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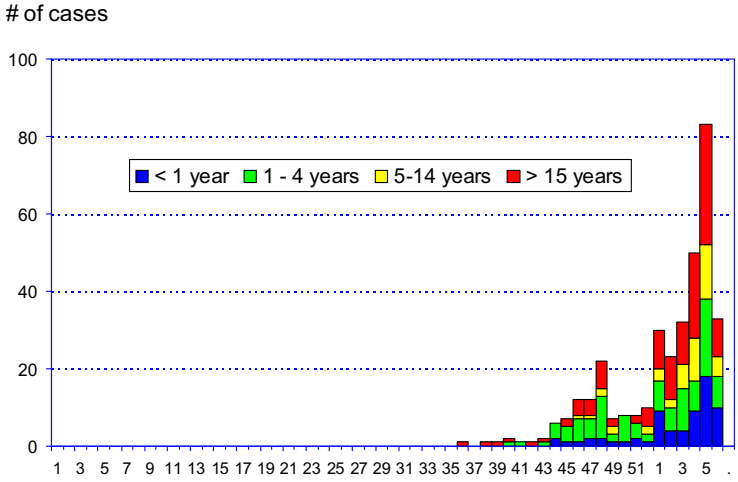
Measles Outbreak in Venezuela

Summary

Since August 2001, Venezuela is affected by a measles epidemic. A total of 347 cases have been reported since the beginning of the epidemic. During January 2002, 244 confirmed cases have been reported from three States (Figure 1). The State most affected is Zulia, the most populated in the country, bordering Colombia, with 228 confirmed cases in the first four weeks of 2002. Venezuela has become the only country in the Region of the Americas with measles circulation. If not controlled soon, the epidemic can spread to other countries of the sub-region that also have areas where vaccination coverage is low.

Figure 1
Distribution of confirmed measles cases by age group and week
Venezuela 2001 - 2002*



*As of epidemiological week 6, 2001
Source: MOH

Background

Venezuela is a country of 25 million people living in 23 States, plus the Capital District. The last large measles outbreak occurred in 1993 – 1994, during which a total of 38,000 measles cases and 124 deaths were reported. In response to the outbreak, and following PAHO's recommendations, Venezuela carried out a *catch-up* national measles vaccination campaign targeting children ages 6 months to 14 years, with a 98% reported coverage. This campaign resulted in a dramatic reduction of measles morbidity and mortality - the last death reported due to measles occurred in January 1995. The next *follow-up* measles vaccination campaign was held in 1998, and used a measles/mumps/rubella (MMR) vaccine. Official coverage reached 92%. Subsequently, during 1998, there were only 4 cases, and none in 1999. Between 1995 and 1997, routine measles vaccine coverage for 1-year olds was below 70%. In 1999, routine coverage was 80% and 84% in 2000.

During 2000, an outbreak of 22 confirmed cases among preschool and school-age children occurred in the municipalities of Maracaibo and Mara, Zulia State. Because of delays in the reporting and investigation of the outbreak, its origin remained unknown. During the first semester of 2001, a nationwide active case finding identified a total of 8 suspected measles cases that had not been previously reported, for which no serum samples were available. Given the lack of sufficient information, these 8 cases were defined as clinically confirmed.

An evaluation conducted by the Ministry of Health and an international team led by PAHO in May 2001, confirmed the country's low routine vaccination coverage and recommended that health authorities carry out as soon as possible

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another *follow-up* measles vaccination campaign. The campaign needed to reach 95% coverage with measles-containing vaccine in all municipalities of the country. However, the campaign was delayed, and on September 28, 2001 a measles case was reported in the State of Falcon. Up to September 2001, annual measles vaccination coverage in Falcon, projected to December, was only 44%.

