without previously allocated resources in order to respond effectively and consistently to control measles outbreaks and achieve rubella and CRS elimination, which will enhance equity among Mexicans. Systematizing this experience will yield knowledge useful for designing vaccination strategies and tactics targeting adults in large cities during measles and rubella outbreaks.

1 National Center for Child and Adolescent Health, Mexico.

2 Disease Prevention and Control, Ministry of Healh, Mexico.

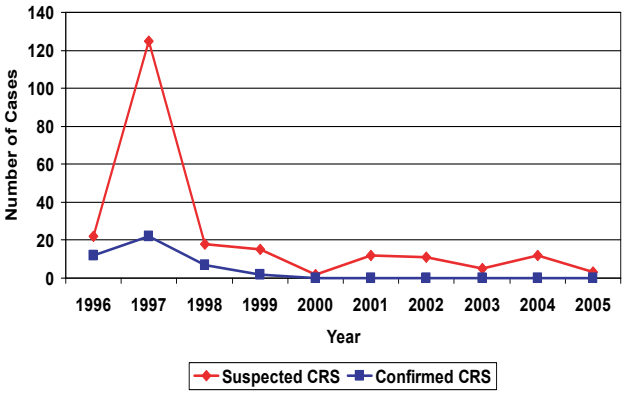
The Evolution of Congenital Rubella Syndrome Surveillance in the Caribbean: Lessons Learned, 1995 to Present

Irons B[1], Morris-Glasgow V[1], Lewis M[2]

Introduction

During the 1980s, the Caribbean experienced both measles and rubella epidemics with resulting morbidity and mortality. The structured implementation and monitoring of the Measles Elimination Surveillance System (MESS) since 1991, identified rubella activity in twelve countries with additional outbreaks surfacing during the period from 1995 to 1998. In 1996, to respond to the outbreaks, a prototype surveillance system for congenital rubella syndrome (CRS) including case definitions, case investigation forms, and reporting algorithms was developed in collaboration with a multidisciplinary, inter-agency team. In response to the rubella outbreaks in the Caribbean countries, the Ministers of Health of the Caribbean Community (CARICOM), in 1998, resolved to eliminate indigenous rubella and, subsequently, CRS through vaccination strategies and improved surveillance. The objective of this study is to present the findings from early and on-going CRS surveillance and to build on the lessons learned for future expansion.

Figure 1. Reported Suspect and Confirmed CRS Cases, English-speaking Caribbean and Suriname, 1996-2005



Source: Ministry of Health Reports to EPI-CAREC.

Methods

On the basis of the data and experience gained from this early CRS surveillance system, PAHO convened a working group in November 1998 to review and refine the existing rubella and CRS surveillance guidelines, which were then disseminated and implemented in all countries. In addition to the specimens collected from babies referred to the Caribbean Epidemiology Center (CAREC) for suspected CRS, additional specimens for testing for congenital infectious diseases such as toxoplasmosis, cytomegalovirus, and herpes were received. In 2004, it was decided that all specimens referred to CAREC for investigation of congenital infectious diseases would also be tested for rubella infection as part of the effort to improve on-going CRS detection.

Results

Implementation of the early CRS surveillance system resulted in the reporting of 12 laboratory-confirmed CRS cases to CAREC in 1996, while 31 confirmed cases were notified during the period 1997-1999. Analysis of the information captured on the case investigation forms indicated that cataracts, intrauterine growth retardation, and heart defects (especially patent ductus arteriosus) were the predominant clinical manifestations. Ninety-five percent (95%) of these cases were diagnosed by physicians, ninety percent (90%) of which as the infants were still hospitalized. There were reports of 4 deaths among the CRS confirmed cases. During the period 1997-1999, 155 suspect cases of CRS were reported, while 42 cases were notified from 10 countries between 2000-2005 (Figure 1). There has been no laboratory-confirmed CRS case since 1999. Between 2000 and 2001, 268 clinical specimens received at CAREC for investigation of congenital infectious diseases were tested for rubella. These specimens, which originated from 8 countries, were all confirmed as rubella IgM negative. During the period 2004-2005, 88 specimens were referred from 9 countries for testing and all of these samples were found to be rubella IgM negative.

Conclusions

The CRS surveillance system is functioning in the Caribbean countries and suspect cases are continually referred to CAREC. Several lessons have been learned since the inception of the surveillance system in the Caribbean. First, training regarding CRS should primarily focus on doctors in hospitals and other infant care providers based on the evidence that 95% of CRS cases were diagnosed by physicians, 90% of those cases while the infants were in hospital. In addition, 90% of cases were identified within the first 6 months of life. Second, surveillance results reveal that signs and symptoms that denote high index of CRS suspicion are cataracts, intrauterine growth retardation, and heart defect (especially patent ductus arteriosus). Finally, the validation of the surveillance system for CRS detection is essential and must be ongoing and responsive to the rarity of CRS occurrence. With the last case of rubella being recorded in 2001 and the last case of CRS occurring in 1999, discussions should be initiated regarding steps for verification of rubella elimination.

1 Immunization Unit/FCH, Caribbean Epidemiology Center, Pan American Health Organization, Trinidad and Tobago.

2 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

Sentinel Surveillance of Congenital Rubella Syndrome, Peru, 2004–2006 (up to Epidemiological Week 22)

Suárez-Ognio L[1], Whittembury-Vlásica A[2], Ortiz A[3], Cabezudo E[3]

Introduction

Peru is a country where rubella is endemic, with epidemic peaks every 3 to 4 years. In light of the absence of reported cases of congenital rubella syndrome (CRS), in 2004 a program of sentinel epidemiological CRS surveillance was implemented. This abstract analyzes and describes the results of the experience with sentinel CRS surveillance in Peru.

Methods

Sentinel health centers (SHC) were selected based on criteria regarding complexity, epidemiological profile, and location. Each SHC formed a team responsible for monitoring, analyzing, and presenting of results using the following definition of probable case:

a. Child aged <1 year with one or more of the following: congenital cataracts/glaucoma, congenital heart disease, hepato-splenomegaly, hearing defects, retinitis pigmentosa, microcephaly, microphthalmia, purpura, thrombocytopenia, radiolucid of long bones, and delayed psychomotor development.

b. Mother with a suspected or confirmed history of rubella during pregnancy.

c. Newborn with a probable diagnosis of TORCH syndrome.

In addition, low birth weight infants were evaluated to detect birth defects associated with CRS. To implement the surveillance system, educational material for pregnant women and health personnel was prepared and neonatologists were trained to conduct ophthalmologic examinations of newborns. The National Health Institute processes serum samples by ELISA IgM and oropharyngeal swabs for viral detection and/or isolation.

Results

During 2004-2006, 739 probable CRS cases were reported. Of 20 IgM-positive cases (2.7%), 8 (40%) were classified as CRS. The clinical and epidemiological characteristics of the IgM-positive cases were history of exanthema in the mother or contact with cases of febrile rash illness during pregnancy, trips during gestation, preterm delivery, congenital glaucoma, congenital cataract, retinitis pigmentosa, cardiac malformations, hearing impairment, intrauterine growth restriction, purpura, delayed psychomotor development, hepatomegaly, splenomegaly, and pathologic neonatal jaundice. In 2004, as part of the implementation of the sentinel surveillance network in the Regional Hospital of Cusco, the definition of probable case was expanded to include newborns small for gestational age and pathologic jaundice of no apparent cause. This change allowed the identification of two cases in 2004 and five cases in 2005 that would not have been detected with the previous definition. Furthermore, in 2005 the same expanded case definition was applied in Junín, with the additional criterion of at-home childbirth without any prenatal visits, coinciding with work to create a sentinel network. Thanks to this, two cases were identified that year. In the department of Loreto, surveillance was extended to second-level units, which increased the detection of probable cases. In multiple logistic regression analysis of the cases reported in the 2004-2006 period, an association was found with: i) history of exanthema during gestation: OR = 11,661 (95% CI: 2,959 – 45,956); ii) presence of congenital cataract in the physical examination of the newborn: OR = 23,321 (95% CI: 3,941 – 138,020), and iii) presence of purpura during physical examination of the newborn: OR = 9,329 (95% CI: 1,022 – 85,151).

Conclusions

Sentinel epidemiological CRS surveillance identified cases of vertical transmission, which indicates that rubella is a public health problem in Peru. The inclusion of less complex centers with trained staff increases the probability of early case detection. Even though the evaluation of the sensitivity of the definitions is pending, it is clear that more sensitive definitions increased case-finding, but it is necessary to evaluate the cost this represents for health services. Samples for serology and for viral detection and isolation are currently obtained when cases are captured. However, it is necessary to retrain the personnel that collect the specimen, emphasizing the importance of virus isolation.

1 General Epidemiology Directorate, Ministry of Health, Peru.

2 Technical Team, Child Vaccine-preventable Diseases, General Epidemiology Directorate, Ministry of Health, Peru.

3 Measles-Rubella Laboratory, National Health Institute, Ministry of Health, Peru.

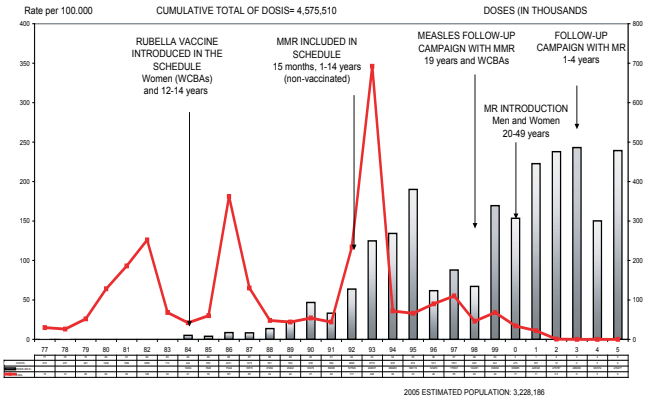
Strategies Used to Determine the Absence of Endemic Rubella Transmission in the Republic of Panama

de Moltó YI[1], de Hewitt[1], Quiroz N[1]

Introduction

Panama initiated rubella vaccination for women of childbearing age in 1984, administering rubella vaccine during the immediate postpartum period, at family planning clinics, and to girls aged 12-14 years. In 1992, the measles-mumps-rubella (MMR) vaccine was introduced at age 15 months and in the unvaccinated population aged 1-14 years. In 1998, vaccination was expanded with MMR for adolescents aged 19 years and women of childbearing age. In 2000, the measles-rubella vaccine (MR) was introduced for men and women aged 20-49 years in routine programs and national campaigns. From 1984 to 2005, 4,575,510 doses of rubella vaccine were administered to an estimated population of 3,228,286 in 2005. The strategies used by Panama to confirm the absence of endemic rubella transmission are described.

Figure 1. Rubella Incidence and Cumulative Number of Doses of Rubella Vaccine (R, MR, MMR) in Different Age Groups, Republic of Panama, 1977- 2005



Source: Expanded Program on Immunization, Epidemiology Department, Ministry of Health.

Methods

Compulsory notification reports for integrated surveillance of febrile rah illnesses and the results of laboratory monitoring were analyzed. The epidemiologic patterns of rubella and congenital rubella syndrome (CRS) before and after the introduction of the rubella vaccine (from 1979 to 2005) are described. Requests for therapeutic abortions in pregnant women with rubella are analyzed. The results of a retrospective search for CRS cases done by reviewing hospital discharge files for the 1984-2001 period are presented.

Results

From 1977 to 2002, three rubella epidemics were recorded: 1981–1982, 1986, and 1993 (Figure 1). The number of rubella cases declined from 8,779 (rate = 346.3 per 100,000) in 1993 to 10 (0.3 per 100,000) in 2002. From 1977 to 2002 (the last year in which cases were reported), the highest incidence was in the age group <1 year, with rates ranging from 1,031 to 4.9 per 100,000 children aged <1 year, and in children aged 1-4 years, with rates ranging from 452 to 1.6 per 100,000. The least affected group was the group of persons aged 15-49 years. Of the 307 rubella cases recorded in 2001, only one (0.3%) was laboratory-confirmed. Of 516 suspect measles/rubella cases in 2002, 8/10 rubella cases were confirmed by laboratory. Since 2003, no rubella case has been confirmed. During the 1986 and 1993 epidemics, an increase in the number of CRS cases and rates was recorded in the year of the epidemic and the following year. CRS rates ranged from 0 to 0.33 (n = 20) per 1,000 live births, with the highest rate reported in 1987. From 1995 to 1999, 1 or 2 cases were notified every year. No CRS cases have been confirmed since 2000. In 2001, the last authorization of a therapeutic abortion in a pregnant woman with rubella was recorded. During the retrospective case-search conducted from 1984 to 2001, 65,297 hospital discharge records were investigated. Two hundred twenty-nine suspect CRS cases were identified, four of which were classified as confirmed: one in 1994, two in 1998, and one in 1999. These findings coincided with the reports registered by the routine information system.

Conclusions

Vaccination against rubella has been the measure that has had the greatest impact on the prevention and control of CRS in the Republic of Panama. This study documents the absence of endemic rubella transmission since 2003, with the last case of confirmed CRS occurring in 1999. To further substantiate evidence of rubella and CRS elimination, a study of the prevalence of rubella antibodies is being conducted in adults aged 18-49 years of both sexes. To date, the study has shown that 98% of samples contain IgG rubella antibodies. Strategies for active rubella and CRS surveillance, in addition to routine rubella vaccination against rubella of all susceptibles, make it possible to maintain the absence of endemic rubella transmission, which is everyone's achievement.

1 Ministry of Health, Panama.

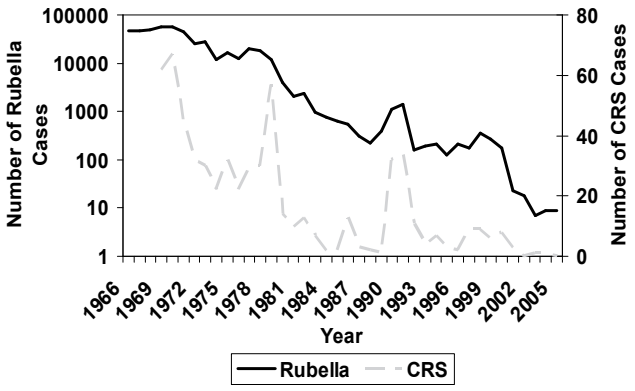
The Elimination of Rubella and Congenital Rubella Syndrome in the United States: Understanding the Process

Reef S[1] and the CDC Rubella Elimination Team[2]

Introduction

A rubella vaccination program was established in the United States in 1969. In 1989, a goal for the elimination of rubella and congenital rubella syndrome (CRS) was established for Healthy People 2000. In 2004, the Centers for Disease Control and Prevention (CDC) convened an independent panel of international experts to review the available data on rubella and CRS. To prepare for the independent panel, case definitions for elimination were established, available data were reviewed, and additional studies were conducted to determine the progress toward rubella elimination in the United States.

Figure 1. Reported Rubella and CRS: United States, 1966-2005



Methods

Elimination of rubella was defined as absence of transmission of endemic rubella virus transmission over a 12-month time period in the United States. Data from several sources were analyzed to assess the epidemiology of rubella/CRS, the level of vaccine coverage and population immunity, and the adequacy of rubella and CRS surveillance. To review the epidemiology of rubella and CRS, data were analyzed on cases reported to the National Notifiable Diseases Surveillance System (NNDSS), CRS cases reported to the National Congenital Rubella Syndrome Registry (NCRSR), and the molecular epidemiology of rubella virus. For reviewing levels of immunity, national rubella vaccine coverage data from the National Immunization Survey and from the school coverage surveys and rubella seroprevalence data from a nationally representative survey NHANES (National Health and Nutrition Examination Survey) were analyzed. To review the adequacy of surveillance, the national rubella surveillance system was assessed, a questionnaire on rubella investigations and laboratory testing was conducted, and retrospective reviews of high-risk areas for adequacy of rubella and CRS surveillance were conducted.

Results

From 1969 to 2004, the number of reported rubella cases declined significantly from 57,600 to the record low number of 7 cases (Figure 1). Since 2000, the annual rubella incidence has been <1 reported case/million population. The number of reported CRS cases declined from 67 in 1970 to no CRS cases being reported in 2002. One CRS case was reported each year in 2003 and 2004 (0.025 per 100.000 live births). The molecular epidemiology of rubella and CRS showed a pattern of virus genotypes consistent with virus originating outside the United States. Since 1995, the national coverage among 19-35 month-old children has been ≥90% annually. Since 1980, the average coverage for school-entrant surveys among reporting states was >95%. From 1998 to 2002, the estimated population immunity for persons aged 6 to 49 years was 91%. Rubella surveillance was adequate to detect rubella outbreaks and, in recent years, importations.

Conclusions

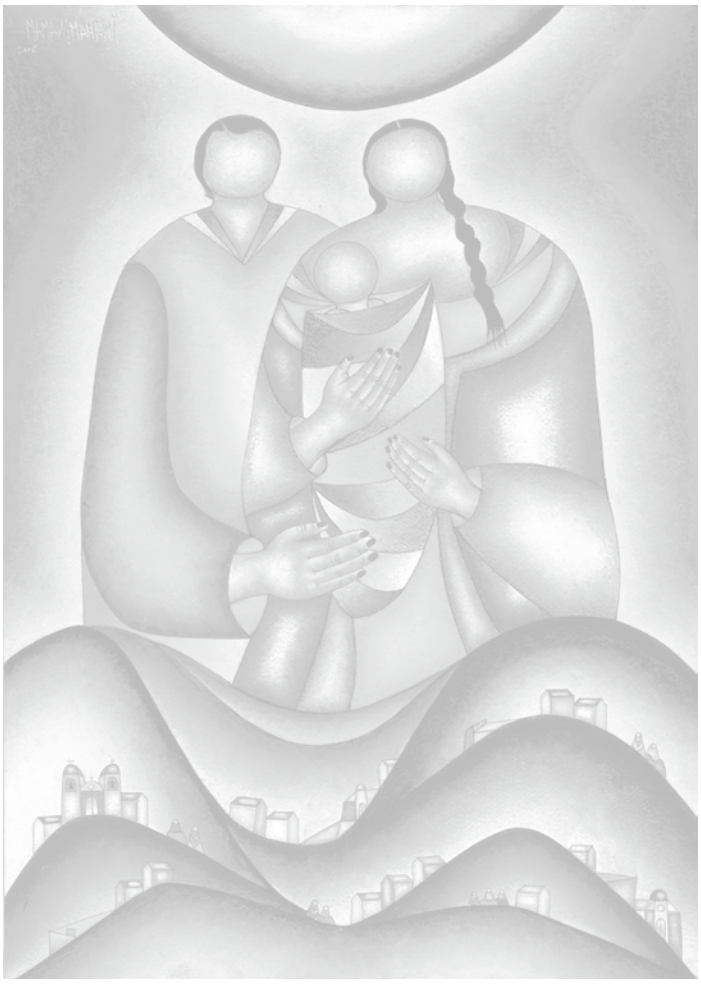
After careful review of available data on surveillance and epidemiology, coverage, and population immunity in the United States, the independent expert committee unanimously concluded that endemic rubella circulation had been eliminated in the United States, thus achieving the Healthy People goal 2010 well ahead of schedule. The changing epidemiology of rubella in the United States during the preceding 10 years reflected efforts to control the disease elsewhere in the Western Hemisphere. The United States is the largest and most diverse country in the world to achieve rubella elimination. Since importations of rubella can be expected to continue, high population immunity and rapid response to rubella and CRS cases and outbreaks will be needed to maintain rubella elimination.

1 Centers for Disease Control and Surveillance (CDC), Atlanta, Georgia, USA.

2 Mark Papania, Francisco Averhoff, Sharon Bloom, Gustavo Dayan, Terri Hyde, Joe Icenogle, Charles LeBaron, Susan Redd, Jane Seward.

Part 1: Disease Control and Eradication

Measles Elimination in the Americas



Global Measles Update

Strebel P[1]

Introduction

In May 2003, the World Health Assembly endorsed a resolution urging member countries to achieve the goal adopted by the United Nations General Assembly Special Session on Children (2002) to reduce deaths due to measles by half by the end of 2005 (compared to 1999 estimates). This presentation will provide an update on progress towards this goal.

Methods

Data on surveillance and vaccine coverage and a natural history model were used to estimate measles-related mortality at global and regional levels.

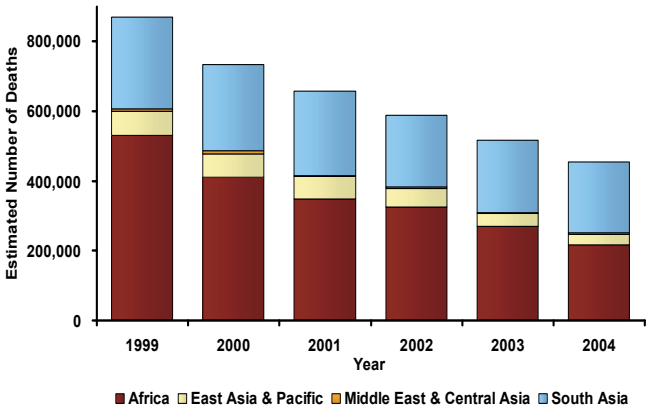
Results

Overall global measles mortality decreased 48% from 871,000 deaths in 1999 (uncertainty bounds: 633,000–1,139,000 deaths) to 454,000 deaths in 2004 (329,000–596,000 deaths). The Figure illustrated the decrease for major geographical regions. The largest percent reduction during this time period was in Africa, where estimated measles mortality decreased by 59%, followed by East Asia and the Pacific (52% estimated decrease), and the Middle East and North Africa Regions (50%).

Conclusions

From 1999–2004, improvements in routine measles vaccination coverage and the implementation of measles supplementary immunization activities (SIAs) in the 45 African and Southeast Asian countries that are a priority for WHO/UNICEF have resulted in a 48% decrease in the estimated number of global measles deaths. Worldwide, since 1999, over 500 million persons have received measles vaccine through SIAs and an estimated 1.4 million deaths due to measles have been averted as a result of implementing the strategy of improving routine coverage of measles first dose along with providing a second opportunity for measles vaccination. If global progress continues at the rates achieved over the past few years, it appears highly likely that the 2005 measles mortality reduction goal will be met.

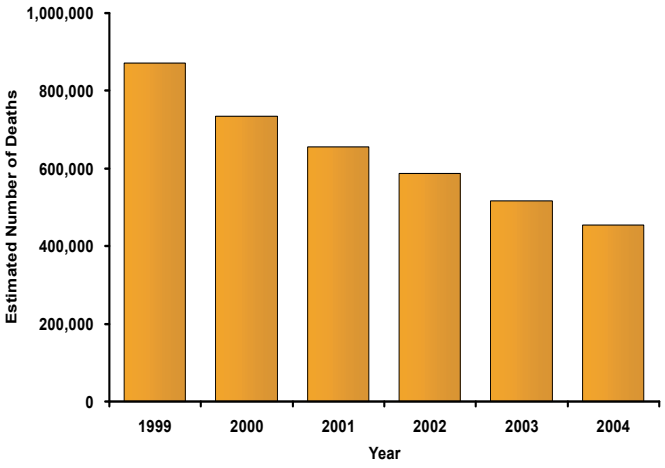
Figure 1. Estimated Number of Measles-related Deaths by Major Geographical Regions, 1999–2004



Note: The mathematical model estimates <1,000 deaths in the Americas and Europe.

Source: World Health Organization

Figure 2. Global Burden of Measles: Estimated Number of Measles-related Deaths Worldwide, 1999–2004



Source: World Health Organization

1 World Health Organization, Geneva, Switzerland.

Measles Elimination in the Americas: A Regional Update

Vicari A[1], Andrus JK[1]

Introduction

In 1994, health ministries of countries in the Americas established the goal of measles elimination by the year 2000. Transmission of the D6 measles virus genotype–which began in 1995 and caused large outbreaks in Argentina, Bolivia, Brazil, the Dominican Republic, and Haiti–was interrupted in September 2001. The subsequent transmission of the D9 measles virus genotype in Venezuela was interrupted in November 2002, 14 months after it had started. The 2001–2002 Venezuelan outbreak can be viewed as the last instance of widespread measles virus transmission in the Americas. Since 2003, measles importations have continued to be reported and some have resulted in contained outbreaks. We provide an update on measles occurrence and surveillance in the Americas.

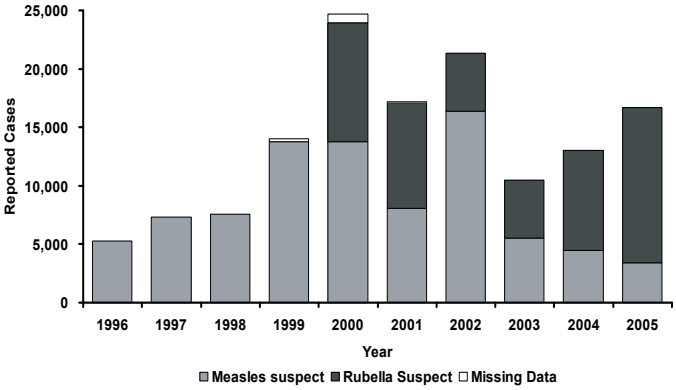
Methods

Data on confirmed and suspect measles cases were obtained from country reports, which were either case-based or aggregated data. Confirmed cases were classified as imported, import-related, or of unknown origin following the 2004 TAG recommendations. Outbreaks were defined as ≥2 subsequent cases linked epidemiologically. Rates of patients with febrile and eruptive illnesses that were not confirmed as having measles, rubella, or dengue were calculated at subregional level for three different years (2003–2005), using census data from PAHO's database on Regional Core Health Data. A non-confirmed suspect case was defined as a patient who met the surveillance case definition ("*any patient for whom a health care provider suspected either measles or rubella*" or "*a patient with fever and rash*") and who was laboratory-negative for measles, rubella, and dengue. Data on usage and coverage of measles-containing vaccines were obtained from country reports.

Results

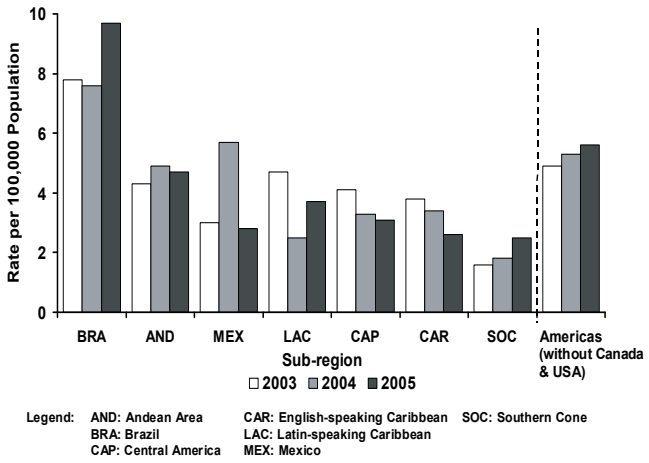
Between January 2003 and April 2006, 370 measles cases were confirmed in the Americas, which is equivalent to an annual cumulative incidence of 0.1 cases per million population. Fifty-one percent of the cases were imported or related to an importation. Likely WHO Regions of exposure for the 90 (24%) imported cases were: Western Pacific, 32% (6 countries involved); Southeast Asia, 24% (5 countries); Europe, 22% (14 countries); Eastern Mediterranean, 10% (4 countries); Africa, 4% (2 countries); two different Regions, 2%; unknown Region, 4%. The two countries from which >10 measles cases were imported from were China (14 cases) and India (12). Whereas 104 (28%) cases were sporadic, 266 (72%) cases occurred in outbreaks. Twenty-two outbreaks were reported: ten (46%) outbreaks had 2 cases, five (23%) 3 cases, three (14%) 6–11 cases, and four (18%) ≥27 cases. The four largest outbreaks (range = 27–108 cases) occurred in 2003–2004 in Mexico (108 cases in one outbreak), in 2005 in the United States of America (34 cases), in 2005–2006 in Mexico (27 cases), and in 2006 in Venezuela (49 cases, as of May). Affected age groups varied in these outbreaks–infants and young adults in the Mexican outbreaks, children and adolescents in the United States, no specific age group in Venezuela, but a common characteristic was the predominance of unvaccinated case-patients. Health care workers and nosocomial transmission played a key role in several transmission chains.

Figure 1. Suspect Cases by Initial Diagnosis: The Americas, 1996–2005



Source: Countries reporting to PAHO's Measles Elimination Surveillance System.

Figure 2. Rates of Measles/Rubella Suspect Cases not Confirmed as Measles, Rubella, or Dengue: The Americas, 2003–2005



Source: Country Reports

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

In 2005, 40 (83%) countries and territories of the Americas reported case-based data on measles/rubella surveillance to PAHO through the Measles Elimination Surveillance System (MESS). Three countries (6%; Brazil, Cuba, and Mexico) reported aggregated data, and five countries and territories (11%; Canada, Guadeloupe, Martinique, Puerto Rico, and the United States of America) only reported information on confirmed cases. Population in countries reporting through MESS represented 28% of the Hemisphere's population; those reporting aggregated data 34%. In MESS-reporting countries and territories, the proportion of cases initially suspected of measles fell from 53% in 2003 to 20% in 2005 (Figure 1); in Brazil, this proportion did not change (15% vs. 17%). At subregional level, the rates of suspect cases that were not confirmed as measles, rubella, or dengue showed no clear pattern of variation between 2003 and 2005 (Figure 2). At Regional level, this rate went from 4.9 to 5.6 suspect cases per 100,000 population ($p < 0.001$). Three of six surveillance indicators were unsatisfactory in 2005: the proportion of suspect cases with adequate investigation (from 90% in 2004 to 73% in 2005—the indicator became more stringent in 2005), the proportion of cases with a serum specimen received at the laboratory ≥5 days of its shipment (2004, 61%; 2005, 63%), and the proportion of cases with laboratory results ≥4 days of specimen reception (2004, 83%; 2005, 77%). A detailed analysis of the 259 suspect cases classified as vaccine-related during 2003–2005 through MESS (0.7% of all MESS-reported cases) showed that only 34% of these cases had had a rash onset within 7–14 days of vaccination, one of five criteria recommended by the TAG for justifying such a classification.

In 2005, the national routine immunization schedule of 39 (81%) countries and territories of the Americas recommended two doses of MMR vaccine; approximately 6.5 million children aged one year (69% of the Hemisphere's total) lived in those countries. Ten Latin American countries have conducted *follow-up* campaigns since 2001. A single dose is recommended in four Andean countries, three Central American countries, the Dominican Republic, and Haiti. Haiti is the only country in the Region that has not introduced the MMR vaccine and where the measles vaccine is still administered at nine months of age. The median coverage of measles-containing vaccine reported at national level was 93% in 2004 (range = 57%–99%), down from 98% in 2003. Coverage was ≥95% in 58% of municipalities, where an estimated 50% of children aged one year lived; coverage was <80% in 17% of municipalities, where an estimated 23% of children aged one year lived. Coverage data on the second routine dose is currently not collected consistently and could not be evaluated.

Conclusions

Absence of widespread measles virus transmission since November 2002 is proof of the success of the measles elimination initiative in the Americas. However, the 90 imported cases detected since 2003 show that measles virus circulation in other parts of the world is a continued source for importations.

The integrated measles/rubella surveillance system is a critical tool for the timely detection and containment of importations. Outbreaks detected since 2003 in the Americas have remained contained because epidemiological investigations led to understanding of transmission pathways and designing and implementing targeted responses. The need to act before the availability of serological results, the role of active case-searches in controlling transmission in metropolitan settings, and the importance of including the private health sector in the surveillance network were among the important lessons from those outbreaks.

Coverage at the municipal level with measles-containing vaccines remains inhomogeneous in our Region and the resulting pockets of susceptible groups could potentially sustain larger outbreaks. A renewed commitment to achieving homogeneous vaccine coverage is necessary. Additionally, vaccination of workers of the health, tourism and transportation sectors—groups that could amplify measles virus transmission following an importation—must be formalized through a process of certification and periodic revision. Finally, completion of adult vaccination campaigns in all countries to eliminate rubella and congenital rubella syndrome will be critical for sustaining measles elimination in the Americas.

Measles in Brazil: Elimination and its Maintenance

Segatto TCV[1], Pereira MC[1], Silva MM[1], Toscano CM[2], Barros F[1]

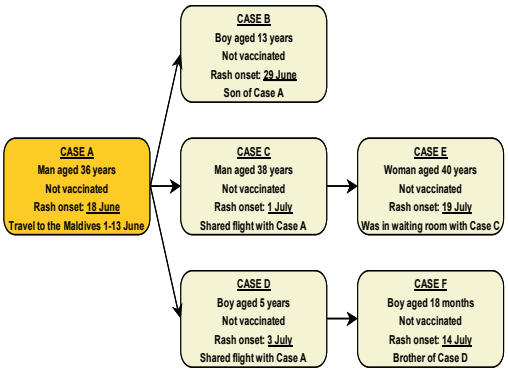
Introduction

In 1992, Brazil launched its measles elimination plan with a nationwide mass vaccination campaign. After a substantial reduction in the number of cases, the country experienced a measles outbreak with more than 53,000 cases in 1997. Since 2001, only imported measles cases have been detected in Brazil.

Methods

The main surveillance and vaccination activities in Brazil for measles elimination are described, in addition to the imported measles cases identified during the period 2001-2005, and recommendations for maintaining measles elimination in the country are presented.

Figure 1. Transmission of Measles Starting from an Imported Case, Brazil, 2005



Note: Measles virus of genotype D5 was detected in Cases A, B, C and E.

Source: Ministry of Health, Brazil

Results

After the 1997 epidemic, measles elimination activities were intensified with the efforts of a task force–a team devoted exclusively to measles surveillance and control in each of the country's 27 states and its federal district. Financial and material resources were used in priority activities such as decentralizing training activities for health professionals, increasing the surveillance system's sensitivity and specificity by integrating measles and rubella surveillance, and discarding cases through laboratory testing. Measles cases in the country fell from 908 in 1999 to 36 in 2000, 83% of them laboratory-confirmed. Of these, 15 cases were reported during the last indigenous measles outbreak in the State of Acre between February and March 2000. The last case of indigenous measles in Brazil was reported in November 2000. Two follow-up vaccination campaigns targeting children aged 1-5 years were conducted in 2000 and 2004, attaining almost 100% coverage. Since 2002, the measles-mumps-rubella vaccine is administered to children aged 12 months for routine measles vaccination, with a second dose for preschool children (4-6 years). In the period 2001-2005, 10 measles cases were confirmed in the country, all of them imported or related to importation and all of them laboratory-confirmed. In June 2001, the D5 virus was isolated in an unvaccinated 7-month-old infant returning from Japan. In March 2002, another imported case from Japan was reported in an unvaccinated 2-year old; however, the virus could not be isolated and the genotype is therefore unknown. In November 2003, a case in an 11-month old was reported, and during the investigation, it was found that his father had symptoms consistent with measles and had been in Europe (Germany, England, and the Netherlands) prior to the onset of symptoms. Both cases were confirmed as measles, and the D4 strain was isolated in the child. In June 2005, an unvaccinated 36-year-old athlete was diagnosed with measles after returning from the Maldives in southeast Asia (Figure 1). This individual transmitted the disease to three other people, all of them unvaccinated: his son and two passengers who had been on the same domestic flight as the index case. One of these secondary cases transmitted the virus to his unvaccinated 18-month-old brother, and another of the cases transmitted it to a woman with whom he had shared the waiting room in a health facility. Thus, six measles cases were identified - one of them imported and five related to importation. In three of these cases, the D5 strain was isolated. Transmission occurred on a plane, at home, and in a health facility. During the transmission period, active case-finding was conducted, along with mass vaccination of susceptible contacts in several Brazilian states where the index case had been. All 10 measles cases in the period 2001-2005 presented fever, rash, cough, runny nose, and conjunctivitis.

Conclusions

Given the risk of measles virus importation from regions where measles is still in circulation, it is recommended to prioritize specific surveillance and vaccination activities, namely:

1. Early detection of suspected cases and implementation of control measures, with special attention to cases that mention travel to another country in the past 30 days or contact with travelers;
2. Training of state and municipal health professionals, enlisting the participation of professionals from the private health network;
3. Rapid coverage monitoring of vaccination in disadvantaged areas on the outskirts of major cities;
4. Vaccination of specific risk groups such as health and tourism professionals, travelers, and border populations; and
5. Use of communication and information strategies to raise awareness among the population and health professionals nationwide.

1 Secretariat of Health Surveillance, Ministry of Health, Brazil.
2 Immunization Unit/FCH, Pan American Health Organization, Brazil.

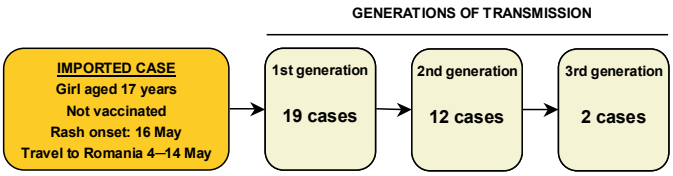
Investigation of the Largest Measles Outbreak in the United States in a Decade, Indiana, 2005: Implications for Sustaining Measles Elimination

Parker AA[1,2], Staggs W[5], Dayan GH[2], Ortega-Sánchez IR[2], Rota PA[4], Lowe L[4], Boardman P[5], Teclaw R[3], Graves C[3], LeBaron CW[2]

Introduction

Though measles is endemic in many regions of the world, ongoing measles virus transmission has been eliminated in the United States since 1997 because of high childhood vaccination coverage. The low reported incidence (i.e., <1 case per million) since 1997 and the high percentage of imported cases support the conclusion that measles is not endemic in the United States; however, outbreaks continue to occur. Most outbreaks in the United States since 1999 have been small and linked to importations. In May 2005, a 17 year old unvaccinated girl who was incubating measles returned from a trip to Romania. Over six weeks, 33 secondary cases occurred creating the largest U.S. measles outbreak since 1996 (Figure 1). We investigated transmission patterns, vaccination coverage, and containment activities to determine whether new policies are needed to sustain U.S. measles elimination.

Figure 1. Transmission of Measles from an Imported Case, Indiana & Illinois, USA, May June 2005



Note: 33 of the 34 cases occurred within a community church group that does not routinely accept vaccinations.

Source: Morbidity and Mortality Weekly Report 2005, 54(42):1073–1075 (available online at: http://www.cdc.gov/mmwr/)

Methods

We determined transmission patterns through interviews with cases and contacts. The outbreak period was defined to extend from one incubation period (14 days) before the first case patient's rash onset until one incubation period after the last case patient's rash onset, i.e. from 2 May to 8 July 2005. A case was defined as a person who had symptoms/signs compatible with the standard clinical case definition of measles during the outbreak period, and who was either laboratory-confirmed for acute measles infection or was epidemiologically linked to a laboratory-confirmed case. A case was considered laboratory-confirmed if a specimen of the patient's serum tested positive for anti-measles IgM or if a specimen of urine tested positive for measles virus by polymerase chain reaction. Molecular typing of measles isolates was performed at the U.S. Centers for Disease Control laboratory using the protocols recommended by WHO. Personnel time, materials, and direct costs from a health care perspective for a period extending from recognition of the first case patient until containment efforts ceased (i.e., the period from 29 May to 22 July 2005) were evaluated. School vaccination coverage surveys to determine measles vaccination levels in the surrounding community were also conducted.

Results

Over six weeks, 34 confirmed cases occurred: 33 (97%) were white non-Hispanic. Thirty-three (97%) were members of a local church, 32 (94%) were unvaccinated, 30 (88%) were aged <20 years, and 3 (9%) were hospitalized (i.e., one adult and one child who required intravenous rehydration, and one adult who required six days of ventilator support for pneumonia complicated by acute respiratory distress syndrome). The only case-patient who was not a member of the local church with 33 cases worked as a phlebotomist in an Indiana hospital. Of the 28 cases aged 5–19 years, 71% were home-schooled. Although containment measures began after 20 persons were already infectious, the outbreak remained largely confined to children whose parents refused vaccination, with four households comprising 71% of cases. The viral strain was genotype D4, which is endemic in Romania. Coverage surveys showed that measles vaccination levels in the surrounding community were 89% by 24 months of age and 96% by 60 months of age. Containment costs were estimated at US $167,685, including US $113,647 for a hospital with an infected employee.

Conclusions

This outbreak was caused by importation of measles into a population of children whose parents refused vaccination. This import-associated outbreak occurred because of failure to adhere to existing vaccination policies for preventing measles in U.S. residents who travel abroad, children, and health care workers. High surrounding-community vaccination levels and low vaccine failure rates prevented a generalized epidemic. Maintenance of high immunization coverage through enhanced implementation of current policies, including improved communication strategies for vaccine objectors, are necessary to prevent future costly outbreaks and sustain measles elimination.

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2 Epidemiology and Surveillance Division, National Immunization Program, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.
3 Indiana State Department of Health, Indianapolis, Indiana, USA
4 Division of Viral and Rickettsial Diseases, National Centers for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.
5 Home Hospital, Lafayette, Indiana, USA

Mumps Outbreak, Uruguay, 2005-2006

Velásquez M[1], Vázquez R[2]

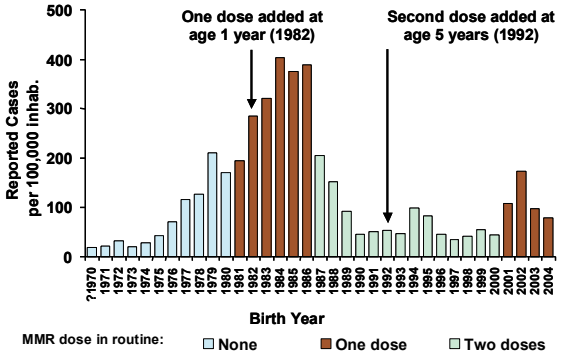
Introduction

Uruguay added the mumps vaccine to the Expanded Program on Immunization (EPI) in 1982. Thus, many years ago, acute cases of mumps fell to the point where they almost disappeared. In 2005, an increase in reported cases was observed around epidemiological week 20, leading to increased surveillance.

Methods

Data from the Compulsory Notification System were used. A communication campaign aimed at health and education institutions was launched to remind them that reporting was compulsory. In addition, a more detailed investigation of cases between age 18 and 26 years was conducted through interviews and the detection of IgM-specific antibodies to determine the origin of the outbreak and characterize the organism involved. A descriptive analysis was done that included case mapping.

Figure 1. Epidemic Mumps Rate by Birth Cohort, Uruguay, 2005



Source: Ministry of Health, Uruguay.

Results

More than 2,400 people suffered acute mumps during the period January 2005 to April 2006 (Figure 1). The cases were concentrated in Montevideo, the capital city, but over time, spread to all departments in Uruguay. In Montevideo, it was observed that the initial cases occurred in young people from middle- and upper-income neighborhoods. Morbidity from mumps in those neighborhoods was especially high. Also interesting from the beginning was the fact that young people between the ages of 18 and 26 were being stricken. A specific investigation to determine the origin of the outbreak did not produce results. Only 34% of the sera from mumps patients tested positive. The virus was not isolated.

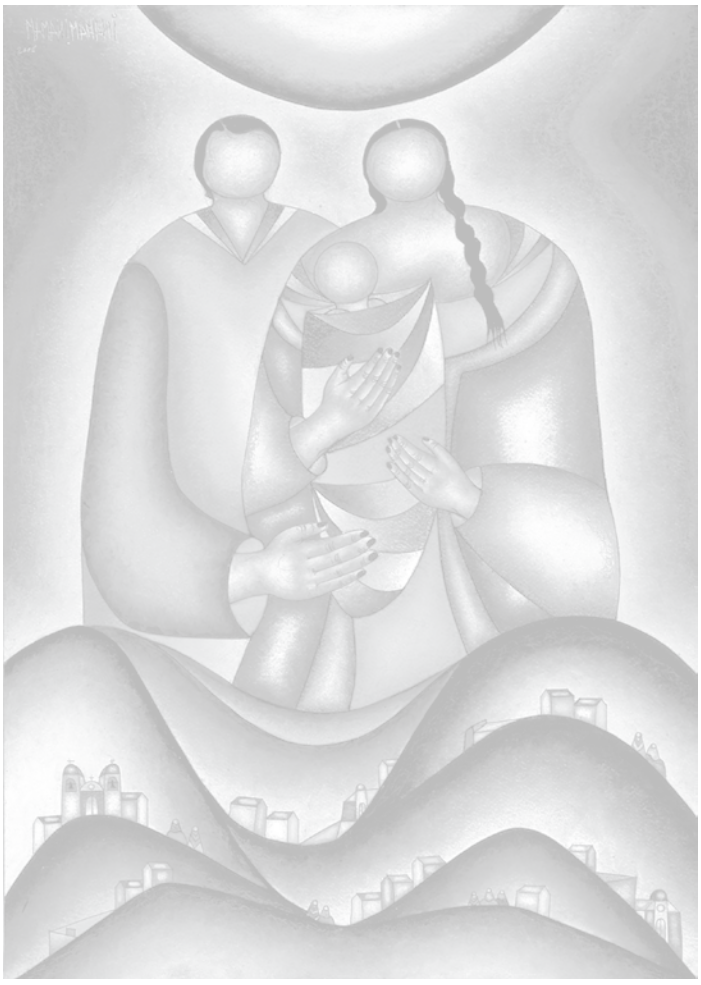
Conclusions

We studied the history of mumps vaccine inclusion in the EPI and concluded that cohorts born between 1981 and 1986 had received only one dose of vaccine, since the program began administering the second dose at age 5 years in 1992 (when the children in these cohorts were already over age 5 years). As a result, this group was particularly susceptible to the disease, as demonstrated by the high age-specific rates compared to individuals who had received two doses of the vaccine or who had never been vaccinated (>26 years). Serology contributed no additional information, and its use was therefore halted. The National Vaccination Advisory Commission recommended NOT administering a second dose to susceptible young people as England has done, for example. The Ministry of Public Health launched an educational campaign on the transmission mechanism for mumps.

1 Public Health Surveillance Unit, Ministry of Public Health, Uruguay.
2 Department of Epidemiology, Ministry of Public Health, Uruguay.

Part 1: Disease Control and Eradication

Maintaining Polio Eradication in the Americas



Progress Toward Polio Eradication

Aylward B[1], Heymann D[1]

Introduction

In 1988, when poliovirus was endemic in more than 125 countries, resolution WHA41.28 of the World Health Assembly (WHA) established the goal of global eradication of poliomyelitis. In 1999, Resolution WHA52.22 urged all Member States to accelerate eradication activities. The decision to eradicate poliomyelitis was made on the basis of a large body of evidence from the Americas indicating the efficacy of a combination of routine immunization, supplementary polio immunization campaigns, and highly sensitive surveillance to interrupt transmission of wild poliovirus.

Methods

Information used to assess progress towards global eradication includes reports to WHO of poliovirus isolates (daily) and polio surveillance quality (weekly) from all countries, the results of National and Sub-National Immunization Days and mop-up activities, research conducted to advance the knowledge informing 'post- eradication' policies, and the findings and advice of technical oversight bodies at national and international levels.

Results

In 2005, the world achieved several critical milestones, including: reduction of polio-endemic countries to an all-time low of four (Nigeria, India, Pakistan, Afghanistan; Egypt's last virus was found in an environmental sample in January 2005 and all 10 of the Niger cases in 2005 were importations from Nigeria); re-interruption of transmission in 14 of the 22 countries that had been re-infected in 2003-2005; successful introduction of new monovalent oral polio vaccines (mOPV1, mOPV3); a 50% decline in cases in India and Pakistan. In addition to the 4 remaining endemic countries, 9 previously polio-free countries were still considered to have active transmission of an imported virus at March 2006 (Somalia, Yemen, Indonesia, Ethiopia, Angola, Chad, Nepal, Bangladesh, Niger).