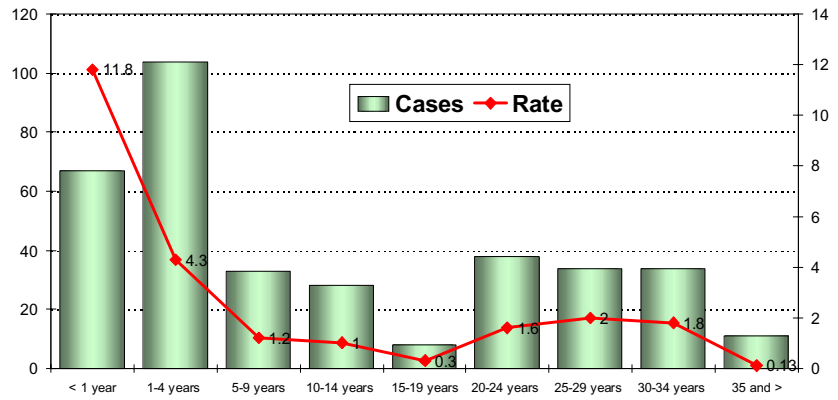
The 2001-2002 outbreak

Falcón

The index case was an adult male aged 39 years with rash onset on August 29, 2001, one day before returning from a trip to Europe. He visited Switzerland, Germany and Spain during August 4-30. The second case of the outbreak, a 35 year-old brother of the index case, with rash onset September 21, 2001, became the first to be reported on 28 September 2001, after three visits to health facilities. Serum samples from this case tested positive for IgM, and an urine sample was taken for viral isolation and is being analyzed at the Centers for Disease Control and Prevention in Atlanta, Georgia.

The outbreak in Falcon lasted until week 50 (15 December), with a total of 35 confirmed cases, mostly unvaccinated persons, distributed in three municipalities (Figure 1). Of the total cases, 16 corresponded to the 1-4 age group (46%), 12 cases to the >20 years age group (34%); and 4 were <1 year (12%). The attack rate was highest among < 1 year old (26.7 per 100,000), 1- 4 years (25 per 100,000) and 25-29 years (16.7 per 100,000). The majority of the adults were laborers, school students and health care workers. The outbreak was interrupted after a statewide MR vaccination campaign for children aged until 15 years. In the affected municipalities, the campaign also included adults. During epidemiological week 5, 2002, measles was reintroduced to Falcon. The first detected case was a 7-month old girl, who lives in Zulia and visited the municipality of Carirubana in the peninsula of Paraguana, an important tourist area, and had rash onset on January 3, 2002. The infant was taken to a health center run by the Social Security of Venezuela, where she tested positive for measles. Three cases, a nurse and two others, had contact with the same hospital. This reintroduction had limited spread (9 confirmed cases, none in the last two weeks). Of the 9 confirmed measles cases, two are children <1-year of age and the 7 remaining cases are >24 years of age. It appeared that the 1-14 age group, vaccinated in the November –December campaign, had not been affected.

Figure 2
Distribution of confirmed measles cases by age group and rate per 100,000
Venezuela, 2001 - 2002*



* As of epidemiological week 6
Source: MOH

Zulia

During epidemiological week 43, 2001, the State of Zulia, located West of the State of Falcon, reported a confirmed measles case in the city of Maracaibo, a 27 year-old nurse assistant in a private clinic, who had rash onset on October 25, 2001. On the following day, another case was reported, a 1-year old girl, who had been seen by the nurse four days prior to developing rash and fever. The girl was given respiratory therapy due to a suspected pneumonia and had rash onset November 1, 2001. The nurse also infected her 3-year old son and a 22 year-old sister, as well as a 27 year-old colleague and her 10-month old daughter, who resided in another parish of the municipality of Maracaibo.

Although the source of infection of the primary case at Maracaibo could not be identified, this clinic receives many patients from the State of Falcon who are employees of an oil company from that State.

On November 16, three suspected measles cases were reported in the municipality of San Francisco, which together with the municipality of Maracaibo form the city of Maracaibo, a city with the greatest population density in the country. One of the cases is a 27-year old male working as a guard in an ambulatory health center in San Felipe. He travels twice a week to the State of Falcon, especially to the municipality of Buchivacoa. The other two cases correspond to a 4-year old girl, who visited the health center of San Felipe several times, and a 1-year old boy who lives in the same building as the guard. These three cases were confirmed as measles by the regional laboratory. The outbreak spread during November 2001-February 2002 and is ongoing. A total of 223 cases have been reported from Zulia alone, affecting all age groups up to age 34 years (Figure 2). Moreover, a large majority of the cases were previously unvaccinated. As of September 2001, projected routine vaccination coverage with MMR in the State of Zulia was 34%.

The majority of infected adults have been health care workers, employees, laborers, students and housewives.

Trujillo

On January 29, 2002, health authorities in the State of Trujillo, South-East of Zulia, investigated suspected measles in a 1-year old child from Maracaibo, Zulia, who was visiting his grandfather. He had received a dose of MR in Maracaibo on January 21, 2002, six days before the rash. An active search for measles cases was instituted and vaccination of all children <15 years in the entire municipality was strengthened. No further cases had been found as of February 20, 2002**.**