Conclusions

The necessary tools and strategies to eradicate polio are now in place. Stopping polio transmission can be completed rapidly in all countries except Nigeria where an additional 12-18 months will be required due to the large proportion of children (20-50%) that continue to be missed during polio campaigns in 6 of the 37 states in that country.

The major challenges to a polio-free world are now:

1. Improving the quality of polio campaigns in northern Nigeria to stop transmission.
2. Sustaining campaigns to break the final polio chains in the other 3 endemic countries.
3. Quickly stopping polio outbreaks in previously polio-free countries.
4. Addressing low routine immunization rates and surveillance gaps in polio-free areas.
5. Maintaining funding and political commitment.

1 Polio Eradication Initiative, World Health Organization, Geneva, Switzerland.

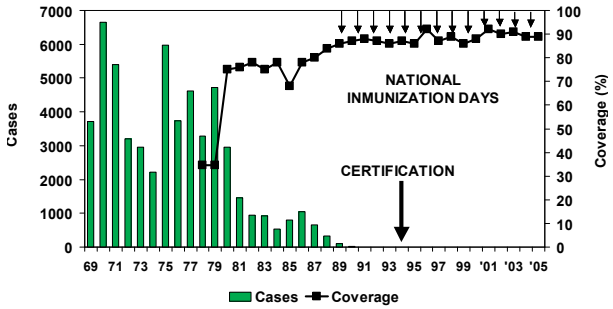
Fourteen Years Without Poliomyelitis in the Americas

Landaverde JM[1] , Andrus JK[1]

Introduction

Twelve years have passed since the Americas were certified free of indigenous circulation of wild poliovirus, and 15 years since the last case of wild virus was isolated in the Hemisphere. Certification was issued by the International Commission for the Certification of Poliomyelitis Eradication after reviewing the evidence that each country had submitted on its eradication activities and the status of acute flaccid paralysis (AFP) surveillance.

Polio Cases and OPV3 Coverage, Region of the Americas, 1969-2005*



Source: PAHO/WHO

* 2005 Provisional Data

Methods

The following was used to review the evidence presented in this document: the weekly country reports on the status of AFP surveillance, sent to the PESS (Polio Eradication Surveillance System) database; the reports on polio vaccination coverage using OPV (oral polio vaccine); the report of the International Commission for the Certification of Poliomyelitis Eradication in the Americas; and the reports of the American Regional Commission for Certification of Poliovirus Laboratory Containment and Verification of Polio-Free Status, which, for reasons specific to the Region of the Americas, reports to the Global Commission for the Certification of the Eradication of Poliomyelitis, not only on advances in containment, but maintenance of the Hemisphere's status as free of the circulation of wild poliovirus.

Results

After the last reported case in the Americas (Peru, 1991) and since the certification of eradication, vaccination coverage with OPV3 for children <1 year was maintained at >85%, and the proportion of municipalities in Latin America with <95% OPV3 coverage was 46% in 2000, 44% in 2001, 44% in 2002, 48% in 2003, and 44% in 2004. The annual AFP rate per 100,000 <15 years has been maintained >1 since certification (except in 1998). The percentage of adequate stool samples from AFP cases has ranged from 68% to 82%. This rate was 79% in 2001 and 2002, 80% in 2003, and 78% in 2004 and 2005. In 2000-2001, Haiti and the Dominican Republic experienced a polio outbreak (21 cases) caused by a vaccine-derived virus. The outbreak ended after two national vaccination campaigns in each country with OPV. In 2004, a vaccine-derived poliovirus was isolated in an immunodeficient child in Peru, and in 2005, a vaccine-derived poliovirus was isolated in an unvaccinated community in the USA. There were no outbreaks in either case.

Conclusions

The Americas remain free of indigenous circulation of wild poliovirus, and AFP surveillance continues at acceptable levels 14 years after eradication. Since the certification of eradication, the laboratory network has tested around 1,400 samples from AFP cases annually without isolating the wild virus.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

Vaccine-derived Poliovirus Infections, Minnesota, USA, 2005

Hull HF[1], Ehresmann K[1], Wax G[1], Miller C[1], Harriman K[1], Harper J[1], Rainbow J[1], Lynfield R[1], Fuller S[1], Cebliniski E[1], Bartkus B[1], Alexander JP[2], Seward J[2], Pallansch M[2], Kew O[2], Oberste S[2], Schleiss M[3], Baker KS[3], Anderson R[4], Ackermann P[4]

Introduction

In September 2005, a type 1, vaccine-derived poliovirus was isolated from an unvaccinated seven-month old girl hospitalized with severe combined immune deficiency syndrome without paralysis. The child's family was Amish, a conservative religious group whose members are often completely unvaccinated. An investigation was conducted to determine the source and extent of spread of this virus.

Methods

Stool and blood specimens were requested from members of the child's community. Surveillance for paralysis was implemented in Minnesota and US states and Canadian provinces connected to this community. A search was conducted for potential sources of vaccine-derived poliovirus (VDPV) in medical facilities where the child had received care and medical facilities in Minnesota providing care to international patients. Viruses from the child and the community were subjected to genetic characterization and phylogenetic analysis.

Results

Virological and epidemiological surveillance failed to find additional poliovirus infections among Amish and related religious groups in the USA and Canada. No source for the VDPV could be identified in the community or medical care facilities in Minnesota. The three unvaccinated siblings of the index patient had high titers of neutralizing antibody only to type 1 poliovirus. Four healthy children from two other Amish families in the index community were excreting VDPV in their stool. Phylogenetic analysis suggested that the initiating OPV dose was given in spring 2004 (~ nine months before the birth of the index patient), and that the VDPV had circulated in the community for at least two months before detection of the index child's infection. Extensive evolution of the antigenic surface of the virus suggests that it is an immunodeficient VDPV (iVDPV) from a person other than the index patient.

Conclusions

This outbreak demonstrates that iVDPVs can circulate in under-vaccinated communities. Strategies for stopping vaccination after polio eradication must address the potential threat posed by chronic poliovirus infections.

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2 Centers for Disease Control and Prevention, Atlanta, Georgia, USA.
3 University of Minnesota School of Medicine, Minneapolis, Minnesota, USA.
4 Children's Hospital and Clinics of Minnesota, Minneapolis, Minnesota, USA.

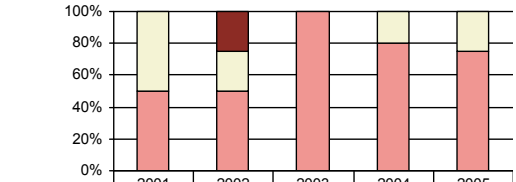
Analysis of Acute Flaccid Paralysis Cases Discarded Without a Stool Sample, Chile, 2001-2005

Chiu, M[1]

Introduction

Chile began vaccination with the oral polio vaccine in 1950. The last case of poliomyelitis occurred in 1975. In order to ensure that the country is free of wild poliovirus circulation, surveillance all acute flaccid paralysis (AFP) cases in children under age 15 years is conducted. Records have been kept since 1990, using the PESS (Polio Eradication Surveillance System) software. This report discusses AFP cases discarded without a stool sample in Chile during the past five years.

Figure 1. Percentage Distribution of AFP Cases Discarded Without a Stool Sample as Diagnostic Base, Chile, 2001-2005



	2001	2002	2003	2004	2005
CSF*	0	1	0	0	0
NA# & EMG§	1	1	0	2	1
ONLY EN	1	2	1	8	3

* cerebrospinal fluid # neurological assessment § electromyogram

Source: PESS and AFP Surveillance Reporting Forms, Chile.

Methods

The PESS database and forms for notifying or discarding all cases entered in Chile's routine surveillance system from 1 January 2001 to 31 December 2005 were reviewed. The current definition of a discarded case is "every probable case that tests negative for wild poliovirus with an adequate stool sample and is without residual paralysis consistent with polio after 60 days". The sample are analyzed at Chile's Institute of Public Health and the Carlos Malbrán Laboratory in Argentina. When a stool sample cannot be collected, it is necessary to document the case with other laboratory tests (electromyogram), cerebrospinal fluid, etc.) and a clinical examination performed by the attending physician to discard the case.

Results

In the period analyzed, 466 cases were entered in the surveillance system (Table 1). Of these, 21 were discarded without a stool sample as diagnostic support. Of these 71.4% were discarded on the basis of a neurological assessment; in 23.8%, both the neurological assessment and electromyography were used; and in only 4.8% (1 case), cerebral spinal fluid (Figure 1). A stool sample was not obtained in this last case because the patient died a few hours after admission. In 100% of the cases, clinical assessment at 60 days post- paralysis confirmed the absence of residual paralysis or atrophy consistent with polio.

Conclusions

Although Chile has a long history of using the oral polio vaccine and conducting AFP surveillance in children, not all professionals who come into contact with a case within 15 days of the paralysis onset are clear about the importance of supporting the diagnosis with a stool analysis. Another factor that undoubtedly affects surveillance quality is the high turnover of staff in charge of this area. In the five years studied, four professionals were in charge of surveillance at the central level. The need for greater dissemination of current regulations, with special emphasis on sample collection, is evident.

Table 1. AFP Cases in Children aged <15 Years Discarded Without a Stool Sample,Chile, 2001-2005

Year	Total Entered	Total Without Sample	% Without Sample	Nº Cases per Year of AFP Onset	Final Diagnosis	Basis for Discarding
2001	86	2	2.3	1	GBS [a]	Neurological assessment [b] and EMG [c]
				2	GBS	Neurological assessment
2002	114	4	3.5	1	Transverse myelitis	Neurological assessment
				2	Acute encephalopathy	Neurological assessment and EMG
				3	GBS	Neurological assessment
				4	Idiopathic polyradiculoneuritis	CSF [d] (-) Enterovirus.
2003	86	1	1.8	1	Mononeuritis post otitis media	Neurological assessment
2004	84	10	11.9	1	Acute malnutrition and muscular dystrophy under study	Neurological assessment and EMG
				2	GBS	Neurological assessment
				3	GBS	Neurological assessment
				4	Acute polyradiculoneuropathy	Neurological assessment and EMG
				5	Inflammatory polyradiculoneuropathy	Neurological assessment
				6	GBS	Neurological assessment
				7	Post-infection polyradiculitis	Neurological assessment
				8	GBS	Neurological assessment
				9	GBS	Neurological assessment
				10	Viral encephalitis	Neurological assessment
2005	96	4	4.2	1	GBS	Neurological assessment
				2	GBS	Neurological assessment
				3	GBS	Neurological assessment and EMG
				4	Mild acute polyradiculoneuropathy	Neurological assessment

[a] GBS: Guillain-Barré syndrome. [b] Neurological assessment: Examination by a pediatric neurologist in a private facility, public hospital, or specialized rehabilitation center.
[c] EMG: Electromyogram. [d] Cerebrospinal fluid.
Note: The number of case per year is correlative and assigned for this analysis; as a result, it does not correspond to PESS data.

Source: PESS and AFP Surveillance Notification Reports.

1 Department of Epidemiology, Ministry of Health, Chile.

Analysis of Acute Flaccid Paralysis Cases Discarded without Adequate Sample, Colombia, 2004-2005

Castillo O[1], Peláez D[1], Rey G[1], Pastor D[2]

Introduction

In May 1991 the last polio case was confirmed in Colombia. Since then, efforts have been targeted toward maintaining eradication through intensifed vaccination efforts and surveillance of acute flaccid paralysis (AFP). Nevertheless, in recent years there has been decrease in the achievement of surveillance indicators such as the reporting rate and adequate case investigation. This abstract reviews the classification of cases discarded without adequate sample over the last two years.

Methods

A search of the regional PESS (Polio Eradication Surveillance System) database and a review of case reports, neurological assessments, field investigations, vaccination history, and other data from cases recorded in 2004 and 2005. A review of the records of the National Institute of Health's (INS) virology laboratory on the samples received in 2004 and 2005. The cases were divided into five categories: 1) cases with no sample, 2) deceased cases, 3) cases with a small or inadequate sample, 4) cases with a contaminated sample, and 5) cases with a sample collected late.

Results

In the two years studied, 333 AFP cases were recorded in PESS, 197 in 2004, and 136 in 2005. A total of 60 (18.0%) cases met some of the criteria or fit some of the classification categories (Table 1).

Table 1. AFP Cases with a Late, Inadequate, or Unprocessed Stool Sample, Colombia, 2004-2005

Category	2004	2005	Total
No Sample	3	5	8
Small Sample	1	1	2
Contaminated Sample	1	1 *	2
Sample Collected Late	30	18	48
TOTAL	35	25	60

*The contaminated sample belonged to a deceased case.

All of the 8 cases with no sample were discarded for clinical and epidemiological reasons, without residual paralysis or atrophy. The age of these cases ranged from 13 months to 14 years. Four had received 3-5 doses of the oral polio vaccine (OPV). The average time between the onset of paralysis and the last neurological assessment in 7/8 cases was of 62 days (median=58); for the other case, an MRI revealed the presence of a neuroblastoma. The final diagnosis of the cases was Guillain-Barré syndrome/GBS (4 cases), peripheral neuropathy with no sequelae (1 case), syringomielia (Chiari's syndrome, neuroblastoma - 1 case), motor compromise of the median and deep peroneal nerves (1 case), and a healthy child at 60 days (1 case). One of the 4 cases with a small or contaminated sample, an 11-year old who had received 3 OPV doses, was discarded through a neurological assessment at 18 days with no sequelae and a diagnosis of GBS. Another case, a 14-year old who had received 6 OPV doses, was discarded through a neurological assessment at 61 days, with no sequelae and a diagnosis of GBS. The third case was a 16-month old who had received 4 OPV doses; the sample was processed, with negative result and timely field investigation. The case with the contaminated sample died within 60 days of paralysis onset; the diagnosis was nosocomial pneumonia and malnutrition, and the pathological study did not reveal lesions consistent with wild poliovirus. In the last category, of the 48 cases with samples collected late, the average age was 6.3 years, and the interval between the onset of paralysis and collection of the sample was 15-72 days, with a median of 21 days and a mean of 25 days. Of these samples, 48% (23/48) were collected between 15 and 20 days; 54% (26/48) of cases underwent a neurological assessment, with the average time between the onset of paralysis and the last (or only) assessment, 52.5 days (med=42,5 days). Some 79% percent (38/48) of these cases involved field investigation, 73.7% (28/38) of them in less than 48 hours (mean = 5 days; med=2 days). In 54.2% (26/48) of cases, some history of vaccination with OPV was documented, finding from 1 to 6 days (mean and median =4). The final diagnosis of these cases was GBS (54.2%), transverse myelitis (2.1%), other (33.3%), and unknown (10.4%).

Conclusions

Despite efforts to maintain the AFP reporting rate, there are always cases in which adequate, timely collection of stool samples for final classification is not achieved. Notwithstanding, cases have been ruled out for clinical and epidemiological reasons, based on other types of diagnostic exams that make it possible to assert that wild poliovirus has not been circulating in Colombia.

1 National Institute of Health, Colombia.

2 Immunization Unit/FCH, Pan American Health Organization, Colombia

Laboratory Containment of Wild Poliovirus in the Region of the Americas

Landaverde JM[1] , Andrus JK[1]

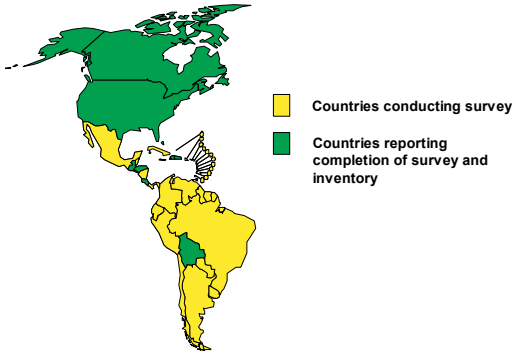
Introduction

Laboratory containment of wild poliovirus and evidence that there is no circulation of the wild poliovirus in the world for at least the past three years are the conditions set by the Global Commission for the Certification of the Eradication of Poliomyelitis for certifying that all the Regions of the World Health Organization have eradicated poliomyelitis.

Methods

The reports from the countries of the Americas to 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, have been reviewed. The reports submitted to the AMR RCC during the meeting in Antigua, Guatemala, in 2005, and the resolutions of the Governing Bodies of the Pan American Health Organization (PAHO) have also been examined.

Figure 1. Progress with Phase I: Region of the Americas



Source: Country Reports to Immunization Unit, PAHO.

Results

During its 126th Session, held on 27 June 2000, PAHO's Executive Committee adopted Resolution CE126.R4 recommending that the Directing Council urge Member States to "*initiate activities related to the containment of any laboratory material that may harbor specimens of wild poliovirus, to ensure that global certification of eradication is eventually accomplished.*" According to the March 2004 report presented by the National Committees for the Containment of Wild Poliovirus, which was examined by the Regional Commission, 39 of the 47 countries of the Hemisphere had submitted reports. Eight countries reported that they had completed their inventory, and the rest reported substantial progress had been made in drawing up the list of laboratories and completing the inventory.

Conclusions

The AMR RCC has been formed, and all the countries in the Hemisphere have National Committees for the Certification of Laboratory Containment of Wild Poliovirus. The AMR RCC has asked countries to broaden the terms of reference of National Committees to include not only containment activities, but also activities guaranteeing the countries' status as free of the circulation of wild poliovirus. From an analysis of the reports presented in Antigua, Guatemala in 2005, it was concluded that Bolivia, Canada, Costa Rica, El Salvador, Guatemala, Honduras, and the USA had completed phase I. The rest of the countries should complete phase I in 2006 (Figure 1).

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Activities for Laboratory Containment of Poliovirus: Achievements and Challenges in Brazil

Colatto ANW[1], Dantas MCS[1], Toscano CM[2], Luna E[2]

Introduction

The last case of poliomyelitis in Brazil was reported in 1989. In 2002, the country began drafting its National Plan for Laboratory Containment of Poliovirus, which includes a national survey to identify laboratory materials infected or potentially infected with poliovirus, according to the standard definition of the World Health Organization (WHO). This study presents the results of these activities and proposed actions to finalize containment efforts in the country.

Methods

In 2004 the national and state Commissions for Laboratory Containment of Poliovirus were set up. That same year, a questionnaire was mailed to some priority laboratories. These laboratories were major public and private laboratories in operation since before 1994. The results and analysis of the initial survey are presented, as well as the activities programmed for 2006 for a broader survey that will cover all the laboratories included in the National Registry of Health Facilities.

Results

The first laboratory survey covered 173 institutions. A total of 289 laboratories from these institutions responded to the survey (Table 1). Of them, only 7 (2.42%) reported storage of specimens containing wild or vaccinal poliovirus or potential poliovirus infectious materials. However, these laboratories are a small proportion of all laboratories in the country. According to the new WHO recommendations issued in 2005, in order to conduct the survey, countries should know how many laboratories there are and identify priority facilities on the basis of well-defined risk criteria. Thus, in 2005 Brazil drew up a new proposal to identify all laboratories operating in the country and conduct a broader national survey. In 2005, 17,587 laboratories engaging in a variety of laboratory activities were listed in Brazil's National Registry of Health Facilities. From the registry, it is impossible to determine which of them pose the greatest risk. Therefore, a new national survey will be conducted that is broader and more independent of the laboratory dimension. Given the large number of laboratories and the operational constraints involved in conducting a paper survey, a questionnaire is being drawn up for placement on the Ministry of Health website, where it can be accessed and filled out. When available, a document will be sent to each laboratory requesting that the questionnaire be filled out online.

Table 1. Results of the First Laboratory Survey, Brazil, 2002

Types of Laboratories	Number of Institutions Surveyed	Number of Laboratories that Completed the Survey	Number of Laboratories with Potentially Infectious/ Infectious Materials
Teaching institutions	56	132	0
Main laboratories of the national public health laboratory network (LACEN)	25	51	6
Municipal laboratories of the municipal health secretariats	20	23	0
Private institutions	06	06	0
Environmental laboratories	03	06	0
Health facility laboratories	63	71	1
Total	173	289	7

Conclusions

The initial survey included only 1.66% of the registered laboratories in Brazil. As this preliminary study was insufficient, Brazil is planning to conduct a new survey. The national reference laboratory network will be upgraded to ensure that national reference laboratories will be available to store the materials identified in the survey in a facility with adequate biosecurity level (BSL-2/polio).

1 Secretariat of Health Surveillance, Ministry of Health, Brazil.

2 Immunization Unit/FCH, Pan American Health Organization, Brazil.

Activities for Laboratory Containment of Poliovirus and Certification of Polio Eradication in Mexico: Progress, May 2006

Morales Jorge[1], Magaña A[1], Pérez E[1], Solís F[1], Albuerne A[2], Espinosa E[2], Maltos S[2], León L[2], Albores V[2], Anaya L[3], Gutiérrez G[3], Velázquez O[4], Kuri P[3], Villaseñor I[1]

Introduction

According to the Global Commission for the Certification of Polio Eradication, the countries of the world must meet two fundamental criteria to obtain certification. They must: (1) provide documentary evidence that demonstrates, in at least the past three consecutive years, absence of the circulation of wild polioviruses in the community. and (2) verify that the biological containment conditions of laboratories that house biological materials with wild poliovirus are adequate to prevent the virus' reintroduction in the community. In 1991, Mexico reported its last case of poliomyelitis caused by the wild strain of poliovirus. Thus, it has met one of the two criteria for certification as a country free of the wild poliovirus circulation.

Methods

- Updating of State Laboratory Lists and on-site verification that the laboratories are operational;
- Creation of the National Laboratory List and the classification of facilities as high-, medium-, and low-risk;
- Design and field testing of the National Laboratory Survey;
- Drafting of the model Sanitary Verification Visit Order to enter laboratories and provide a legal foundation for containment of the poliovirus;
- Design of the information system for storing and online transmission of surveys;
- Designation of the poliovirus containment coordinator at state level by the state secretaries of health;
- Training of 40 state officials in charge of poliovirus containment (29 November and 15 December 2005);
- Provision of documents issued by PAHO/WHO and the Operations Coordinator for Laboratory Containment of Poliovirus, among others, to the responsible state officials. The documents include: the National Laboratory Survey; the Global Action Plan for Laboratory Containment of Wild Polioviruses; Methods for the Destruction and Final Disposal of Material that Contains Poliovirus; Verification of Basic Infrastructure for Biosecurity Level 2/poliovirus Laboratories; Sanitary Surveillance Procedures in Low-, Medium-, and High-Risk Laboratories; and commitments and deadlines.

Results

- The state officials in charge replicated the training (December 2005 and January 2006) for staff in the State Public Health and Sanitary Regulation Laboratories (301 people);
- In January 2006, the Progress Report on containment activities was prepared and delivered on time and in the proper form to PAHO/WHO;
- The state officials in charge were sent user names and passwords to log onto the National Survey website to report advances mentioned in the surveys;
- In February 2006, the federal authorities concluded the survey of high-risk laboratories;
- In May 2006, high-risk laboratories at Mexico City institutes, universities, and research centers will continue to be surveyed;
- Preliminary figures from laboratory lists indicate that there are 10,172 laboratories countrywide. This figure will be confirmed during the process; and
- In March 2006, the Operations Coordinator began visits to advise and supervise the federal authorities.

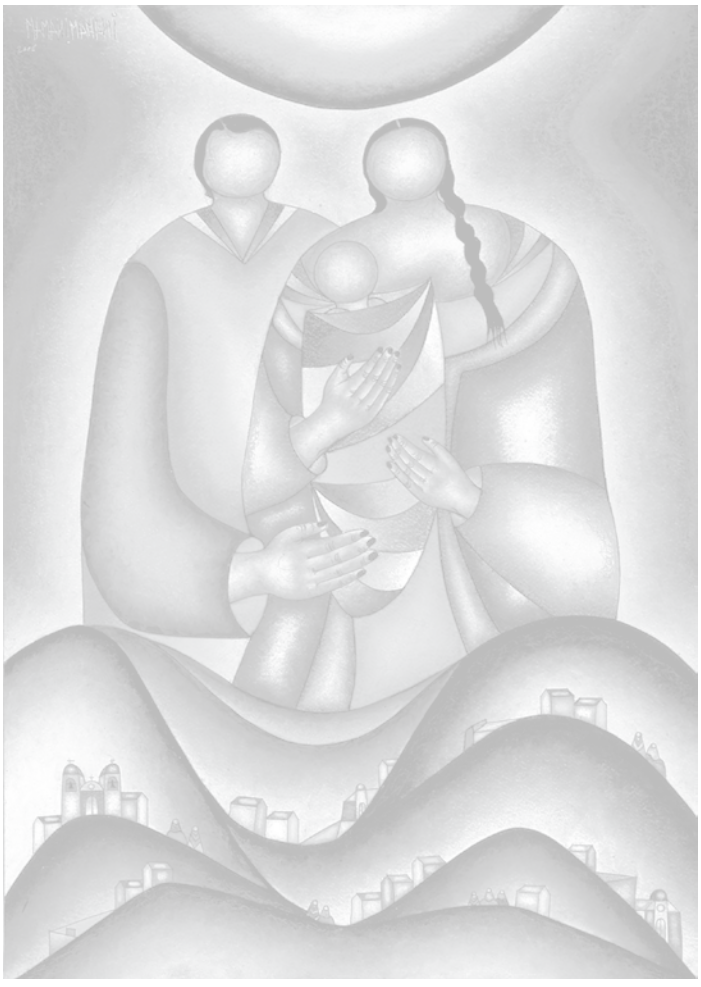
Conclusions

The Progress Report submitted to PAHO in January 2006 indicates advances in surveying the majority of high-risk laboratories and notes that, in May, containment will continue in institutes, universities, and research centers where samples of poliovirus may exist. As to reporting time, samples of the poliovirus have been found only at *Biológicos y Reactivos de México S.A. de C.V.*, since it is the manufacturer of the respective vaccines. The survey process in medium- and low-risk laboratories is concluded.

1 National Diagnostic and Epidemiological Reference Institute, Mexico.
2 Federal Health Risk Protection Commission, Mexico.
3 Bureau of Epidemiology, Mexico.
4 National Center for Epidemiological Surveillance and Disease Control, Mexico.

Part 1: Disease Control and Eradication

Maternal and Neonatal Tetanus



Maternal and Neonatal Tetanus Elimination

Gasse F[1]

In a Resolution adopted in 1989, the World Health Assembly called for neonatal tetanus elimination by 1995. Neonatal tetanus elimination was defined as less than 1 neonatal tetanus case per 1,000 live births at district level. The three strategies used were tetanus toxoid (TT) immunization of women, promotion of clean deliveries, and surveillance. The 1995 goal could not be reached and in 1999 a new fundraising initiative by the United Nations Children's Fund (UNICEF) led to renewed efforts by the World Health Organization (WHO), UNICEF, and the United Nations Fund for Population Activities. Maternal tetanus elimination was added as a goal and the initiative is now officially called the Maternal and Neonatal Tetanus Elimination (MNTE) Initiative. Strategies remain unchanged. The mainstay of the renewed efforts was the implementation of a high-risk area approach involving 3 rounds of TT Supplementary Immunization Activities (SIAs) to vaccinate at least 80% of women of childbearing age (WCBAs) living in high risk areas.

Since 1999, over US $87 million have been raised and US $82 million spent, mostly on implementation of the high risk area approach. Between 1999 and 2005, 37 countries conducted TT SIAs, targeting 77.1 million WCBAs and protecting 63.8 million with at least two doses of TT. Since 1999, nine countries (Eritrea, Malawi, Namibia, Nepal, Rwanda, South Africa, Togo, Vietnam, and Zimbabwe) and two Indian states (Kerala and Andhra Pradesh) have been validated as having eliminated maternal and neonatal tetanus (MNT). Of the remaining countries, all except 6 (Equatorial Guinea, Gabon, Liberia, Nigeria, Papua New Guinea, and Sierra Leone) have a National Plan of Action for MNT Elimination. The number of countries not having eliminated neonatal tetanus (NT) dropped from 90 in 1990 to 57 in 1999, and 49 in 2005. In 1990 and 2000, NT caused 14% and 7% of all neonatal deaths, respectively. In 1988, 787,000 newborns died of NT. This figure dropped to 180,000 deaths in 2002. WHO is currently working on NT death estimates for 2005 and a further drop is expected.

In 2006, MNTE activities are being funded using funds raised by UNICEF National Committees and the United States Fund for UNICEF (USF). So far a total of 13 countries have been allocated approximately US $6 million to target 9,982,142 WCBAs and another US $3.2 million will be allocated shortly. All activities planned for 2006 are fully funded. Recently, the International Finance Facility for Immunization (IFFIm) approved US $62 million for MNTE activities for the period 2006-2009, which will be used to continue MNT SIAs in 20 countries targeting 38 million WCBAs. It is expected that all but 11 of these countries will be able to eliminate MNT, provided funding and supplies are made available. With the currently available USF funds and expected IFFIm funds, an approximate gap of US $80 million still exists to achieve MNT elimination in all countries.

Countries that have eliminated MNT in the recent past must now plan for MNTE sustaining activities that will include improving routine TT immunization coverage through Red (Reaching Every District) and other strategies like Child Health Days and Immunization Weeks to reach the hard-to-reach populations. Many countries are looking to introduce TT boosters for school-age children.

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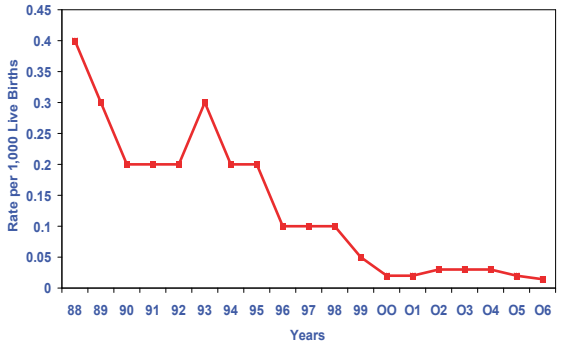
Neonatal Tetanus Elimination in Ecuador: The Final Stretch

Vásconez N[1]

Introduction

In the 1970s, more than 10,000 newborns died annually from neonatal tetanus (NNT) in the Americas. After the resolution issued by the Directing Council of the Pan American Health Organization that established the goal of NNT elimination by 1995, Ecuador began specific program activities. After almost two decades, the Expanded Program on Immunization of the Ministry of Public Health decided to evaluate the actions of the program and redefine strategies for the final elimination phase.

Figure 1. Incidence Rate of Neonatal Tetanus, Ecuador, 1988–2006*



Source: Ministry of Health, Ecuador. * Up to June 2006.

Methods

At the beginning of the 1980s, vaccination strategies using two doses of tetanus toxoid (TT) for all pregnant women were established**.** In 1989, the Elimination Plan began by identifying risk areas (in the Ministry of Public Health, information is not structured by municipalities but by health areas) and developing surveillance to differentiate neonatal and non-neonatal tetanus cases. A vaccination card was prepared for pregnant women and the goal of reaching an annual rate <1 case per 1,000 live births was set. In 1998, two TT booster doses for second-year and seventh-year schoolchildren were added, and in 1999, a national TT vaccination campaign was conducted in women of childbearing age.

Results

To date, progress has been made which has resulted in the reduction of the NNT rate (Figure 1), reaching the zero area with a rate of 1 per 1,000 live births (Figure 1). Plateauing of the trend motivated an analysis of the last 5 years (2000-2005) for the purpose of adjusting strategies to the new risk profile. Analysis of cases in this period showed that 94.8% of cases had at-home deliveries, and that 80% of mothers had never been vaccinated. Forty-six percent of mothers were aged 20-29 years, 23% aged 30-39 years, 17% aged 15-19 years, and age was unknown in 12% of cases. Sixty-nine percent (69.1%) of women had not had any prenatal care and 26.6% stated that they were seen at least once. Seventy-two percent of women were multiparous, 14.5% were primiparous, and this information was not collected in 13.5%. Twenty-five percent of cases occurred in areas of recurrence as compared to 63% in the previous five-year period. Vaccination reports showed that 18% (4) of provinces had cumulative coverage (10 years) of 90% or more, 45% (10) had cumulative coverage of 50 to 89%, and 36.4% (8) had cumulative coverage <50%. Twenty-three percent of areas were classified as being in the attack phase (27% of women of childbearing age), 75% in maintenance phase, and 2% without risk, out of a total of 167 areas distributed throughout the country.

Conclusions

The incidence trend has not varied in the last six years. Most cases occur with at-home deliveries, in unvaccinated mothers, mothers aged <29 years who are multiparous and have not had prenatal care, and in areas where vaccination coverage is <90%. NNT occurs sporadically in the country and mainly in new health areas in the last 5 years.

Plan of Action:

1. Improve the quality of information on vaccination to monitor coverage and validate the classification of risk areas;
2. Conduct case-by-case analysis of NNT to identify risk factors;
3. Prioritize interventions in the communities most susceptible to present cases;
4. Coordinate with agencies for indigenous populations health and maternity program (midwives);
5. Conduct active case-search in the community and institutions reporting high death incidence from neonatal sepsis;
6. Prioritize the vaccination of women of childbearing age for Vaccination Week 2006; and
7. Develop strategies to take advantage of opportunities to vaccinate women of childbearing age.

1 Expanded Program on Immunization, Ministry of Health, Ecuador.

Assessment and Perspective of Maternal and Neonatal Tetanus Elimination in Haiti

Célestin E[1], Lacapère F[2]

Introduction

As Haiti enters the last year of its five-year (2002-2006) Maternal and Neonatal Tetanus (MNT) Elimination Plan, the disease remains a major cause of neonatal mortality in the country. Haiti remains the first contributor of the disease in the Region of the Americas, with more than half of all reported cases. The objective of this study was to analyze the causes of this situation and propose solutions that build on the lessons learned when Haiti and all the American countries succeeded in eradicating poliomyelitis and eliminating measles.

Methods

The following were evaluated: a) data collected by the national epidemiologic surveillance system and by the national health information system; b) results of surveys on MNT; and c) documents of the national Expanded Program of Immunization (EPI).

Results

Although surveillance needs improvement, the average MNT incidence reported at national level is twice the threshold of 1 per 1,000 live births. It exceeds that threshold in 10 departments out of 12, and in one third of the districts. Districts where incidence is under the threshold in some cases may represent "silent" districts. MNT is ranked sixth among causes of neonatal deaths, accounting for 4% of neonatal deaths. In Haiti, the elimination plan was only partially implemented: TT coverage in women of childbearing age (WCBAs) achieved by the campaigns has been generally below an acceptable level. MNT incidence remains high even when many strategies have been tried: (e.g. traditional strategy recommended by WHO/UNICEF/UNFPA, vaccination in markets, multi-antigen campaigns during Vaccination Weeks in the Americas). There are two main factors that should be addressed or improved to correct this situation: First, the mass MNT vaccination campaigns targeting WCBAs, the national vaccination campaigns aimed to sustain the gains of polio eradication and measles elimination, and routine vaccination activities, have exceeded the capacities of a country with limited human resources. Also, the continued political and socio-economical instability of the country has imposed a heavy burden on this initiative. Notwithstanding, positive aspects must be underlined. Attendance in prenatal clinics is satisfactory and efforts to reduce missed vaccination opportunities in pregnant women can also target the fight against MNT. Mass MNT campaigns in WCBAs are well accepted. The majority of reported MNT cases are concentrated in large cities, where vaccination efforts are easier than in rural settings due to wider impact of mass-media, proximity to institutions, and adequate staffing levels. Consequently, operational and opportunity costs of health staff are much lower. In rural areas, the fight against MNT could benefit from a network of community agents supported by powerful Non-governmental Organizations (NGOs). Finally, the school system has also a high and still unexploited potential.

Conclusions

Although Haiti is no longer a class A country (i.e. a country that should be able to meet the elimination goal in 12 month because fewer than 10% of its districts are at high risk and immunization services reach 70% of children as measured by DPT3 coverage) (1), it is possible to reduce the MNT death toll through innovative strategies, drawing on lessons learned from successful experiences and taking into account country opportunities and constraints. The most promising strategies are as follows:

1. Reducing missed vaccination opportunities;
2. Concentrating campaigns to reach the underprivileged in highly populated areas: a high proportion of reported cases originates from these areas, due to their environment; they can be easily targeted by the media; the operational costs to reach them are limited; and health staff are concentrated there, making the opportunity costs minor with respect to the provision of other services;
3. Integrating tetanus vaccination with food distribution programs: these programs target the underprivileged populations, they ensure regular contact with their target, and they use individual follow-up materials, which makes it possible to record doses administered; and
4. Vaccinating teenage girls in schools, during campaigns against intestinal helminths being implemented throughout the school system, or during the initial phase of rubella and congenital rubella syndrome elimination.

Mass vaccination campaigns against MNT in rural zones should only be considered after having (1) implemented the preceding measures; (2) strengthened the surveillance; (3) reclassified districts according to level of risk; and (4) mobilized NGOs with a network of community health workers so that they make MNT elimination one of their priorities and provide the needed additional human resources.

Reference

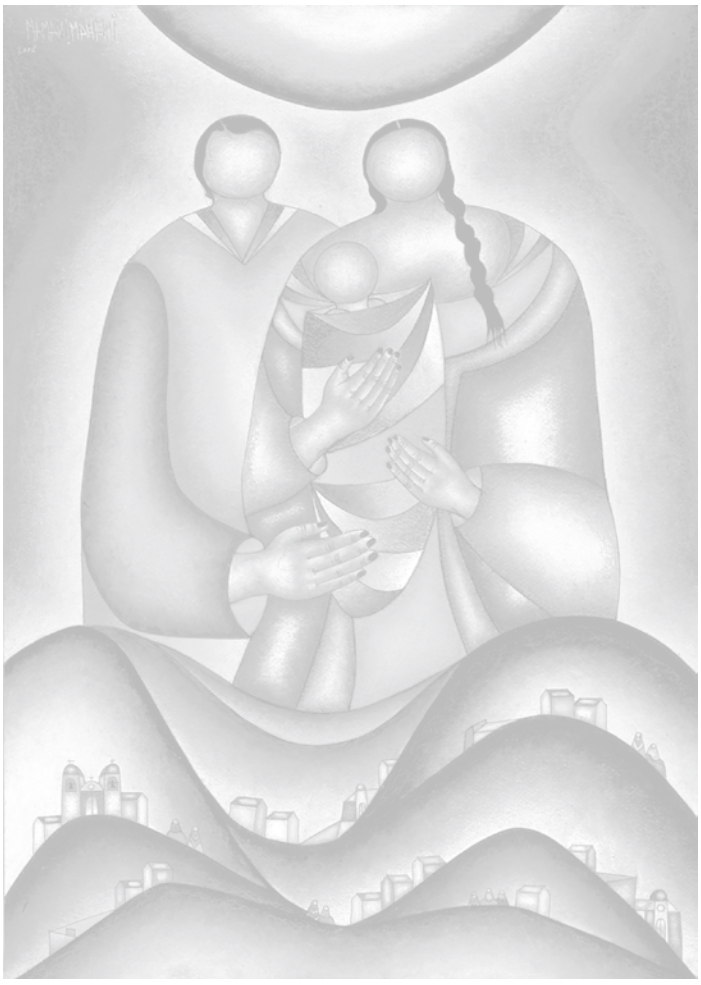
(1) World Health Organization. Maternal and Neonatal Tetanus Elimination by 2005. Strategies for achieving and maintaining elimination. WHO/V&B/02.09. November 2000 (in cooperation with UNICEF and UNFPA).

1 Expanded Program on Immunization, Ministry of Public Health and Population, Haiti.

2 Immunization Unit/FCH, Pan American Health Organization, Haiti.

Part 2: New and Underutilized Vaccines

Financial Sustainability of National Programs



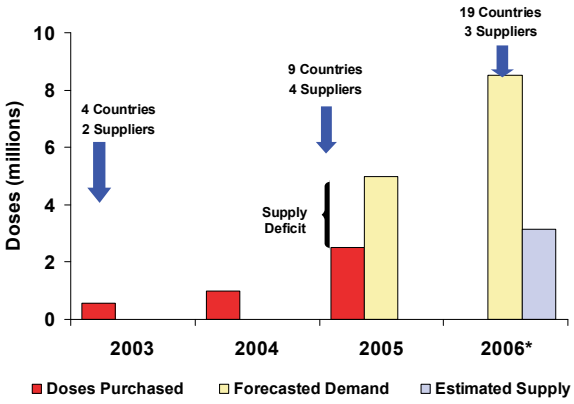
Sustaining National Immunization Programs in Latin America and the Caribbean in the Context of Introducing New and Underutilized Vaccines

Andrus JK[1], Fitzsimmons J[1], Crouch A[1]

Introduction

The Americas have led the world in providing children with an umbrella of protection against basic vaccine-preventable diseases. Sustained high national immunization coverage levels, the eradication of polio, and the interruption of endemic measles virus transmission were achieved in this Hemisphere years ahead of other Regions. Immunization was responsible for almost one quarter of the reduction in mortality in children aged <5 years between 1990 and 2002, contributing significantly to progress toward the Millennium Development Goals (MDGs) in this Region and the target of the Global Immunization Vision and Strategy (GIVS). These outcomes have been achieved through dedicated country efforts and decades of innovation in the areas of vaccine supply and financing, principally through the PAHO Revolving Fund for Vaccine Procurement. Immunization, already regarded as a 'best buy' public health intervention, is now believed to have even more far-reaching economic impacts, in better education outcomes and more years of productive life.

Figure 1. Uptake of Seasonal Influenza, 2003-2006



Source: PAHO Revolving Fund, Immunization Unit * estimated

Technical and Programmatic Challenges

However, in the Americas, there remains an unfinished immunization agenda. Almost one child in three lives in an under-serviced municipality, and rubella and congenital rubella syndrome (CRS) elimination targets have not been reached in many countries. Emerging public health threats, including pandemic influenza, pose serious challenges to national health systems. New generation vaccines against killer childhood infections, including rotavirus and pneumococcus, are many times more costly than the basic vaccines. The vaccine against human papilloma virus (HPV) causing cervical cancer in women is also very expensive. Introducing these vaccines into routine schedules will require additional financing for national immunization programs, as will accelerating country uptake of seasonal influenza vaccine (Figure 1). The proportional increases in immunization budgets required to introduce these vaccines are significant and indicate the need for enhanced decision-making capacity at country level as well as strengthened dialogue between Ministries of Health and Finance, to ensure that allocation and disbursement of sufficient funds for immunization occur routinely and on a sustained basis.

Strategic Vision

To address these challenges, PAHO proposes a renewed vision to countries, recommending strategies to:

- Address inequity by reaching the unreached through better integration with other life-saving interventions;
- Establish mortality reduction targets toward the achievement of the MDGs and targets outlined in GIVS for diseases caused by rotavirus and pneumococcus;
- Support strengthened national resource allocation and vaccine introduction decision-making capacity through strategic partnerships with key global and regional institutions;
- Transition from childhood to family immunization for influenza, HPV, tuberculosis, and HIV (when available) by building on rubella and CRS elimination experience and;
- Attain unprecedented levels of participation in the PAHO Revolving Fund through clear demonstration of the benefits to countries.

Conclusions

Global leadership in reducing child mortality through immunization has depended on country commitment, innovative vaccine procurement, and financing mechanisms. However, the future presents many challenges to both sustaining this pioneering momentum and responding to the significant technical and programmatic demands ahead. By acting as a Regional block of countries united in common purpose, these challenges can be surmounted.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

Use of Economic Analysis on Immunization Vaccine Programs in the Americas

Toscano CM[1], Crouch A[2], Fitzsimmons J[2], Andrus JK[2]

Introduction

Best practice in making and implementing informed decisions for public health requires policy-makers to consider economic information, in addition to the usual epidemiologic, demographic, and management data. Evidence to assess the balance between the economic costs of vaccination and the economic savings and health benefits from disease prevention is key to responsible decision-making. Some of the data needed for economic analyses are already available in many country contexts, but several barriers contribute to their underutilization. Available economic analysis studies could be considered as an important component of decision-making at regional and country levels. In addition, simplified methodologies and tools for conducting these studies at local level should be made available to promote the *best use of available data in health economic analysis and the incorporation of its results in the decision-making process.*

The results of a number of different health economic studies can contribute significantly to inform decisions on vaccine introduction or expanding target groups for vaccines already in use. The principal objective of Cost-of-Illness (COI) studies is to measure the economic burden of illness to society. COI is a descriptive study that can provide information to support the political process as well as the management functions at different levels of health care organizations. Cost-of-Programs (COP) studies are also descriptive and aim to provide information about the estimated costs of a program to be introduced. These studies are important to evaluate the medium- and long-term affordability of programs, which are important aspects of sustainable vaccine introduction. Financial sustainability evaluation of new vaccine introduction is a crucial portion of the decision-making process within national immunization programs.

The findings of COI and COP studies are important inputs for more complex economic analysis used to assess the economics of health care interventions designed to control and prevent a disease – cost-effectiveness analysis. *It is critical to the goals of completing the unfinished immunization agenda and closing equity gaps for immunization services in the Region that decision-making on new vaccine introductions be based on the best evidence and that it considers the financial sustainability of adding the new vaccine to the immunization schedule.*

Promoting Economic Analysis on Vaccine Introduction (Pro-Vac)

Vaccine introduction decision-making has become increasingly complex and now requires a range of skills and competencies beyond those traditionally found in national immunization programs. The findings of a country needs assessment indicated a demand from program managers for tools to undertake economic analyses. As a result, an inventory of existing tools and guidelines for program costing, estimating economic burden of disease, and simplified frameworks for cost-effectiveness analysis of vaccine introduction were developed. These materials will be adapted for the Region and translated into Spanish, Portuguese, and French.

The Pro-Vac Initiative will support bridging the gap at country level between academic centers for economic analysis and immunization program management. It is anticipated that this will generate greater demand for, and promote the informed use of, relevant economic studies to support policy-making at country and regional levels. This initiative consists of multiple steps of training, data collection, and development of economic analysis at country level in the context of new vaccine introduction. A workshop will take place in Washington, D.C. in September 2006 to present the theoretical framework for economic analysis, including affordability, cost-of-illness, cost-of-programs, and cost-effectiveness studies, as well as to present and discuss the main tools for economic analysis for new vaccine introduction.

Conclusions

For new vaccine introduction to sustainably contribute to overall prevention effectiveness, economic evidence must be considered together with the usual epidemiologic, demographic, and management data. The Pro-Vac Initiative will provide the tools and linkages with national centers of economic studies to strengthen immunization program capacity for evidence generation and priority setting for these new technologies.

1 Immunization Unit/FCH, Pan American Health Organization, Brazil.

2 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

Strategies for Creating Financial Sustainability

Fitzsimmons J[1], Andrus JK[1], Crouch A[1], Suarez R[2]

Introduction

Participation in the Pan American Health Organization Revolving Fund (RF) for vaccine procurement has benefited many countries in the Americas. This includes achieving disease eradication and control targets, and accelerating the introduction of new and underutilized vaccines years ahead of other Regions in the world. Successes of the RF include the sustained introduction of MMR (measles-mumps-rubella) vaccine beginning in 1998, pentavalent (DTP-HepB-Hib) vaccine in 2000, and seasonal influenza vaccine in 2005, contributing to measles elimination, progress with rubella and congenital rubella syndrome elimination targets, and reduced mortality due to Hib disease. At the close of 2005, the RF was capitalized at just over $34 million and total expenditures exceeded $154 million that year. New generation vaccines such as rotavirus present new challenges, being more costly than basic childhood vaccines (Figure 1). New measures of immunization effectiveness will be needed to support new, higher levels of immunization financing.