Control Measures

- Nationwide measles vaccination campaign for children ages 1-4 years (*follow-up* campaign): A national, *follow-up* door-to-door measles vaccination campaign was started in November 2001. Preliminary reports of vaccination coverage during the campaign showed 100% coverage in most States. In Zulia, as in most States, reported coverage exceeded 100% in all 21 municipalities, but house-to-house monitoring of vaccination evidenced numerous unvaccinated children. Nationwide, between 80 and 85% of all children visited during house-to-house monitoring (that uses convenience samples) had been vaccinated. Based on these data, vaccination brigades are mopping-up parish by parish children that lack proof of vaccination, including now children under 1-year of age, the highest risk group.
- Vaccination in Falcon: In the municipality of Zamora, where the first cases occurred, an aggressive door-to-door vaccination effort was carried out that targeted the population from 6 months to 60 years of age. Reported vaccination coverage reached 98%. In the rest of the State, the scheduled *follow-up* measles vaccination campaign was extended up to age 15 years.
- Given that cases had reported frequent contacts with health facilities, vaccination of all health workers at private and public health establishments was required in the municipalities of Zamora and Miranda, and subsequently in the rest of the State, to avoid for them to become a potential foci of virus dissemination. Health authorities have made it imperative for all health workers in private and public health establishments to be immediately vaccinated.

Next steps

Starting in March, 2002, the Minister of Health and the main health authorities determined the following strategies aimed at ending the circulation of measles virus in Venezuela:

1. Indiscriminate mass vaccination of all children <15 years in the country, and up to 34 years in the risk areas (captive population in barracks, factories and universities, factory and construction workers and army recruits, persons who live in large, peri-urban concentrations of people of rural origin, bus drivers, migrant population that circulate between Colombia and Venezuela).
2. Design and implemention of an aggressive plan of social mobilization of the campaign, led by the Ministry of Health and Social Development, with active participation of the Governors and political authorities in the different States.
3. Preparation and immediate publication of Ministerial Resolutions requiring vaccination of all health care workers that provide services to the community, and of all children < 15 years attending educational, private or public establishments, in agreement with the Ministry of Education.
4. Provision of necessary resources for the mobilization of vaccination brigades at the local levels in the different States.

Editorial note: Venezuela is at the moment the only country where transmission is now prevalent. The Ministry of Health of Venezuela and the State Health Authorities are taking the necessary measures to stop the transmission of measles. Following a few years with low or no incidence of the disease, introduction got transmission established in at least two states. This indicates that a high level of coverage and surveillance have to be maintained at all times. Some factors were decisive for the reestablishment of transmission after measles virus was introduced in the country. Among them was low vaccination coverage in several areas, resulting in the accumulation of susceptibles that fueled the introduction and dissemination of the measles virus. Annual coverage in the affected parishes and municipalities of the States of Falcon and Zulia have ranged between 10% and 30%.

Some deficiencies in surveillance also contributed to the current measles situation in Venezuela. The first case was neither detected nor reported on time, even though several public and private hospitals and clinics had seen it. Also, the next few cases were reported late. Problems in reporting caused delays in the intervention, allowing the outbreak to spread to a highly populated State (Zulia), despite the fact that the vaccination measures taken in Falcon had been appropriate and effective. The appropriateness of the intervention in Falcon was shown by the limited secondary spread when measles was reintroduced to Falcon in January.

As has been the case in previous measles outbreaks in the Americas, there was a significant contribution of unvaccinated health care workers to the spreading of the measles virus.

Based on these lessons and the recommendations of the evaluation, the health authorities of the country have recognized the need to make radical changes in the management of the different aspects of the regular program. Steps are being taken to develop an annual Plan of Action for 2002.

Assessing the risk for poliovirus circulation in Ecuador

Background

In 1994, three years after the last reported case of paralytic polio caused by a wild virus, the Region of the Americas was certified free of polio. The strategies used to interrupt wild poliovirus transmission included achievement of high routine vaccination coverage with oral poliovirus vaccine (OPV), coupled with supplemental bi-annual immunization activities, and the development of a surveillance system for acute flaccid paralysis (AFP) supported by a regional laboratory network. However, from July 12, 2000 to February 8, 2001, 13 laboratory confirmed poliomyelitis cases attributed to vaccine-derived poliovirus type 1 (12 in the Dominican Republic and one in Haiti) were identified. All were in persons inadequately vaccinated or unvaccinated. The cause of the outbreak was low population immunity and poor sanitation, allowing OPV-derived viruses to establish wild-like poliovirus circulation. This outbreak underscored the need for maintaining high OPV coverage and AFP surveillance even in the absence of wild poliovirus circulation.

The risk for polio outbreaks varies by country and in different areas within a country. In 2001 the Pan American Health Organization (PAHO) developed a protocol to assess a country's risk for undetected poliovirus circulation. Countries were categorized based on three parameters for a five-year period 1996-2000: national coverage with three does of OPV of >85% (the minimum coverage needed to maintain the country polio free); AFP surveillance with a rate of at least 0.8 per 100,000 population among persons <15 of age, and a ≥ 10% enterovirus isolation rate. Among the stool samples analyzed by the laboratory, a low rate of isolation means that either the sample was not correctly maintained and transported, or that the laboratory did not perform well.