Figure 1, Financial Requirements for Vaccines

	Vaccine	Cost		Vaccine Budget
Basic Vaccines (Fully immunized child)	BCG OPV Pentavalent+Booster MMR TOTAL	$14.72		Total X Birth Cohort
Underutilized Vaccines	Yellow Fever, Pediatric Yellow Fever Influenza, Seasonal, Pediatric Influenza, Seasonal, Adult	$0.65 $0.65 $1.20 $3.50	2 doses 1 dose 2 doses 1 dose	Doses X Cost X Children <1 year Cost X Adults at risk Doses X Cost X Children <1 year Cost X Adults at risk
Supplemental Immunization	Rubella Elimination	$0.44	1 dose	Cost X Women 15-39 years
New Vaccines	Rotavirus (Oral Vaccine Candidates)	<$7.00	2/3 doses	Cost X Doses X Birth Cohort
TOTAL	Routine Childhood Vaccines	$32.42		Total X Birth Cohort

Source: PAHO Revolving Fund (Average Prices, 2005), Immunization Unit.

Sustainability

The RF is currently considering new strategies to support country vision for sustainable uptake of a new generation of vaccines, including rotavirus, pneumococcus, and human papilloma virus (HPV). These strategies, addressing both supply and demand side factors, include: fostering greater participation in the vaccine marketplace; including participation of national suppliers; developing collaboration among bulk purchasers; and improving supply chain efficiencies in ways that expand participation in the RF to achieve even higher purchase volume and affordable prices. Together with countries, PAHO is working to review the role of legislation in keeping transaction costs low; identify new revenue flows for immunization; and foster strategic national and external partnerships to strengthen the evidence for decision-making on new vaccines. PAHO is also working with Ministries of Economy and Finance, the International Monetary Fund and the Inter-american Development Bank on promoting inter-sectoral coordination to assist countries to ensure that the true value of immunization is reflected in budget allocations and disbursements. Dialogue with the World Bank on developing country tools for assessing fiscal space and work with GAVI (Global Alliance for Vaccines and Immunization) on common approaches to vaccine price negotiations is ongoing.

Participation in the Revolving Fund

The RF has brought significant benefits to participating countries. Examples include cost savings, due to lower, uniform vaccine prices resulting from high volume bulk purchasing agreements; increased consistency and adequacy of vaccine supply through much more accurate forecasting; and greater cooperation between immunization programs of member countries when emergencies occur. Thirty-seven countries are currently making regular use of the RF for the procurement of up to forty-five different vaccine products. In addition, the RF is streamlining its integrated services to countries through further reducing costs of vaccine procurement, holding, distribution, and use along the supply chain. The key to future immunization program growth is expanded country participation across the range of RF support services. Now more than ever, with the challenge of the new generation vaccines already here, Pan American cooperation through the RF will enable this Region to continue its spectacular immunization achievements.

Conclusions

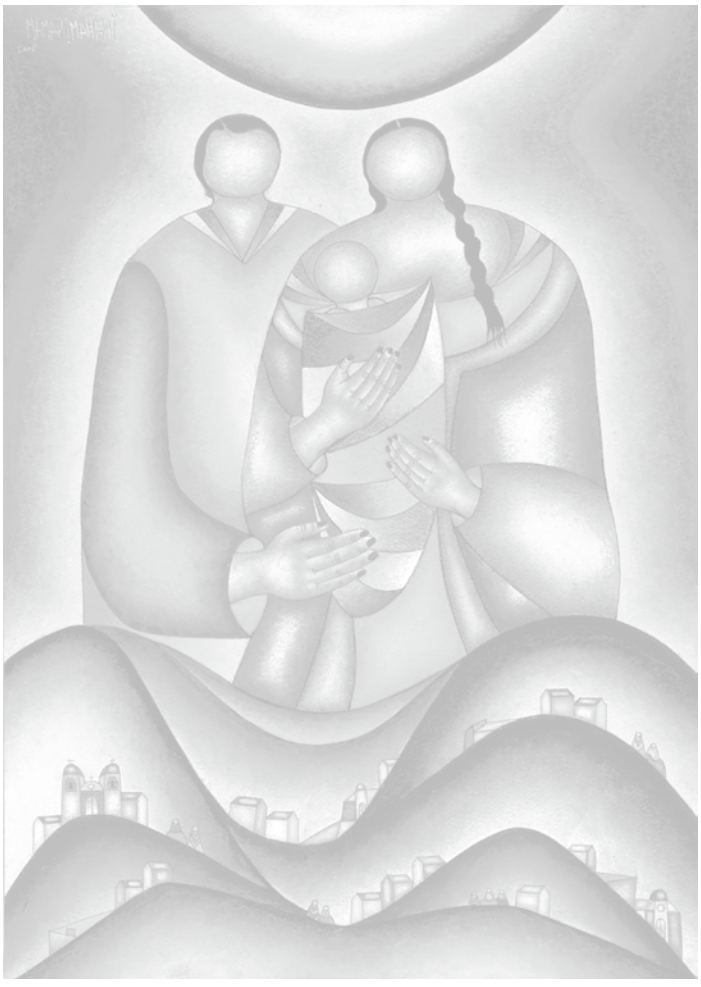
The challenge for countries will be to increase the flow of sustainable financing to accelerate the introduction of new generation vaccines for this transition. This will require evidence to ensure that national budgetary processes recognize the true economic value of immunization; close attention to supply chain efficiency and vaccine legislation to reduce transaction costs; the development of new sources of revenue for immunization; and unprecedented levels of RF participation to ensure safety and affordable prices. The RF, as a highly efficient procurement agency, is positioned to continue its strategic role in strengthening the sustainability of national immunization programs throughout the Region.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

2 Health Systems Strengthening/SHD, Pan American Health Organization, Washington, D.C., USA.

Part 2: New and Underutilized Vaccines

Vaccines against Rotavirus, Human Papillomavirus, Yellow Fever, Influenza, and Hookworm



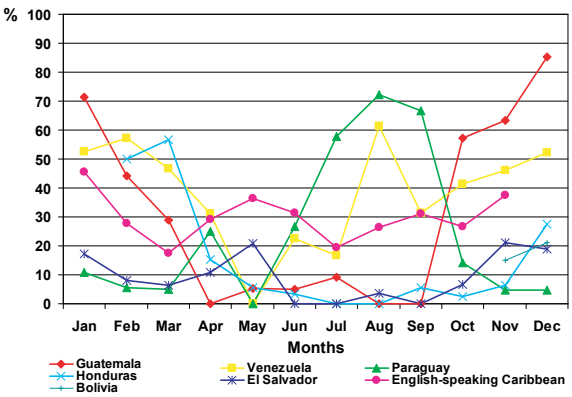
Rotavirus Diarrhea Surveillance in the Region of the Americas

Oliveira LH[1] , Garcia S[2], Andrus JK[1]

Introduction

Rotavirus infection is the leading cause of diarrhea in children aged <5 years worldwide and is responsible for some 608,400 deaths annually and 39% of hospitalizations due to diarrhea in children aged <5 years. According to the available data in the Region of the Americas, rotaviruses result in approximately 75,000 hospitalizations and nearly 15,000 deaths annually. The incidence of rotavirus infection is similar in developing and developed countries, since the quality of the water supply and of hygiene and sanitation conditions has not proven to affect control of the infection. However, the case-fatality rate is higher in poorer countries due to malnutrition and the difficulties involved in securing timely access to services. The high social cost is accompanied by the high economic cost of the disease burden in health care centers. Efforts to develop a safe and effective vaccine bring to us two new vaccines now on the international market. Since the addition of a vaccine to the routine immunization programs is imminent, there is an ongoing need for up-to-date information on the behavior of the disease and the predominant strains in the countries of the Region of the Americas. The objective of this study is to describe the implementation of rotavirus diarrhea surveillance in sentinel hospitals in certain countries of the Region of the Americas.

Figure 1. Percentage of Diarrhea Cases Positive for Rotavirus, by Selected Countries, January-December, 2005



Source: Country Reports.

Methods

Rotavirus diarrhea surveillance in the Region began in 2003. The data to be analyzed correspond to 2005 surveillance activities in Bolivia, El Salvador, Guatemala, Honduras, Paraguay, Venezuela, and three English-speaking Caribbean countries. Surveillance was conducted in sentinel hospitals chosen on the basis of set selection criteria, with a standard case definition and rotavirus ELISA testing in the laboratory. The percentage of rotavirus diarrhea by country and month of the year, seasonal variations, the percentage of rotavirus diarrhea in patients hospitalized with diarrhea, and the quality of surveillance in the countries were analyzed.

Results

Diarrheal diseases are the cause of 11.89% of hospitalizations in children aged <5 years in countries where surveillance is in place, ranging from 6.52% in Honduras to 20.33% in El Salvador. Analyzing rotavirus seropositivity by month of the year in the countries (Figure 1), marked seasonal variations are observed in Guatemala, Honduras, and Paraguay, with case numbers rising in these countries during the winter months. In countries that report sentinel hospital surveillance data, the average was 39.0% of diarrhea due to rotavirus in 2005, with figures ranging from 13.30% in Honduras to 59.20% in Guatemala. As to the quality of surveillance, only Bolivia, Paraguay, and Venezuela have more than 80% of suspected cases with stool samples and epidemiological records.

Conclusions

In the Region of the Americas, sentinel surveillance data from the countries studied reveal that the etiology in a high percentage of hospitalized diarrhea cases is rotavirus, a finding consistent with the data already published in the literature. However, countries need to improve the quality of their surveillance, since some of the data are still inconsistent. Furthermore, it is essential that every country in the Region conduct sentinel surveillance of rotavirus, so that the behavior of the disease can be studied at regional level, allowing the evaluation of country data. Analysis of these data coupled with economic studies will support the introduction of control measures based on evidence, as in the case of the rotavirus vaccine.

Acknowledgment: We wish to thank the staff of the U.S. Centers for Disease Control and Prevention (CDC) for their assistance in the surveillance of rotavirus diarrhea in the Region of the Americas.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA

2 Immunization Unit/FCH, Pan American Health Organization, Argentina.

Hospital-based Surveillance of Rotavirus Diarrhea in Bolivia, 2005-2006

Flores J[1], Iñiguez V[2], Rivera R[2], Rosales P[1], Mamani N[2], Halkyer P[3], Ronveaux O[3]

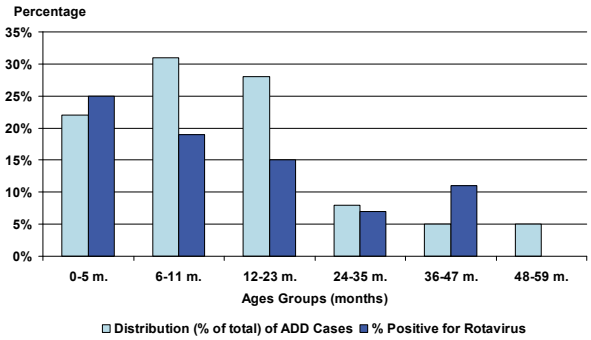
Introduction

Bolivia launched its rotavirus sentinel surveillance program in October 2005, with the objectives of documenting the burden of the disease and identifying the circulating serotypes to assess the potential impact of using rotavirus vaccines in the country. We describe the preliminary surveillance results (up to February 2006) and the lessons learned.

Methods

The sample corresponds to six hospitals representative of the country's three ecoregions. Hospital admissions for acute diarrheal disease (ADD) in children aged <5 years are recorded. An ADD is defined as the presence of three or more watery or somewhat watery stools in a 24-hour period for less than 14 days. In suspected cases, a standard epidemiological form is filled out and a stool sample taken. Rotavirus is detected in the reference laboratory by ELISA (reference diagnosis) and PAGE (Polyacrylamide Gel Electrophoresis).

Figure 1. Distribution of Hospitalization Cases Due to Acute Diarrheal Disease (ADD) and Proportion Positive for Rotavirus, by Age Group, Bolivia, October 2005 - February 2006



Source: Ministry of Health, Bolivia.

Results

In the period October 2005 to February 2006, 322 samples were collected from the six participating hospitals. The proportion of samples positive for rotavirus was 14% (n=45), with hospitals ranging from 7% to 20%. Of the 187 samples from boys, 15% were positive for rotavirus, and of the 135 samples from girls 13% (p=0.5) were positive for rotavirus. Children aged <1 year accounted for 42% of rotavirus cases (and 53% of all ADD), with the rotavirus-positive proportion gradually decreasing with age (Figure 1). Hospital admissions for rotavirus ADD in children aged <5 years accounted for 1.5% of all hospitalizations in this age group. The PAGE method had a sensitivity of 68%, a specificity of 98%, and a positive predictive value of 86%. The greatest problems found were inadequate storage of samples in the participating hospitals, late sending of the samples, and ensuring strict adherence to the case definition. Regular educational supervision and the publication of a quarterly bulletin helped to maintain interest.

Conclusions

These initial results indicate a heavy burden of disease in Bolivia. The PAGE technique is not very good for this type of study. Despite the logistical problems encountered, the surveillance system has proven efficient, owing to the commitment and motivation of all participants.

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2 Rotavirus Reference Laboratory, Institute for Molecular Biology and Biotechnology, Bolivia.
3 Immunization Unit /FCH, Pan American Health Organization, Bolivia.

Surveillance of Rotavirus Gastroenteritis in Sentinel Hospitals, Honduras, 2005

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Introduction

Rotavirus has been identified as one of the leading causes of severe diarrhea and dehydration in children worldwide. Diarrhea is a serious public health problem in Honduras. In January and November 1979, the importance of rotavirus in the etiology of diarrheal diseases was demonstrated since rotavirus was isolated in 38% of the 98 children seen for diarrhea in the pediatric emergency unit of the Honduran Social Security Institute. In February 2005, within the framework of the strategic plan for the possible introduction of rotavirus vaccine, the permanent epidemiological surveillance system was implemented to characterize rotavirus diarrhea patterns in six hospitals around the country.

Methods

We present a series of cases in patients aged <5 years admitted to the six sentinel hospitals from February to December 2005. The case definition used was patients aged <5 years admitted to the sentinel hospitals with diarrhea that had begun less than 15 days earlier. The data were recorded on a form with fields for demographic data, clinical data, and laboratory results, all of which were subsequently entered into the Epi Info database for analysis. In each of the cases, a 5 ml stool sample was collected and placed in a sterile container within 48 hours of hospitalization. The samples were then processed in the laboratories of the sentinel hospitals and the reference laboratories. Rotavirus detection was performed by enzyme immunoassay (ELISA) using DAKO kits. The samples were sent to the Centers for Disease Control and Prevention (CDC) in Atlanta for serotyping and characterization. The analysis plan included a description of cases by sex, age, place of residence, symptoms, and laboratory results. Means, medians, and standard deviations were calculated.

Results

From February to December 2005, the sentinel hospitals reported 37,456 admissions of children aged <5 years, 2,472 (7%) of which were for acute gastroenteritis; of these, 940 met the case definition. The surveillance form was filled out, and a sample was taken from 597 children, resulting in 69 positive cases, or 12% (69/597). In 6 cases, or 9% (6/69), genotype P[8] G9 was identified. The temporal distribution corresponded to the months of February, with 4 cases (6%); March, with 10 (14%); April, with 6 (9%); May, with 4 (6%); and December, with 41 (59%). The proportion of rotavirus-positive cases varied in each of the sentinel hospitals. The cases came from six departments. The sex distribution was 70% male (48/69) and 30% female (21/69). Seropositivity in children under 1 year was 67% (46/69) and 23% (23/69) in the 1–4 year group. Fully 100% of the cases presented acute diarrhea; 96%, vomiting; and 54%, fever. No deaths were reported.

Conclusions

In 2005, surveillance identified rotavirus in 12% of admitted cases; children aged <1 year were the most affected group. Although the results are limited to the period in question, as surveillance activities increase, more will be known about rotavirus disease burden and it will be easier to justify use of the vaccine in the country. A major discrepancy has been observed between the number of cases that met the criterion for a suspect case and the number for which the forms were filled out and samples collected. This indicates the need to improve the quality of sentinel surveillance in these hospitals. The main constraint identified was the limited participation of doctors and nurses; this led to the preparation of a manual that details the activities of each of the actors who participates in the surveillance network.

1 Rotavirus Gastroenteritis Surveillance, Bureau of Health Surveillance, Secretariat of Health, Honduras.

2 Expanded Program on Immunization, Secretariat of Health, Honduras.

3 Virology Laboratory, Secretariat of Health, Honduras.

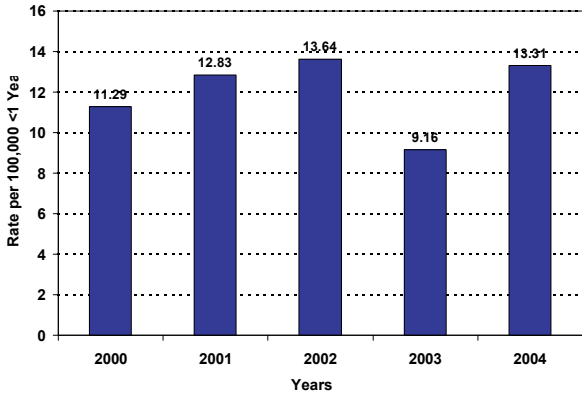
Intussusception in Infants Aged Under One Year, Venezuela, 2000-2004

Larrea F[1], Morales M[2]

Introduction

As part of its health policy, the Ministry of Health has planned to introduce the rotavirus vaccine in the national immunization schedule. The introduction of a new vaccine requires that a series of prerequisites be met. For this vaccine in particular, it will be necessary to have a baseline for intussusception patterns in the country for surveillance purposes after vaccine introduction. This is necessary because the tetravalent Rhesus rotavirus vaccine (RV-TV) developed in 1998 by Wyeth-Lederle and approved for use in the United States was withdrawn after one year due to an association with intussusception observed in approximately 1 in every 10,000-12,000 vaccinated infants, particularly after the first dose. Thus, the purpose of this study is to determine the incidence of intussusception in infants aged <1 year in Venezuela's public hospital network, as well as its epidemiological and clinical characteristics.

Intussusception: Morbility in Children aged <1 year, Venezuela, 2000–2004



Source: Ministry of Health, Venezuela.

Methods

This is a descriptive, retrospective, observational study to determine the incidence of intussusception in children aged <1 year in the national public hospital network. The medical histories of patients with a diagnosis of intussusception (ICD-10 = K56.1) discharged from the hospital during the period 2000-2004 were reviewed. The data collected for the characterization correspond to age, sex, place of residence, place of treatment, date of admission and discharge, type of diagnostic confirmation, type of treatment, and condition on discharge. Annual and 5-year average percentages and incidence rates were calculated, using population data from the National Statistics Institute.

Results

A total of 340 cases were identified in public hospitals, with an average of 68 cases per year and a 5-year average rate of 12.05 cases per year per 100,000 children aged <1 year. An increase in incidence was observed up to age 6 months, followed by a decline; 78% of the cases involved infants aged <7 months, with 69% of all cases in the 3-6-month age group, and 61.5% of children were male. Of the total cases identified, 51.4% were referred to a hospital of greater complexity and 82.1% called for surgical intervention. The states with the highest incidence were Lara (17.7%) and Carabobo (16.2%), which accounted for 33.9% of all cases.

Conclusions

This study improved our knowledge about the epidemiological patterns of intussusception in children aged <1 year in Venezuela, even though it was limited to the public hospital network. Nevertheless, the findings coincide with those of another study in the country that included private health care centers, but was conducted in only one state. This study provides a baseline for surveillance following the introduction of the rotavirus vaccine. It also supports the decision on when to administer the first dose of vaccine, as the observed risk is lower in infants under 3 months, considering that an association between the tetravalent Rhesus rotavirus vaccine and intussusception was observed when doses were administered after 3 months.

1 Immediate Response Unit, Epidemiological Surveillance Bureau, Ministry of Health, Venezuela.

2 Hospital Epidemiology Unit, Epidemiological Surveillance Bureau, Ministry of Health, Venezuela.

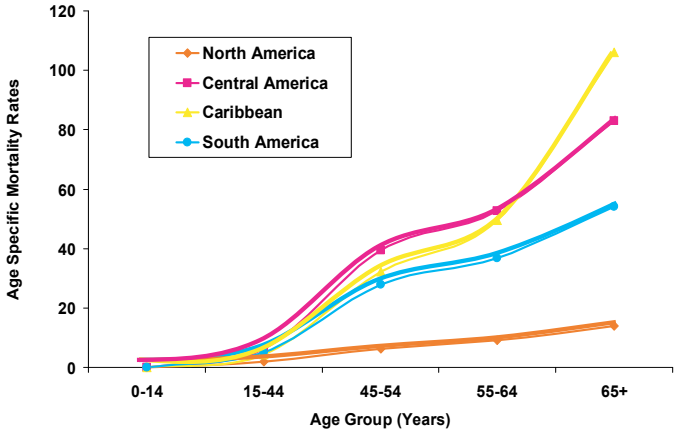
Setting the Stage for HPV Vaccine Introduction in Latin America and the Caribbean

Lewis MJ[1], Andrus JK[1]

Introduction

Every year, approximately 92,136 cases of cervical cancer and 37,640 deaths are recorded in the Region of the Americas. Significant sub-regional disparities are also evident as cervical cancer incidence and mortality rates in Latin America and the Caribbean (LAC) are roughly four to five times greater than those in North America. Cervical cancer is closely associated with poverty, poor access to health services, rural living, and low educational attainment, with the greatest burden occurring among middle-aged women. The definitive identification of certain types of human papillomaviruses (HPV) as the etiologic agents in cervical carcinogenesis has culminated in development of HPV vaccines, and their subsequent testing in human populations with excellent results. There is a high probability that two HPV vaccines, one a bivalent (types 16 & 18) formulation and the other a quadrivalent (types 16, 18, 6 & 11) formulation, will receive regulatory approval during 2006. These vaccines have been shown to be highly efficacious in preventing persistent type-specific infections, as well as associated cervical cytological abnormalities and pre-cancerous lesions. In addition, they have been safe and well tolerated in human subjects.

Figure 1. Malignant Neoplasm of the Cervix Uteri: Estimated Age Specific Mortality Rates per 100.000 Population in Selected Sub-regions of the Americas, GLOBOCAN 2000



Source: IARC

Methods

A review was undertaken of the experiences and strategies developed by the Pan American Health Organization (PAHO) as part of its technical guidance to Member States regarding HPV vaccine introduction.

Results

Commencing in 2005, PAHO in its international technical cooperation role embarked upon a series of activities, which are geared to prepare Member States for the introduction of HPV vaccines. These activities have included engagement of the HPV vaccine suppliers in an ongoing technical dialogue; assembling all of the relevant internal stakeholders around the topic of HPV vaccine introduction; strengthening the National Regulatory Authorities in order to ensure the quality of products; initiating advocacy efforts in order to heighten awareness about HPV vaccines through publications and oral presentations; and exploring avenues and mechanisms for building effective partnerships with external agencies and organizations. A preparedness plan for HPV vaccine introduction in Latin America and the Caribbean has also been developed. The essential pillars of this plan revolve around:

- Building and strengthening political will for cervical cancer prevention through multi-dimensional and cross-cutting advocacy efforts;
- Disseminating relevant technical and economic information and knowledge in order to support evidence-based policy formulation and other decision-making activities;
- Encouraging or conducting relevant research, such as economic analyses and acceptability studies in order to specifically clarify pertinent regional issues;
- Developing technical consensus on optimal surveillance strategies and tools and designing relevant surveillance systems as appropriate;
- Galvanizing cross-sectional support for HPV vaccination through effective social marketing and communication; and
- Mobilizing the required financial and technical resources through the creation of effective partnerships with external agencies and organizations.

Conclusions

The execution of this preparatory plan will result in Member States having an enhanced capacity to plan, deliver, and sustain equitable, safe, and high-quality HPV vaccination programs, within appropriate financial and policy frameworks.

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HPV Vaccine Trials: Findings and Public Health Implications

Villa LL[1]

Introduction

Human Papillomavirus (HPV)-associated diseases, such as cervical/anogenital cancers, cervical intraepithelial neoplasia, genital warts, and recurrent respiratory papillomatosis, confer considerable morbidity and mortality, and are a significant health care concern. Cervical cancer is the leading cause of female malignancy in many developing countries. Furthermore, screening programs and treatment for precancerous states are a major public health burden in developed countries. Successful vaccination strategies that protect against HPV infection are expected to substantially reduce HPV-related disease burden. Since many types of HPV cause disease in the mucosal epithelium, and the immune response to HPV is thought to be mainly type specific, the utility of vaccination can be greatly increased by combining virus-like particles (VLPs) into multivalent vaccines that provide protection against multiple HPV types. The four HPV types implicated in the majority of HPV-related diseases have been the focus of prophylactic vaccine development efforts. HPV 6 and 11 are low-risk types associated with the majority of cases of genital warts, and HPV 16 and 18 are high-risk types implicated in approximately 50% of cases of high-grade cervical intraepithelial neoplasia (CIN), invasive cancer at a variety of anogenital sites, and 60% to 72% of cervical cancers.

Methods

Prophylactic HPV vaccines in late stages of clinical testing are composed of exogenously expressed HPV capsid proteins that self-assemble into VLPs. Proof-of-principle trials have suggested that intramuscular injections of VLPs result in strong adaptive immune responses, both B- and T-cell mediated, that are capable of neutralizing subsequent natural infections. Clinical trials conducted in different countries with a bivalent vaccine designed to protect against high-risk, oncogenic HPV 16 and 18 and a quadrivalent vaccine designed to protect against HPV 16 and 18, and low-risk, genital wart-causing HPV 6 and 11 have demonstrated that VLP vaccines reduce the incidence of HPV-associated disease in vaccinated individuals.

Results

Thousands of young women from different countries were enrolled in randomized, double-blinded, placebo controlled studies. Efficacy rates between 90 and 100% were obtained against HPV infections and associated diseases. More than 25,000 men and women from across the globe were recruited to participate in phase 3 safety and efficacy studies of the quadrivalent vaccine. In a recent presentation of such a study involving 12,000 young women, this vaccine was shown to prevent 100% of HPV 16 and 18 associated CIN2/3, adenocarcinoma in situ, and cancer during 2 years of follow-up. Results from these phase 3 trials are expected to be published soon. The vaccine may be commercially available as early as 2006-2007. Further studies involve vaccination in adolescents, mid-adult women, and men.

Conclusions

Preventive HIV vaccines offer an effective means for dramatically reducing the morbidity and mortality of cervical/an genital cancers and recurrent respiratory papillomatosis, as well as the emotional and economic burdens of abnormal Pap tests and genital warts. However, administration of these vaccines may offer several distinct challenges including age of vaccination, public perception of disease risk, and vaccine cost, as well as moral and cultural issues. To derive the greatest public health benefit, implementation of HPV vaccination programs will require educational initiatives to communicate the risks and adverse consequences of HPV infection and to foster widespread vaccine acceptance.

1 Ludwig Institute for Cancer Research, São Paulo, Brazil.

Regional Yellow Fever Situation

Oliva O[1], Ropero AM[2], Andrus JK[2]

Introduction

Yellow fever is a disease of the jungle in South America, found in geographical areas with confirmed virus circulation and ecological conditions that maintain its transmission, that is the presence of competent vectors and susceptible vertebrates. Countries with enzootic areas are Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Suriname, Trinidad and Tobago, and Venezuela

Methods

Countries immediately report isolated cases or outbreaks to the Pan American Health Organization. They have intensified vaccination in enzootic areas. In 2004, some countries began reporting vaccination coverage in the population aged 1 year.

Results

Yellow fever has cyclical characteristics. From 1995 to epidemiological week 9 of 2006, 3,701 cases and 1,938 deaths were reported, with three major epidemic peaks, the highest in Peru, with 499 cases in 1995. In 1998, outbreaks were reported in Peru (165), Bolivia (57), and Brazil (34). In 2003, case incidence rose with outbreaks in Colombia (112), Brazil (64), Venezuela (34), and Peru (26). From 2004 to 2006, small outbreaks and isolated cases were reported. However, reporting has been late in some cases. Colombia and Venezuela have implemented national plans as a response to the 2003-2004 outbreaks. Bolivia and Peru have targeted their interventions on traditionally enzootic areas and have expanded them to areas that are a source of migration to enzootic areas. Yellow fever vaccination plans involve the vaccination of 100% of the population residing in enzootic areas and areas that are a source of migration to enzootic areas. The majority of the countries with enzootic areas have included the yellow fever vaccine into the national schedule for all children aged 1 year, together with the measles vaccine.

Conclusions

All the countries with enzootic areas have made great strides in controlling yellow fever in the Region by implementing national plans of action that include vaccinating the population in those areas and increasing epidemiological surveillance. Nevertheless, continued improvements are needed in the quality and sensitivity of the epidemiological surveillance system and the information on vaccination coverage. Countries with enzootic areas should consider yellow fever a public health priority, providing the necessary political, technical, and financial support for implementing national yellow fever prevention and control plans. Non-enzootic areas should bolster outbreak control measures, which include increasing the sensitivity of the surveillance system, improving the capacity for timely response to outbreaks, implementing vector control, and vaccinating travelers to enzootic areas.

1 Communicable Diseases Unit/DPC, Pan American Health Organization, Washington, D.C., USA.

2 Immunization Unit /FCH, Pan American Health Organization, Washington, D.C., USA.

Evaluation of the Accelerated Yellow Fever Control Plan, Peru, 2004-2005

Ruiz J[1], Ticona M[1], Gutiérrez V[2], Mendoza M[3], Martinez M[4]

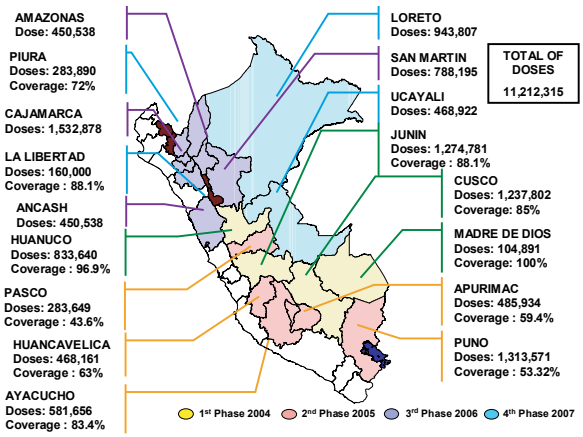
Introduction

The historical pattern of the yellow fever virus in Peru since the late 1930s has been that of a wild endemic virus with cyclical and seasonal hyperendemicity, as epidemic outbreaks and/or isolated cases occur, every 7-10 years, during the first three months of the year in districts located in endemic enzootic watersheds in jungle regions 300-2,000 meters above sea level. The affected population is the economically active population of the High Andes who migrate to these areas following the agricultural cycle of planting and harvesting and are unaware of the ecological niche, the signs and symptoms, and the measures to prevent the disease.

Methods

Peru designed, organized, and implemented the Accelerated Jungle Yellow Fever (JYF) Control Plan, 2004–2007, programming the administration of 11,212,315 doses of yellow fever vaccine to approximately 41.2% of the country's population and giving priority to residents of the High Andean region. The plan has four phases according to year of implementation (Figure 1) In the first phase (November and December 2004), 3,451,114 doses were administered in the departments of Junín, Huánuco, Cusco, and Madre de Dios; in the second (April, May, and June 2005), 3,132,971 doses were administered in Pasco, Puno, Ayacucho, Huancavelica, and Apurímac; in the third (April and May 2006), 2,771,611 doses will be administered in Amazonas, San Martín, Cajamarca, and Ancash; and in the fourth (April and May 2007), 1,856,619 doses will be administered in Ucayali, Loreto, Piura, and La Libertad. The plan includes strengthening the capacity of staff in charge of epidemiology, immunization, laboratory testing, and health promotion at local level (health service networks and micronetworks) who are responsible for the JYF surveillance system, events supposedly attributable to vaccination and immunization (ESAVIs), safe vaccination, and specimen management.

Figure 1. Phases of the Plan for Accelerated Control of Jungle Yellow Fever, Peru, 2004-2007



Source: Ministry of Health, Peru.

Results

During the first and second phases of the plan, the average coverage was 88.35% and 70.05%, with 3,048,887 and 2,222,560 doses administered, respectively. At the present time, 180 trained teams are on the alert in the health service networks and micronetworks of the departments where activities have been conducted. The cyclical hyperendemic activity in 2004 and 2005 that was anticipated did not materialize. Ninety percent (60/67) of the cases in 2004 were migrants from priority departments in the High Andean areas where interventions had not been conducted. In 2005, 76.27% (45/59) of the cases were migrants from departments that were not considered a priority. In December 2005, the largest epidemic outbreak of the last five-year period (24 cases) occurred in Alto Tuntus, an Aguaruna indigenous community in the department of Amazonas, which had been prioritized for intervention in the third phase (April and May 2006).

Conclusions

The Accelerated JYF Control Plan for priority departments is contributing to a gradual reduction in yellow fever cases, timely control of isolated cases and individual outbreaks, prevention of the reurbanization of yellow fever, and maintenance of community confidence in vaccines. It is recommended that districts involved in phase one and two that achieved yellow fever vaccination coverage of less than 95.0% be identified, and that follow-up and monitoring of vaccination activities be strengthened to achieve optimal coverage.

1 Technical Team on Vaccine-preventable Communicable Diseases of Children – DGE, Ministry of Health, Peru.
2 Viral Metaxenia Laboratory, National Institute of Health, Ministry of Health, Peru.
3 National Immunization Strategy, Ministry of Health, Peru.
4 Immunization Unit /FCH, Pan American Health Organization, Peru.

Epidemiological Situation of Yellow Fever in Venezuela, 2004-2005

Núñez L[1] , Córdova J[1]

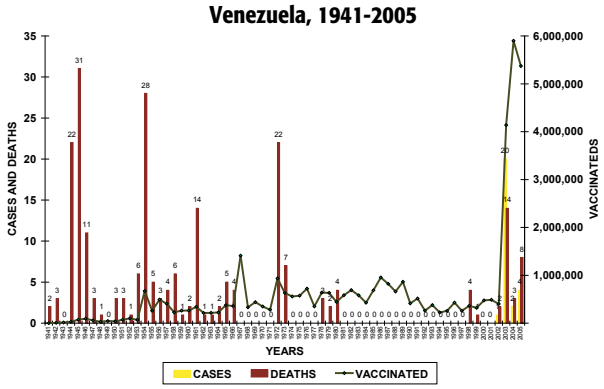
Introduction

In Venezuela, three major enzootic yellow fever foci are described: the San Camilo focus, the southern Lake Maracaibo focus, and the Guiana focus. Remarkable successes have been achieved in several components of the plan to combat yellow fever, which have become more evident in the period 2003-2005.

Methods

The components of the plan to combat yellow fever are syndromic and laboratory surveillance of cases and deaths, vaccination of 100% of the population aged >6 months in at-risk areas, entomological and epizootic surveillance, and risk mapping. Sixteen high-risk states have been identified, with 251 municipalities; of these 65 are high-risk; 58, medium-risk; and 128, low-risk.

Cases and Deaths vs. Persons Vaccinated Against Yellow Fever, Venezuela, 1941-2005



Source: Epidemiological Surveillance Office, Ministry of Health, Venezuela.

Results

The surveillance system for hemorrhagic febrile icteric syndrome has been strengthened, since the diagnoses obtained increased from 13% in 2003 and 17% in 2004 to 34% in 2005. The figure rose from 41% of cases with the definition of febrile icteric syndrome studied in 2004 to 74% in 2005. The sensitivity of the case definition for icteric fever went from 40% in 2004 to 67% in 2005; the specificity of the definition of hemorrhagic febrile icteric syndrome held at 99%. All aspects of laboratories have been strengthened; from 1998 to 2002, 93 samples were processed for viral isolation, and from 2003 to 2005, 953 were processed. Between 2003 and 2005, 3 viral isolates were obtained from humans and 4 from primates. To strengthen the pathological diagnosis, the immunohistochemistry technique was introduced in mid- 2004. To date, 121 patients (85 humans and 36 howler monkeys) have been studied in the *Instituto de Anatomo-patología-Universidad Central de Venezuela*, with a finding of 8 humans and 3 howler monkeys immunopositive for yellow fever. The states with cases in 2004 were Mérida (2) and Monagas (3), with 1 and 2 deaths, respectively. Three of the cases were male and two female. They occurred between epidemiological weeks 28 and 33, and the ages ranged from 10 to 34. In 2005, the cases were in Mérida (3), Apure (1), Bolivar (1), and Portuguesa (7); with 2, 1, 1, and 4 deaths, respectively. Ten of the cases were male and two female. The cases occurred between weeks 17 and 40, and the ages ranged from 10 to 45 and over. No case had a history of vaccination. Vaccination of 1-year-old children is conducted nationwide as part of the Expanded Program on Immunization, and coverage jumped from 17% in 2000 to 93% in 2005. In the 16 high-risk states, 90% of the residents of high-risk municipalities have been vaccinated, together with 100% of residents in medium-risk municipalities, and 58% in low-risk municipalities; of these latter 7 already had 100% coverage. Furthermore, the response to outbreaks is excellent, with entire states being vaccinated in three weeks. Between 2003 and 2005, more than 14 million doses were administered throughout the country. Some major cities in these states were targeted, and the strategy was designed to cover pockets of underimmunization. Vaccination is the component with the greatest emphasis, as it is the control and prevention measure that the Ministry of Health considers most effective. In 2003, an unconventional epizootic surveillance system for nonhuman primates was set up. Between 2004 and 2005, epizootics in primates have been detected in the states of Apure, Barinas, Guarico, Monagas, Portuguesa, and Sucre, which has permitted timely prevention measures.

Conclusions

Venezuela has had major successes in yellow fever control, the most outstanding of which is the vaccination coverage achieved, with over 5 million doses administered in two consecutive years. Epidemiological surveillance of humans and epizootics has been key, making it possible to target activities to reduce human cases and strengthen the capacity of diagnostic laboratories with the increase in tests performed and the introduction of new diagnostic techniques - all this with the support and recognition of PAHO, and the recommendations of the Technical Advisory Group on Vaccine-preventable Diseases.

1 Ministry of Health, Venezuela.

Update on the Status of Influenza Vaccination in the Region of the Americas

Ropero AM[1], Oliva O[2], Picón D[1], Gilani Z[1], Andrus JK[1]

Introduction

Influenza is a viral disease that strikes millions of people worldwide and causes approximately one million deaths 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 Member States to increase influenza vaccination coverage in all high-risk groups and to achieve 50% coverage in people aged >65 years by 2006 and 75% coverage in this population by 2010. In 2004, the Pan American Health Organization (PAHO)'s Technical Advisory Group on Vaccine-preventable Diseases (TAG) recommended yearly seasonal influenza vaccination for populations aged ≥60 years, chronically ill individuals, immunodeficient individuals, health professionals, and pregnant women. PAHO also encourages routine vaccination for children aged 6-23 months. Furthermore, optimal use of vaccines for seasonal epidemics will hopefully help ensure a sufficient vaccine supply for all peoples of the Region in response to a future pandemic.

Methods

With the objective of determining the current status of influenza vaccination in the Region, a survey of national immunization program managers was conducted. Information from country influenza publications and vaccine procurement through the PAHO Revolving Fund were also reviewed. This survey builds on a similar survey conducted in 2004.

Results

Thirty-nine countries and territories responded to the survey, 19 from Latin America and 20 from the non-Spanish speaking Caribbean. Influenza vaccination has been introduced in the public sector in 19 (49%) of these countries or territories. In nine countries and territories (23%), vaccination is administered only in the private sector. In the remaining countries and territories (28%), vaccination against influenza is not administered at all. The formulation used and the time of the year when the vaccine is administered vary with the country's geographical location. Twenty-eight countries or territories (72%) are planning to extend vaccination into additional coverage groups or add influenza vaccine into their immunization schedules. Seventeen countries or territories are adding influenza vaccine into their immunization schedules for the first time. The target groups vary among countries; however, most countries target the very young and elderly. Three countries or territories (8%) vaccinate populations in close contact with birds. Brazil has also included the vaccination of additional at-risk groups, including indigenous and incarcerated populations. Among the countries or territories surveyed, 33 (85%) had sentinel site surveillance systems for influenza. Most countries or territories show an improvement in surveillance since the last survey was conducted. However, the gap still remains for lack of information in tropical areas. Countries purchase influenza vaccines from different suppliers. In 2005, 14 (36%) countries or territories purchased influenza vaccines through the PAHO Revolving Fund. Brazil and Mexico have technology transfer agreements to produce influenza vaccine in the Region.

Conclusions

Influenza vaccination has gradually been introduced and more recently accelerated in the Region. TAG and the World Health Organization recommendations concerning vaccinating at-risk target populations are being adapted. However, it is essential to introduce the vaccine in the schedule for high-risk groups in the remaining countries, as well as strengthening surveillance. High-quality surveillance is critical for determining the formulation and proper time for administering the vaccine in each sub-region, especially tropical areas where more information is needed to understand patterns of viral transmission. Countries should continue to explore mechanisms for purchasing vaccine through the PAHO Revolving Fund, which will result in quality assurance and lower prices.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

2 Communicable Diseases Unit/DPC, Pan American Health Organization, Washington, D.C., USA.

Table 1. Countries Offering Influenza Vaccine in the Public Sector, by Year of Vaccine Introduction, The Americas, 1970-2004

Country	Year of Introduction	Target Population	2004 Coverage	2005 Coverage
Bermuda	1970's	Persons 6 months to 18 years with chronic disease	n.a.	n.a.
		Children 6 months to 5 years	n.a.	n.a.
		Persons 50 years	n.a.	n.a.
		Persons 65 years	59%	64%
		Persons with chronic diseases	n.a.	n.a.
		Health workers	n.a.	n.a.
		Pregnant women (>10 weeks)	n.a.	n.a.
Chile	1975	Persons 65 years	97%	95%
		Persons with chronic diseases	100%	100%
		Pregnant women	58%	94%
		Health workers	100%	100%
		Children 6 months to 5 years with chronic disease	n.a.	n.a.
Cayman Islands	1990	Children 6 months to 5 years	n.a.	n.a.
		Persons 50 years	n.a.	n.a.
		Persons with chronic diseases	n.a.	n.a.
		Health workers	n.a.	n.a.
		Pregnant women [a]	n.a.	n.a.
Argentina	1993	Persons 65 years	n.a.	n.a.
		Persons with chronic diseases	n.a.	n.a.
		Health workers	n.a.	n.a.
Cuba	1998	Persons 60 years in homes	100%	100%
		Persons 85 years	n.a.	100%
		Persons with chronic disease	100%	100%
		Health workers in National Reference Laboratory	100%	100%
		Persons working with birds	100%	100%
		Persons with HIV	100%	100%
		Persons with physical/mental disability	100%	100%
		Other groups	100%	100%
Uruguay	1998	Children 6 months to 24 months	15%	<15%
		Children >24 months with risk factors	n.a.	n.a.
		Older adults	n.a.	n.a.
		Persons with chronic diseases	n.a.	n.a.
		Health workers	n.a.	n.a.
		Pregnant women	n.a.	n.a.
Brazil	1999	Persons 60 years	91%	88%
		Persons with chronic diseases	n.a.	n.a.
		Health workers	n.a.	n.a.
		Other risk groups (including indigenous and incarcerated)	n.a.	n.a.
Netherland Antilles (Saba)	1999	Persons 65 years	n.a.	n.a.
		Persons with chronic disease	n.a.	n.a.
		Health workers	n.a.	n.a.
		Pregnant women	n.a.	n.a.
British Virgin Islands	2000	Elderly home residents	<33%	0%
		Persons with renal dysfunction	90%	90%
Honduras	2003	Children 6 to 23 months with chronic disease	n.a.	n.a.
		Persons 60 years	100%	100%
		Health workers	100%	100%
		Persons working in poultry farms	n.a.	100%
Costa Rica	2004	Children 6 months to 5 years with chronic diseases	88%	n.a.
		Persons 65 years	98%	n.a.
El Salvador	2004	Children 6 to 23 months	70% [b]	77% [c]
		Persons 60 years	99% [b]	96% [c]
		Persons with chronic diseases	n.a.	n.a.
		Health workers	85% [b]	n.a.
Mexico	2004	Children 6 to 23 months	n.a.	n.a.
		Persons 60 years	n.a.	70%
		Persons 65 years	n.a.	85%
		Persons with chronic diseases	n.a.	n.a.
		Health workers	n.a.	n.a.
Anguilla	2005	Elderly with chronic diseases	n.a.	51%
		Health workers	n.a.	51%
Bahamas	2005	Children 6 months to 5 years	n.a.	n.a.
		Persons 65 years	n.a.	n.a.
		Persons with chronic diseases	n.a.	n.a.
		Pregnant women	n.a.	n.a.
		Health workers	n.a.	n.a.
Colombia	2005	Children 6 to 23 months	n.a.	n.a.
		Children 6 to 18 months with respiratory disease or living in poor areas	n.a.	10%
		Persons 65 years	n.a.	n.a.
		Persons 65 and institutionalized	n.a.	10%
Panama	2005	Children 7 to 23 months	n.a.	n.a.
		Persons 60 years	n.a.	100%
		Persons with chronic disease	n.a.	n.a.
		Health workers	n.a.	n.a.
Paraguay	2005	Persons 60 years	n.a.	13%
		Persons with pulmonary disease	n.a.	23%
		Persons with cardiovascular disease	n.a.	8%
		Persons with diabetes	n.a.	32%
		Persons with renal dysfunction	n.a.	34%
		Persons with immunosuppressive disease	n.a.	6%
		Health workers	n.a.	36%
		Bird breeders and persons providing essential services	n.a.	12%
French Guiana	n.a.	Persons 65 years	n.a.	n.a.
		Persons with chronic disease	n.a.	n.a.
		Health workers	n.a.	n.a.

n.a.: not available. [a] on doctor's recommendation [b] coverage assessed in January 2005 [c] coverage assessed in December 2005

Source: Country Survey, 2006; Canada and the United States are not included.

Influenza Vaccination in Brazil

Pereira SF[1], Bertollo LA[1], Barbosa LM[1], Teixeira AM[1], Daufenbach LZ[1], Samad SA[1], Alfonso LMD[1], Toscano CM[2], Souza MA[1]

Introduction

Brazil initiated annual influenza vaccination in groups at risk in 1999, vaccinating people aged ≥65 years. Since 2000, vaccination has include people aged ≥60 years, in addition to people with chronic diseases. Other risk groups are also given priority by health professionals, such as prison populations and indigenous populations. In indigenous populations, routine vaccination also includes children >6 months. Vaccination, virologic sentinel surveillance activities, and the expansion of influenza surveillance to include monitoring of disease morbidity in the country are the main strategies used to prevent and control seasonal human influenza in the country. The experience of Brazil with mass influenza vaccination is reported and recommendations to achieve high and uniform vaccination coverage in high-risk groups are made.

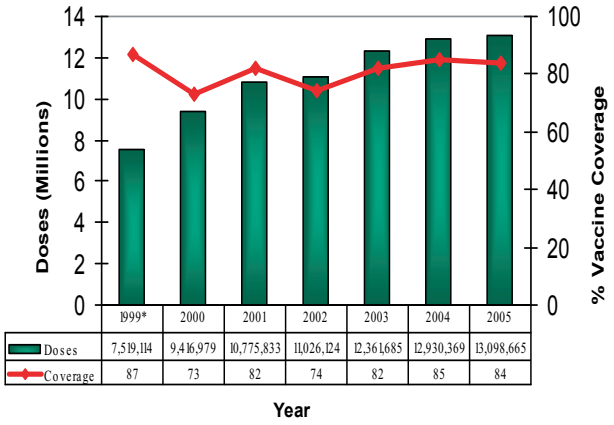
Methods

The national data of the National Immunization Program Information System (Spanish acronym SI-PNI) and reports from the Influenza Surveillance System (Spanish acronym SVE-Influenza) for 1999-2005 were analyzed.

Results

Since influenza vaccination activities began, Brazil has proposed the goal of achieving 70% vaccination coverage in older people. Every year, an average of 12 million people are vaccinated during campaigns. Vaccination coverage and the percentage of municipalities in the country with a coverage of 70% are presented in Figures 1 and 2. In 2002, the Commission for the Mobilization and Dissemination of vaccination for the elderly was created. This commission has representatives from different levels in the society and from governmental and nongovernmental organizations. Its main function is to support the planning and execution of social mobilization activities preceding vaccination campaigns. Strategies of mass social mobilization include advertising campaigns targeting older adults. The vaccination coverage achieved is high, ranging from 72% (2000) to 84% (2005). There was an increase in the proportion of municipalities with high coverage, ranging from 88.4% in 1999 to 95.4% in 2005. Furthermore, influenza surveillance (SVE-Flu) is being expanded with sentinel centers in the capitals of the 27 states of the country. These centers must monitor influenza morbidity in the community, in addition to monitoring circulating viral strains. Studies to evaluate the impact of vaccination are being conducted. The preliminary data from ecological studies of hospitalizations in the public health system for causes attributable to influenza indicate that there has been a reduction of 15.4% in the southern part of the country and an increase of 6.8% in the northern part. More analysis is needed to determine the meaning of these data and the true impact of influenza vaccination in different regions of the country.

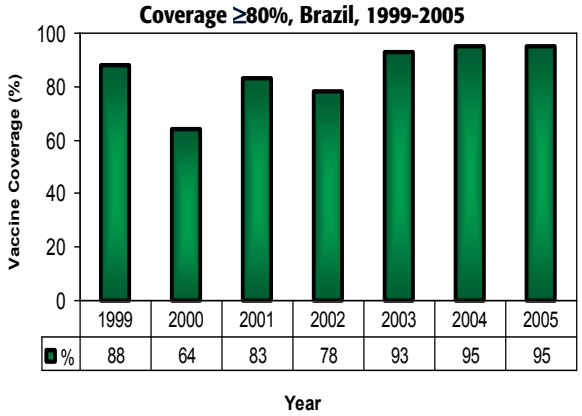
Figure 1. Influenza Vaccination in Older Adults, Brazil, 1999-2005



*En 1999, adults aged 65 and over were vaccinated.

Source: CGPNI/DEVEP/SVS/Ministry of Health, Brazil.

Figure 2. Percentage of Municipalities with Influenza Vaccine Coverage ≥80%, Brazil, 1999-2005



Source: CGPNI/DEVEP/SVS/Ministry of Health, Brazil.

Conclusions

In order to achieve high and uniform vaccination coverages against influenza, the country has identified key strategies for reaching older adults. Specific strategies for other populations at risk are needed, as well as vaccination coverage monitoring in this population using denominators estimates. Self-sufficiency in the production of influenza vaccine is a priority of the government. Consequently, Brazil has reached technology transfer agreements and produces the vaccines used in immunization campaigns. In 2007, all the influenza vaccine used in the country will be produced locally.

1 Secretariate for Health Surveillance, Ministry of Health, Brazil.

2 Immunization Unit/FCH, Pan American Health Organization, Brazil.

Seasonal Influenza in El Salvador

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Introduction

The seasonal pattern of influenza infection and the impact of vaccination have been widely studied in countries with temperate climates. In contrast, little is known about the pattern of influenza infection in the tropics. This is the case of El Salvador, where an increase of more than 50% in the incidence of pneumonia was recorded in 2003 compared with previous years. The incidence was 136 per 10,000 population. Seventy-three percent of consultations involved children aged <5 years with the greatest incidence is reported in this group (827 per 10,000 population). The population aged >60 years was the next most affected group (103 per 10,000 population). This situation accelerated the development and implementation of health policy for the introduction of the influenza vaccine for 2004.

Methods

Surveillance of acute respiratory infections (ARIs) is conducted by the National Epidemiologic Surveillance System of the Ministry of Public Health and Social Welfare (Spanish acronym MSPAS). The notification of pneumonia cases was added in 1990 and the notification of influenza case in 2000. In 2001, the MSPAS began laboratory surveillance of viral respiratory agents with the support of the Centers for Disease Control and Prevention (CDC) of the USA. Sentinel monitoring was implemented in 2004, during a period when the frequency of pneumonia cases increased. In 2005, with the support of the Pan American Health Organization (PAHO), the Central Laboratory of the MSPAS joined the network of national centers for influenza surveillance (FluNet), increasing the number of sentinel sites and systematizing sampling throughout the year.

Results

The incidence of pneumonia tends to rise at the beginning of the rainy season (May). However, experience with epidemiologic influenza surveillance in El Salvador has been similar to previous reports: a) most infected people do not seek medical care and these cases are not recorded, and b) influenza cases are not confirmed by laboratory tests. Consequently, surveillance is made indirectly through pneumonia morbidity. In 2001, influenza type A and respiratory syncytial virus were isolated. In 2003, A/Korea/770/2002 H3N2 strain was isolated and this strain was isolated again in 2004. The first influenza campaign was in January 2004. The target population was people aged ≥65 years. Ninety-six percent of the target population was vaccinated. In January 2005, children aged 6-23 months were included and coverage was increased to reach adults aged ≥60 years. Ninety-nine percent of adults aged ≥60 years and more than 70% of children were vaccinated. The third campaign was conducted in December 2005, resulting in the vaccination of 96% of adults aged ≥60 years and 77% of children. Health workers in direct contact with patients were vaccinated in all three campaigns. The vaccine with a combination for the Northern Hemisphere was used. Due to the seasonal pattern and intense social mobilization that occur every year during the celebration of the "Senior Month", the MSPAS conducted vaccination during that month. The communication team of the MSPAS, the Salvadoran Institute of Social Security, and PAHO, together with the technical teams from the EPI and the Senior Program, prepared the media campaign designed to promote vaccination as a preventive measure that older adults should take and to motivate parents to vaccinate their children with a new vaccine that has been added to the national vaccination schedule.

Conclusions

El Salvador has attained high vaccination coverages in the group of adults aged ≥60 years who are considered at risk. In addition, it has expanded the target to children aged 6-23 months. An important impact on the incidence of pneumonia has been observed, but it is still necessary to determine more precisely the circulation pattern and the existing relationship between the strains isolated in the hemispheres and in El Salvador. This would make it possible to determine the composition of the vaccine to be used each year and reevaluate the optimal period (months) for influenza vaccination.

1 Emory University, Atlanta, Georgia, USA.
2 Expanded Program on Immunization, El Salvador.
3 Central Laboratory Max Bloch, Ministry of Health, El Salvador.
4 Ministry of Health, El Salvador.

Influenza and Regional Pandemic Preparedness

Oliva O[1]

Human Influenza

Influenza is a viral disease that affects millions of people worldwide and kills approximately one million people annually. Influenza viruses are continuously evolving, and, periodically, their surface glycoproteins change. Constant, usually small, changes in antigenic composition, known as antigenic drift, cause annual outbreaks and require influenza vaccine composition to be changed annually.

Major antigenic changes can occur resulting in the emergence of a novel influenza A subtype in humans. When such a new strain of influenza virus emerges and adapts to enable transmission from person-to-person, the disease can quickly spread, resulting in a pandemic. The lack of previous exposure to this new virus renders the world population susceptible and facilitates the spread of the virus.

In the last century three influenza pandemics occurred. The most devastating was the Spanish Flu of 1918-1919, with an estimated 50 million deaths world-wide. The other two pandemics occurred in 1957-1958 (Asian Flu) and 1968-1969 (Hong Kong Flu), each one responsible for an estimated excess mortality of 4 million people when compared to previous non-pandemic years.

It is impossible to predict when the next influenza pandemic will occur. Nevertheless, it has been almost 38 years since the last pandemic, and the longest recorded inter-pandemic interval is 39 years. The burden of disease posed by the next influenza pandemic is also difficult to predict. However, experts estimate that at least 2-7 million deaths and tens of million infections requiring medical attention will occur in a matter of several months.

Avian Influenza

Type A Influenza is also responsible for outbreaks in animals, particularly in poultry. It is possible for avian influenza A viruses with pandemic potential to become endemic in poultry farms, particularly non-commercial production, small-scale commercial poultry farms, backyard flocks, and places where live poultry is traded. Some poultry outbreaks of avian influenza viruses to date have demonstrated a surprising level of aggressiveness, surpassing biosafety precautions in larger-scale poultry farms with adequate sanitary precautions.

According to estimates from the Food and Agriculture Organization (FAO), the Americas are responsible for the production of 46.9% of the 67 billion tons of poultry produced worldwide, being the largest poultry exporting region in the World (58.3% of 7.7 billion tons). Industrial production is concentrated in 12 countries which produce 98% of total poultry in the region[2]. Of these, five countries are responsible for 99% of total exports[3]. In 2004, FAO estimated that there were approximately 16 billion chickens in Latin America and the Caribbean. Also, several important activities are directly or indirectly dependent on the poultry industry such as grain production, trade, farming services, poultry transportation. Considering the Regional poultry production scale, outbreaks of highly pathogenic avian influenza A viruses with high transmissibility, morbidity, and mortality would imply a major economic impact for the Region.

Influenza H5N1

A cluster of severe infection of humans with an avian influenza A virus was first documented in Hong Kong in 1997, with H5N1 virus causing respiratory disease in 18 humans, of whom 6 died. This cluster coincided with an epizootic of highly pathogenic avian influenza A (H5N1) in Hong Kong's poultry population. Extensive investigation of that outbreak determined that close contact with live infected poultry was the source of human infection. From December 2003 until 24 March 2005, a total of 186 human cases of influenza H5N1 with 105 deaths were reported to the WHO[4] indicating a very high case fatality rate of 56% among reported cases to date. Probable, limited, person-to-person transmission has been reported in Thailand and Vietnam.

For a pandemic to occur, it is necessary for the H5N1 virus to become adapted to sustained person-to-person transmission. Experts agree that the unprecedented epizootics of avian flu in Asia increase the possibility for the H5N1 to adapt to person-to-person transmission. Recent virological and surveillance findings are signs that a pandemic may be imminent. Human global spread is likely to occur more rapidly than in previous pandemics due to increased travel and urbanization.

The population of Latin America and the Caribbean is estimated for 2005 to be around 560 million people (approximately 9% of the world population and close to 15% of the population of the developing world, excluding China). The World Bank estimates that 11% of the population of Latin America lives below the international poverty line and around 130 million people live in rural areas, most of them in direct contact with chickens and pigs that provide a major source of protein for rural inhabitants. The impact of a pandemic in the Region will be not only a public health problem, but an economic disaster for the poorest population in rural areas and for national economies.

1 Communicable Diseases Unit/DPC, Pan American Health Organization, Washington, D.C., USA.

2 USA, Brazil, Mexico, Canada, Argentina, Venezuela, Colombia, Peru, Chile, Ecuador, Guatemala, and Bolivia.

3 USA, Brazil, Canada, Argentina, and Chile.

4 Cases/Deaths have been reported as of 24 March 2006 in Azerbaijan (7/5), Cambodia (5/5), China (16/11), Indonesia (29/22), Iraq (2/2), Thailand (22/14), Turkey, (12/4), and Viet Nam (93/42).

Influenza Pandemic

Influenza pandemics have historically taken the world by surprise, leaving minimal time for health services to prepare for the abrupt increases in cases and deaths that characterize these events and make them so disruptive. The present pandemic threat posed by H5N1 is markedly different as the world has been warned in advance. This advance warning has brought an unprecedented opportunity to prepare for a pandemic and develop ways to mitigate its effects even in areas with problems of access to basic health services.

Preparedness must build on existing infrastructures and mechanisms to improve capacity to respond to both the present situation and a pandemic. Immediate emergency preparedness measures should be combined with longer-term measures aimed at strengthening institutional capacities to respond to any epidemiological emergency. The WHO has identified five strategic actions to ensure full exploitation of all opportunities to prevent the H5N1 virus from developing into a pandemic strain and, should this effort fail, to ensure that measures are in place to mitigate expected impact of such an event. These strategic actions include the reduction of human exposure to the H5N1 virus, strengthening early warning systems, intensification of rapid containment operations, and building the capacity to cope with a pandemic. A fifth strategy involves the coordination of global scientific research and development to foster the timely manufacture of sufficient quantities of pandemic vaccines and antiviral drugs, and to make these interventions broadly accessible to all countries.

Regional Influenza Preparedness

The Pan American Health Organization (PAHO) has developed the *PAHO Strategic and Operational Plan for responding to pandemic influenza*[5] which directs technical cooperation activities to prepare the Region for an influenza pandemic. The plan aims not only to assist countries in the development of national influenza pandemic preparedness plans, but to assist countries in the supporting actions that need to be carried out in parallel to drafting plans to have capacity to detect and respond to an influenza pandemic.

Implementation of this technical cooperation plan is well underway. The most recent *Summit of the Americas* in Mar del Plata, Argentina, yielded a commitment from the countries to finalize national plans by June 2006, with PAHO support. PAHO is actively promoting the development of national influenza pandemic preparedness plans and supporting Member States in this effort. As draft plans have become available, the Communicable Diseases Unit has been performing initial assessments of such plans through use of *WHO's checklist for influenza pandemic preparedness planning.*[6] In addition to promoting the development of national plans, mechanisms and capacities to enable full implementation of such plans are being strengthened. These include surveillance, health services, vaccine and antiviral technology, and communication, among others.

Influenza preparedness has catalyzed improved inter-agency collaboration. Briefing sessions have taken place for the Inter-american Development Bank Board of Governors, the Permanent Council of the Organization of American States, and the World Bank. Such collaboration at country level in the Latin America and Caribbean Region is also being pursued.

5 Available at http://www.paho.org/English/AD/DPC/CD/vir-flu-PAHO-Plan-9-05.pdf

6 Available at http://www.who.int/csr/resources/publications/influenza/FluCheck6web.pdf

Global Perspective on Pandemic Influenza Vaccine Availability and Related Clinical Trials

Stöhr K[1]

Introduction

There is universal agreement that vaccines, the most efficient health intervention to reduce morbidity and mortality from influenza, will be in short supply during the next influenza pandemic. At best, a small number of developed countries with existing influenza vaccine manufacturers will have access to (some) vaccine doses and be able to implement vaccination campaigns in a timely fashion. Vaccine will not be available to the majority of the countries during the first year of the pandemic and presumable not at all to the developing world. The World Health Organization (WHO) and many other national and international players have already taken many steps to shorten the time until influenza pandemic vaccine production can begin. Expedited regulatory pathways for pandemic vaccines have been established, WHO Collaborating Centers have tried and tested procedures in place to prepare vaccine prototype strains within weeks, and more than 12 companies have ongoing or planned clinical trials with pandemic vaccines. Several companies are actively conducting research on new and improved vaccine types.

Methods/Results

Results from clinical trials with H5N1 pandemic vaccines were reviewed. Antigen sparing to levels below those necessary for seasonal vaccination seems unlikely even with adjuvanted vaccines. A fundamental breakthrough is not in sight and the existing gap in influenza pandemic vaccine access remains formidable. The most promising new vaccine will need 2-5 years of further development before registration.

Conclusions

Based on preliminary results from few clinical trials with H5N1 vaccines, it is projected that in the best case scenario around 1.1 billion doses of influenza pandemic vaccines might be available one year after the pandemic virus has emerged. Less than an estimated 25 million US$ were spent for clinical trials with influenza pandemic vaccines in the last few years. However, with one clinical trial at a cost of 1-2 million dollars, finding a smart vaccine formulation or delivery system could possibly more than double pandemic vaccine supply, i.e. from 1 to 2 billion doses in one year. This would be a small investment considering that more than 3 billion US$ have been put into stockpiling of antivirals in the last two years for the benefit of less than 200 million people.

1 Initiative for Vaccine Research, Immunization, Vaccines and Biologicals, World Health Organization, Geneva, Switzerland

Influenza Pandemic Preparedness, Chile, 2006

Sotomayor Proschle V[1], Olea N A[1], Aguilera S X[1], González WC[1], and members of the Commision for Outbreaks and Health Emergencies[1]

Introduction

The Ministry of Health of Chile (Spanish acronym, MINSAL) has developed a preparedness plan for an influenza pandemic to reduce the impact of an influenza pandemic in terms of morbidity and mortality, and to maintain social order. Chile is currently free from avian flu and the last outbreak occurred in Region V in June 2002. Influenza is a priority disease for MINSAL, which has introduced specific surveillance activities and prevention and control measures, including vaccination of at-risk groups.

Methods

In 2004, MINSAL created the Commission for Outbreaks and Health Emergencies, which included representatives from different levels of the Ministry of Health, the Public Health Institute, representatives of scientific societies, and other pertinent institutions. The Department of Epidemiology, Health Planning Division, is the executive secretariat of the Commission. Work teams were formed and the plan was prepared following the recommendations of the World Health Organization. Actions were developed for seven components: general coordination, epidemiologic and laboratory surveillance, public health and mass communication measures, preparation of the support network, and specific control measures (animal surveillance and legal and budgetary tasks).

Results

A plan is available that includes lines of action for every component at different stages of a pandemic. The plan has been approved by the proper authorities in each sector and was published in October 2005. Epidemiologic and laboratory surveillance measures include an increase in sentinel influenza centers that will obtain respiratory samples and provide support with reagents and supplies; the obligation to report all outbreaks of infectious disease, including influenza, in accordance with Supreme Decree 158 on notifiable diseases; a study of outbreak control with antiviral agents; and providing the Public Health Institute with PCR technique for influenza A (H5) and the inhibition of hemagglutination (IHA) technique for H5, H7, and H9. Measured for the support network include estimating the impact on the healthcare network and organizing to address the need for critical beds and resources; and the purchase of supplies for personal protection for the health team. Public health and mass communication measures include risk communications through the MINSAL web page, preparation of recommendations and graphic material for travelers going to and coming from affected areas and for the general community, dissemination at technical meetings, and the preparation of operational plans by the National Office of Emergencies. Specific control and prevention measures include maintaining high vaccination coverage and introducing influenza vaccination for children aged 6-23 months and poultry workers, purchase of a stock of antiviral agents to control initial outbreaks, and treatment of serious cases. Measures for animal surveillance include participation from the Livestock Agricultural Service, responsible for animal surveillance, in the preparation of the plan and increased animal surveillance. Legal measures include the preparation of national and regional decrees to grant health authorities extraordinary powers.

Conclusions

Chile's preparedness plan for an influenza pandemic is about to be disseminated to all stakeholders. Actions are being taken to procure resources for the application, testing, and modification of the preparedness plan.

1 Epidemiology Department, Health Planning Division, Ministry of Health, Chile.

The Human Hookworm Vaccine Initiative: Development and Testing of an Orphan Product for a Neglected Tropical Disease

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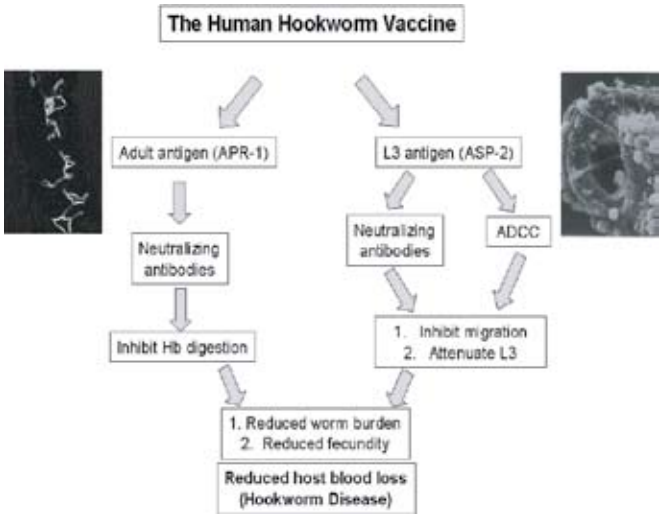
Introduction

Human hookworm infection is a neglected tropical disease affecting 576 million people worldwide. In the Americas approximately 50 million people are infected with hookworm, with the highest prevalence and intensities in Brazil and Central America. The high rates of re-infection that occur following anthelmintic deworming are a major barrier to the public health control of hookworm and other soil-transmitted helminth infections. Therefore, there is an urgent need for the development of new control tools for hookworm, including vaccines.

Methods and Results

A second-generation vaccine, the *Na*-ASP-2 Hookworm Vaccine, was developed and manufactured. The vaccine is comprised of a 21.3 kDa recombinant protein expressed in yeast and adsorbed to Alhydrogel®. The *Na-asp*-2 gene encodes a protein secreted from *Necator americanus* infective larvae, which facilitates parasite invasion. Preclinical *in vitro* studies showed that anti-ASP-2 antibodies recognized the native antigen and inhibit larval invasion. Immunization of dogs and hamsters with animal hookworm ASP-2 orthologues resulted in reduced hookworm burden and blood loss relative to controls, following challenge infections with *Ancylostoma caninum* and *A. ceylanicum,* respectively. Additional epidemiological data from Minas Gerais, Brazil indicates that anti-ASP-2 antibody responses among a subset of the population are associated with a reduced risk of acquiring heavy hookworm infection. Initial data from the Phase 1 clinical trials indicate that the vaccine is immunogenic and well tolerated. A series of clinical studies leading to a proof-of-concept study assessing the ability of the vaccine to reduce host hookworm burden and blood loss in school-aged children will be initiated in Minas Gerais State, Brazil, later in the year. A second antigen from adult hookworms is also under development. *Na*-APR-1 is an aspartic protease required by the adult parasite to degrade host hemoglobin after blood ingestion. In preclinical studies anti-APR-1 antibodies bound to the gut of the adult parasite and inhibited hemoglobin digestion resulting in diminished host blood loss, worm burdens, and fecal egg counts. Downstream studies will evaluate a bivalent Human Hookworm Vaccine comprised of *Na*-ASP-2 and *Na*-APR-1 (Figure 1).

Figure 1. Proposed Mechanisms of the Human Hookworm Vaccine



Both major vaccine antigens, Na-ASP-2 and Na-APR-1, stimulate host antibodies. In the case of APR-1, the antibodies are ingested by adult hookworms during blood feeding and result in neutralization of the parasite aspartic protease, followed by reductions in host blood loss, worm count, and egg production. In the case of ASP-2, the antibodies inhibit third-stage larval (L3) migration either directly or through antibody-dependent cell-mediated cytotoxicity. This results in a reduction in the number of L3 that develop into adult blood feeding hookworms.

Conclusions

Proof of concept for the efficacy of the Human Hookworm Vaccine is being pursued in Minas Gerais State, Brazil. If the vaccine is shown to be efficacious, global access will rely on technology transfer of product manufacturing processes in hookworm-endemic countries, and the development of consensus guidelines for integrating vaccinations with school-based deworming programs.

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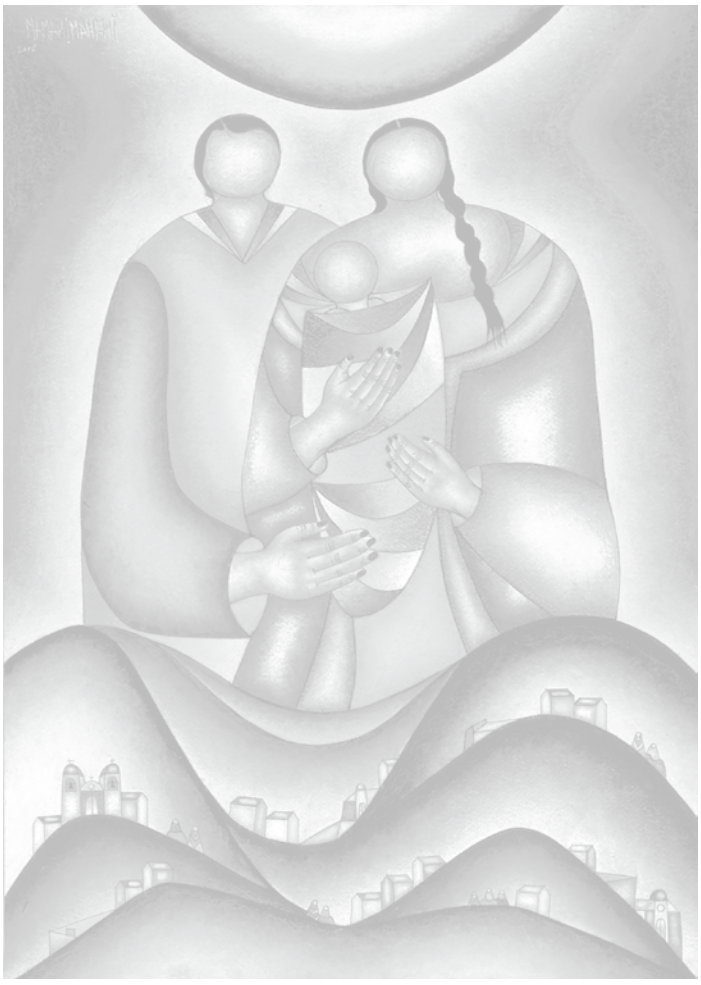
Part 3: Strengthening Program Management



The Quality of Coverage Data: A Regional Overview

Danovaro C[1], Gilani Z[1], Burton A[2]

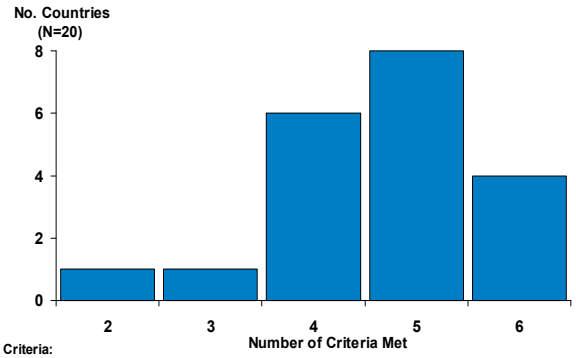
Introduction

Immunization coverage levels serve as a key measure of immunization program performance. They are used to target interventions, allocate resources, guide decisions in vaccine-preventable disease control and elimination, and as a factor in deciding whether to introduce new vaccines.

Most countries in the Americas use administrative data to calculate coverage levels for each antigen. Vaccination services providers, such as health units and private clinics, report the number of doses of a particular antigen given over a period of time (numerator). Subsequently, health authorities aggregate these data and divide the number of doses by the target population (denominator). This procedure may lead to over or underestimation of coverage due to numerator inaccuracies, or inexact estimations of the denominator.

We examined data consistency and denominator accuracy in national immunization coverage data reported annually to PAHO to better understand the quality of these data and to propose recommendations for their improvement.

Figure 1. Distribution of Countries by Number of Criteria Met *



* Criteria:
1) No difference in year-to-year DPT3 coverage >10%;
2) No differences between DPT3 and OPV3 >10%;
3) No negative drop-out rates for three or more years;
4) No coverage level ≥100%;
5) No difference in year-to-year denominator change >10%; and
6) No differences >10% between country denominators and UN estimates of average live births for three or more years.

Source: Immunization Unit, PAHO.

Methods

We focused our assessment on routine coverage for DPT3 (third dose of diphtheria-pertussis-tetanus vaccine) reported to PAHO from Latin American and Caribbean countries with a population size over 500,000 for the years 2000 through 2004. We selected DTP3 coverage because this is the most frequently used indicator of immunization program performance. We evaluated the following:

- Differences > 5% and > 10% in the year-to-year reported coverage.
- Differences > 5% and > 10% between reported DPT3 and OPV3 (third dose of oral polio vaccine) coverage.
- Negative DPT drop-out rates ([DPT1 – DPT3] / DPT1).
- Reported coverage levels of ≥100%.
- Differences > 5% and > 10% in the year-to-year reported denominator used for calculation of DPT3 coverage (number of live births or children < 1 year of age).
- Differences > 10% between reported denominators for DPT3 coverage and the United Nations annual birth average estimate.

We decided on these thresholds because such values and variations are unlikely, and would warrant further examination of the data to explain them.

Results

We included 23 countries in the analysis. DPT3 coverage data was available for all countries for all the years evaluated. However, 2003 coverage data reported by one country was received 6 months late and was a clear outlier; therefore this observation was excluded from data consistency analyses. For denominator analyses, data was available for all countries for all years, except for two countries in 2004. Additionally, we excluded a country that uses a nominal census which differs more than 50% from the UN estimates of average live births. The main results are summarized in Table 1.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.
2 Immunization, Vaccines and Biologicals, World Health Organization, Geneva, Switzerland.

Table 1. Summary of consistency and denominator accuracy indicators, Latin America and the Caribbean, 2000-2004.[1]

Indicator		Observations	Countries
Year-to year difference in DPT3 coverage[2,3]	>5%	28/90 (31%)	15/23 (65%)
	>10%	12/90 (13%)	8/23 (35%)
DPT3 and OPV3 differences[2,4]	>5%	18/109 (17%)	10/22 (45%)
	>10%	7/109 (6%)	3/22 (14%)
Negative DPT1-DPT3 drop-out rates[2,5]	Any	44/107 (41%)	16/23 (70%)
	For 2 or more years	--	12/23 (52%)
	For 3 or more years	--	9/23 (39%)
Reported DPT3 coverage ≥100%[2]		6/114 (5%)	4/23 (17%)
Year-to year difference in denominators[6]	> 5%	15/86 (17%)	12/22 (55%)
	>10%[7]	7/86 (8%)	4/22 (18%)
Differences >10% between country denominator and UN average live birth estimate[6]	Any[8]	23/108 (21%)	10/22 (45%)
	For 2 or more years[7]	--	7/22 (32%)
	For 3 or more years	--	4/22 (18%)

1 Includes 23 countries with >500,000 inhabitants.
2 Excludes 2003 DPT 3 coverage for one country (see text).
3 Only one country had reported a vaccine stock-out that explained a large change in year-to-year coverage rates.
4 Excludes one country that does not recommend DTP 3 and the third dose of polio vaccine (OPV 3) at the same age.
5 DPT1 coverage not available for three countries for 1 year each and not available for one country for 4 years.
6 Excludes one country that uses nominal census denominators. 2004 denominator data not available for two countries.
7 Two countries reported both, year-to-year denominator changes > 10% and denominators that differed by 10% or more from the UN estimates of average live births for at least two years.
8 Seventeen of these 23 observations (from eight countries) reflected smaller country denominators compared to the UN estimates of average live births.

To evaluate individual country performance, we counted how many of the countries surpassed the most conservative threshold for each indicator. In this analysis, a country without any extreme observations would meet all six criteria for data consistency and denominator accuracy. Of the 20 countries for which all six criteria could be examined, four countries (20%) met all six criteria; 15 (75%) met three to five criteria; and one country met only two criteria (Figure 1).

Conclusions

In our evaluation most of the observations met our criteria for data consistency and denominator accuracy. However, most countries had at least one extreme observation that would warrant further examination. Changes >5% in year-to-year coverage rates and negative drop-out rates were particularly frequent. Our appraisal of denominator accuracy did not suggest major problems with the denominators used at the country-level for most countries.

Our analyses were not exhaustive and have several limitations. While they identify certain unusual patterns in the reported data they do not necessarily indicate inaccuracies. For example, vaccine shortages may explain large differences in year-to-year coverage rates. Alternatively the non-appearance of an anomaly does not necessarily mean that the data are unproblematic. We did not examine data completeness and reliability.

The value of analysis of coverage data presented lies in the opportunity to critically review the reported data to identify, explain, resolve, or correct features of the reporting system that may lead to inaccurate coverage data. We recommend that countries assess coverage data systematically and periodically using the indicators presented here, or any other indicator, and document national and local efforts to improve the quality of coverage data.

Immunization Data Quality Self-assessment, Costa Rica, November 2005

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Introduction

In Costa Rica, administrative coverage at the state level has been irregular in recent years. National authorities have debated whether this situation is due to program performance or to deficiencies in the information system that lead to underreporting of the doses administered. In this context, Costa Rican authorities asked PAHO to evaluate the quality of its information system and the accuracy of the data it produces. From the 4-12 November 2005, data quality self-assessment (DQS), was conducted in Costa Rica. This was the first evaluation of the accuracy and quality of the data produced by the immunization information system in a country of the Americas using the DQS methodology developed by the World Health Organization.

Methods

In this self-assessment, three main components were evaluated:

1. The **quality of the monitoring system** was evaluated through questionnaires. The categories of evaluation in Costa Rica included: quality of registry and archiving practices, planning, analysis, and supervision.
2. The **coherence of data (accuracy)** was evaluated by comparing data recorded on data collection forms found at different levels.
3. The **timeliness of the report,** which was evaluated when offices receiving or issuing reports stamped them with dates of reception and issue.

The DQS methodology was highly participatory and the participants themselves decided on the scope of the assessment (levels to evaluate, categories to be included in questionnaires, and data to compare). They developed the necessary tools for assessment, analyzed the findings, and decided on the recommendations. Nineteen people, divided into four teams of evaluators, visited the six health regions of the country.

The assessment had three stages.

1. **Design workshop.** The first three days were devoted to defining the scope of the study and preparing the corresponding tools. These instruments were validated in a Basic Integrated Health Care Facility (Spanish acronym, EBAIS) and in two Health Areas in the capital, allowing for improvement before beginning the field work.
2. **Field work.** For the next three days, four work groups visited different Health Regions (4 Health Regions of the Costa Rican Social Security Fund (CCSS) and 6 of the Ministry of Health), Areas (12 Areas of the CCSS and 14 of the Ministry of Health), 21 EBAIS, 9 hospitals, and 3 private institutions. In addition, the headquarters of the Ministry of Health and the Costa Rican Social Security Fund were visited. The selection of regions and institutions to visit was not random.
3. **Analysis workshop.** The last two days were dedicated to the analysis and presentation of the findings from field work. Common findings and recommendations were presented to authorities in a final session.

Results

The results were presented as strengths and weaknesses by level (EBAIS, public hospitals, private institutions, CCSS area, Ministry of Health area, CCSS region, Ministry of Health region, and central level). In addition, the main findings and recommendations were grouped into the following topics: data accuracy (information flow), timeliness, registry and archiving, analysis, planning and training, and supervision.

General Recommendations

- Completing the assessment in the regions of the country not evaluated;
- Developing a work plan to monitor the recommendations of the assessment, including periodic evaluations of the information system;
- Including a topic related to the quality of immunization data in the routine supervisory activities of the immunization program ; and
- Conducting data quality assessments using the DQS methodology in other countries of the Americas.

1 Expanded Program on Immunization, Costarican Social Security Fund, Costa Rica.
2 Expanded Program on Immunization, Ministry of Health, Costa Rica.
3 Costarican Social Security Fund, Costa Rica.
4 Ministry of Health, Costa Rica.
5 University of Costa Rica and Costarican Social Security Fund, Costa Rica.
6 Collective Health, Costarican Social Security Fund, Costa Rica.
7 Expanded Program on Immunization, Bolivia.
8 Expanded Program on Immunization, Honduras.
9 Wold Health Organization, Geneva, Switzerland.
10 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.
11 Immunization Unit/FCH, Pan American Health Organization, Costa Rica.

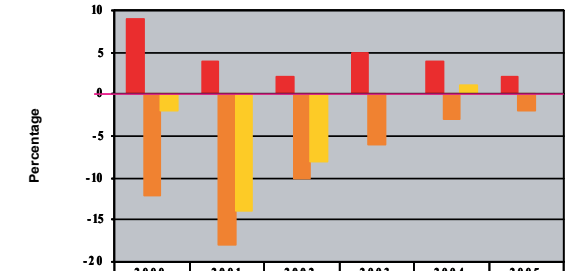
Monitoring the Quality of Immunization Data in Paraguay, 2003-2005

Torres C[1], Ghisays G[2]

Introduction

The Expanded Program on Immunization of Paraguay was established in 1980. Since that year, coverage increased progressively until it reached levels of 80% in 1999, but with results that varied widely between biologicals and between regions. Since 2000, coverage is >85% for all vaccines, but uneven results are persisting; negative dropout rates, high vaccination coverage with a large percentage of municipalities with coverage levels <50% are results that are neither coherent, nor reliable. The purpose of this abstract is to share the interventions conducted to improve the quality of immunization data in Paraguay.

Figure 1. Pentavalent Drop-out Rates According to Doses per Year, Paraguay, 2000- 2005



	2000	2001	2002	2003	2004	2005
Penta1/Penta2	9	4	2	5	4	2
Penta2/Penta3	-12	-18	-10	-6	-3	-2
Penta1/Penta3	-2	-14	-8	0	1	0

Source: Ministry of Health, Paraguay.

Methods

Starting in 2003, regional and local immunization data were reviewed for cleanup and analysis. This helped raise the awareness of vaccinators about concepts such as "coverage as protection and not as a qualification", quality of vaccination records needed for credibility, and explanatory analysis of results to correct errors. The indicators used were the dropout rates between biologicals and dose levels, annual evolution of the percentage of municipalities with low coverage, the proportion of population living in low coverage districts, and rapid coverage monitoring. The strategies were training human resources at all levels, supervising all districts, verifying the coincidence of data from their origin, and making a national assessment by comparing regions and districts.

Results

In 2000, half of the municipalities of Paraguay recorded coverages <50%. In 2005, half of the municipalities in the country had coverages ≥95% or more. The percentage of the population living in high risk areas for all biologicals declined in the same period, consistent with the increase in municipal coverage. Negative dropout rates between the first and third doses of pentavalent vaccine diminished and disappeared, while positive rates consistent with the coverages achieved appeared. Differences in coverage rates between different biologicals became smaller every year, resulting in more homogeneous and reliable vaccination data throughout the country (Figure 1).

Conclusions

Monitoring data quality allowed identifying and correcting weaknesses in programming, registry, consolidation, and tabulation of data at all levels. Coverages have increased progressively and quality indicators are coherent and consistent with results. Consequently, decision-makers are now more confident about immunization data.

1 Expanded Program on Immunization, Ministry of Health, Paraguay.

2 Immunization Unit/FCH, Pan American Health Organization, Paraguay.

Vaccination Week in the Americas: Progress to Date

Ropero AM[1], Picón D[1], Andrus JK[1]

Introduction

Vaccination Week in the Americas (VWA) is an initiative originally proposed in 2002 by the Ministers of Health of the Andean Region and supported by the Pan American Health Organization (PAHO). Based on the principles of Pan Americanism and equality in health, VWA offers the opportunity to strengthen national immunization programs and to identify populations without access to immunization, while promoting bi-national and regional cooperation, particularly through the effective coordination of border activities.

Methods

Countries collaborate during regional and sub-regional meetings to set their own goals, objectives, and target populations for the VWA during the last week in April. Countries also take this opportunity to plan sub-regional and bi-national launching events and vaccination activities during the campaign. PAHO, together with partners such as UNICEF, the Centers for Disease Control and Prevention, Sabin Vaccine Institute, and March of Dimes, support countries through technical and financial assistance, sharing the cost of VWA activities (i.e., social mobilization and evaluation) between countries and partners. A multitude of non-governmental organizations and other local and regional organizations are also involved in VWA activities.

Results

In 2003, the first year of implementation, 19 countries joined efforts to vaccinate 13 million children aged under five years and 2.7 million women of childbearing age (WCBAs). In 2004, 35 countries immunized 15 million children aged under five years and 3 million WCBAs. In 2005, 36 countries vaccinated 38 million people including 17 million children, 2.2 million WCBAs, 13 million people over 60 years of age, and 3 million other adults, aligning their vaccination strategies to the family health cycle. Also in 2005, Brazil and Venezuela reached over 25,000 indigenous peoples. The 2006 target for vaccination is approximately 40 million people. Data from countries demonstrate that inequalities in vaccination access are reduced during VWA: in 2005, over 48,000 children aged 1-4 years were vaccinated for the first time with DTP/Pentavalent (Guatemala, Honduras, Mexico, and Panama), while over 539,000 WCBAs were vaccinated with a first dose of tetanus toxoid (Colombia, Guatemala, Honduras, Mexico, and Panama). In 2004, a study conducted by the Ministry of Health in Paraguay demonstrated that coverage for major vaccines had increased significantly during VWA. During 2005 VWA, 3 Presidents, 2 First Ladies, and several Ministers of Health participated in launching activities. Border activities conducted at the U.S. and Mexico border, focused their efforts on increasing awareness among communities and health professionals. Information modalities used to raise awareness throughout the Region included loudspeakers, radio, TV, flyers, posters, schools, and health centers. An evaluation of social communication used in Paraguay demonstrated that children whose mothers received information on VWA were more likely to be vaccinated than other children. Finally, VWA has served as a model for a European Immunization Week launched in October 2005 with the objective to raise awareness and increase vaccination coverage in that Region. Belarus, Serbia and Montenegro, Ireland, and Macedonia ran awareness campaigns and educational workshops to provide information on vaccines for parents and health professionals.

Conclusions

- High political priority given to VWA has been demonstrated by national and local level launchings that have added political visibility and commitment to national immunization programs.
- Border events have been essential to reach out to border communities and health professionals.
- VWA is an opportunity for countries to reduce inequalities in health, increase coverage, integrate health activities, and introduce innovative strategies for vaccination. Raising awareness in the community is an important element in the achievement of immunization goals.
- Replication of the VWA model in other parts of the world is possible as seen in the experience of Europe.

Vaccination Week in the Americas: Results to Date, 2003-2006

	2003	2004	2005	2006[a]
Vaccination Goal (number of people)		40,762,842	41,190,085	39,409,759
Vaccination Results (number of people)	16,285,888	43,749,720	37,932,765	
Number of Participating Countries and Territories	19	35	36[b]	39
Number of Border Launching Events		22	8	12
Number of Countries with Integrated Activities[c]		4	5[d]	5
Mobilized Resources[e] (in U.S. $)	777,040	1,400,000	737,865	900,000

[a] As of April 2006. [b] 12 countries conducted awareness campaigns. [c] Vitamin A, iron supplementation, anti-parasitic drugs, and oral rehydration.
[d] In 2005, 7,615,778 people received Vitamin A supplementation, and 17,695,149 children received anti-parasitic drugs.
[e] Centers for Disease Control and Prevention (CDC/US), Head Start (US), Spain, Global Alliance for Vaccine and Immunization (GAVI), UNICEF.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

Challenges Faced by National Regulatory Authorities When Introducing New Vaccines in Latin America

Cortés MA[1]

The need for competent National Regulatory Authorities (NRAs), particularly for vaccine regulation, is recognized worldwide. The NRAs responsible for the regulation of vaccines face a variety of challenges in guaranteeing the quality, safety, and efficacy of vaccines from their origin in production to post-marketing events. NRAs have to ensure that effective vaccines are available and present adequate information to advise the public of the risks and benefits associated with vaccine use. Thus, NRAs play a significant role, contributing to the effort of immunization programs to meet vaccination coverage goals without losing sight of ensuring the quality of the biological used for control and eradication of vaccine-preventable diseases.

An additional challenge to NRAs in Latin America is the emergence of new vaccines on the market without clinical development and registration in the same country where biologicals are produced. Traditionally, registration in the country of origin (usually developed countries) was an assurance of quality for the NRAs of the region. However, for new products that are not a necessity in the country of origin, the first registration should be granted by the NRA that first acquires the product. This entails the responsibility for comprehensively evaluating the vaccine, including the analysis and interpretation of the first clinical trials conducted during vaccine development. An example of these vaccines are new vaccines against rotavirus and human papillomavirus, which have been presented for use in the countries of Latin America and the Caribbean for the first time.

The Unit of Essential Medicines, Vaccines, and Health Technology of the Pan American Health Organization has prepared a series of courses and workshops to help NRAs confront these new challenges. Alternatives for evaluating the information presented in the Common Technical Document (*dossier*) have been presented and training for authorities to develop the necessary technical skills for comprehensively evaluating new products, including from the vantage points of production, quality control, stability tests, preclinical tests, and clinical trials. Evaluation of the effectiveness of new products is an additional element of NRA tasks.

The introduction of these new biologicals in the Region is a challenge, but also an opportunity for NRAs to increase, collectively and separately, their knowledge and experience as they perform their crucial task of vaccine regulation.

1 Unit of Essential Medicines, Vaccines, and Health Technology/THS, Pan American Health Organization, Washington, D.C., USA

Vaccines and Thimerosal: General Considerations

Oliveira LH[1], Danovaro C[1], Andrus, JK[1]

Introduction

Thimerosal or thiomersal is an organomercurial derivative of ethyl mercury that has been used as a preservative in vaccines and other biologicals since the 1930s. It is especially effective when added to multi-dose containers, preventing bacterial and fungal contamination. In 1999, consumer groups became concerned about the cumulative levels of mercury to which infants were being exposed as a result of receiving the recommended series of childhood immunizations. In this context, it was hypothesized that autism might be an expression of mercury poisoning. However, thimerosal is composed of ethyl mercury (EtHg), which is different from the neurotoxic methyl mercury (MeHg). Also, EtHg is excreted much more rapidly than MeHg.

Methods

We reviewed published studies examining the association between thimerosal and adverse events following immunization, particularly autism. The main reports examined include studies from Denmark, Sweden, the United Kingdom (UK), and the United States (US) cited by the UK National Centre for Immunization Research (NCIRS), and the final report from the Immunization Safety Review Committee of the US Institute of Medicine (IOM). We also examined the conclusions from the Global Advisory Committee on Vaccine Safety (GACVS) of the World Health Organization (WHO).

Results

Mercury poisoning and autism both affect the central nervous system and share a number of nonspecific symptoms. However, the clinical signs and histopathology show that the specific sites of involvement in the brain and the brain cell types affected are different in the two disorders. Ecologic studies have shown that the incidence of autism has continued to increase when thimerosal is removed from childhood vaccines. Furthermore, none of the epidemiological studies designed to determine the potential effects of exposure to thimerosal during routine pediatric vaccination has shown an association between thimerosal exposure from vaccines and autism. No evidence to support a correlation between thimerosal-containing vaccines and the occurrence of autism was found in Denmark, where the incidence of autism continued to increase from 1991 to 2000 after the removal of thimerosal-containing vaccines. Similarly, in Sweden, autism rates continued to increase after the removal of thimerosal from vaccines in 1992. A retrospective cohort study performed in England dispelled concerns about the possible toxicity of levels of thimerosal exposure via DTP/DT vaccines between 1988 and 1997, concluding that there was no evidence to link thimerosal exposure to neurodevelopmental disorders. In 2000, WHO appointed the GACVS to evaluate safety concerns regarding the use of thimerosal. In 2003, GACVS concluded that there was no need to change immunization practices regarding thimerosal-containing vaccines. Additionally, in May 2004, the IOM concluded that current epidemiological evidence fails to support "*a causal relationship between thimerosal-containing vaccines and autism.*"

Conclusions

The Pan American Health Organization (PAHO) genuinely supports the discovery of the cause and cure for autism. However, due to lack of evidence proving a correlation between exposure to thimerosal and neurodevelopmental disorders, PAHO recommends the continued use of the thimerosal-containing vaccines and adherence to current childhood immunization schedules. PAHO also urges countries to strengthen their national systems for the reporting and investigation of events supposedly attributed to vaccination and immunization (ESAVIs). Functioning ESAVI monitoring systems will lead to the early detection of ESAVIs, their adequate investigation to determine causality, and will allow answering people's concerns rapidly and efficiently, thus supporting the credibility and trustworthiness of immunization programs.

1 Immunization Unit/FCH, Pan American Health Organization, Washington, D.C., USA.

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Pan American Health Organization

Regional Office of the
World Health Organization

Immunization Unit
Family and Community Health Area