Based on these criteria, Ecuador was identified as at-risk since national OPV3 coverage rates were below the targeted 85% in all 5 years except for 1996. Accordingly, a country evaluation was conducted to identify provinces at-risk for potential, but undetected, poliovirus circulation.

Table 1.
Classification of provinces at risk for poliovirus circulation
ECUADOR 1996-2000

Province	(a) Coverage OPV3					(b)
	1996	1997	1998	1999	2000	
Azuay	90.3	89	91	90.7	90.4	
Carchi	90.2	100	87	86.5	84.2	
Galápagos	100	100	100	100	100	
Guayas	100	100	82	82.4	100	
Sucumbios	96.1	80	89	89	82.5	
Pichincha	90.5	90	76	75.3	82.3	
Tungurahua	87.9	94	69	68.8	82.1	
Ríos	87.5	88	64	64.2	73.2	
Pastaza	75.6	75	74	74.3	80.3	
Chimborazo	77.1	70	67	66.6	65.2	
Imbabura	76.6	72	64	64.4	70.4	
El Oro	100	100	76	75.7	93.9	
Morona S.	80.3	100		73.3	86.5	
Zamora CH.	69.2	78	81	80.9	76.6	
Cañar	78.9	100	60	59.3	74.9	
Manabí	71.4	84	51	51.1	70.4	
Cotopaxi	61.1	68	50	49.8	55	
Esmeraldas	63.4	61	48	48.1	69	
Loja	68.5	78	59	59.5	65	
Napo	55.1	56	50	50.1	70.3	
Bolivar	68.3	66	55	55.2	78	

(a) Coverage
(b) Expected # of AFP cases 1996-2000
≥ 80% compliant

Methodology

Provinces were prioritized for AFP active search activities to correlate epidemiological and laboratory findings, using two criteria for years 1996-2000: 1) OPV3 coverage rates of ≥ 80%, and 2) AFP rate of at least 1 AFP case per 100,000 children aged > 15 years old. Provinces were divided into 4 categories:

a) Category 1: OPV coverage ≥ 80% in all 5 years, irrespective of the AFP rate.

b) Category 2: coverage <80% in any year and AFP surveillance performance above the target in all years

c) Category 3: coverage ≥80% in any but not all years, and AFP surveillance performance below threshold in any year.

d) Category 4: coverage and AFP surveillance performance below threshold in all 5 years

Provinces in categories C or D were considered at high risk for undetected poliovirus circulation.

At the national level a line listing of AFP cases during the last five years was developed, based on data from the Poliomyelitis Eradication Surveillance System (PESS), and their viral isolation results were reviewed. All national hospitals were selected for active search activities with the exception of the pediatric hospital in Guayaquil, where active search is routinely performed. In each province, at least two health-care establishments were also chosen for active search based on the following descending order of priority: pediatric hospitals, provincial hospitals and other health-care facilities located in areas with either high population density, low vaccination coverage, areas where active search located AFP cases not previously notified, or areas considered by provincial epidemiologists to be at high-risk. In each health-care unit, discharge data for the last 3-5 years were reviewed seeking the following diagnoses: Guillain-Barré syndrome, transverse myelitis, peripheral neuropathy, traumatic neuritis, paralysis or equivalent diagnoses such us inability to walk. Information was also collected on demographics, clinical diagnosis and date of consultation. The AFP cases identified in the active search were then cross-checked with data in PESS; those cases found in PESS were reviewed, and a household visit was performed to investigate them.

Table 2.
AFP cases found through active search in health-care units
1996-2001

Province	Hospital/ Area	Period reviewed	# patient diagnoses reviewed	AFP Cases Found		AFP Non Reported Visits	Visited with polio compatible sequelae
				reported	Non reported		
Nacional#	Baca Ortiz	1996-2001*	27,372	4	0	0	N/A
	Enrique Garcés	1996-2001	50,717	1	0	0	N/A
Cotopaxi	Provincial	1996-2001	26,673	0	3	3	0
	Zumbahua	1996-2001	5,761	0	0	0	N/A
	Salcedo	1996-2001	2,637	0	0	0	N/A
	Pujili	1996-2001	3,966	0	0	0	N/A
Bolívar	Provincial	1996-2001	11,721	0	0	0	N/A
	Chillanes	1996-2001	3,526	0	0	0	N/A
Loja	Provincial	1996-2001*	33,784	0	1	0	N/A
	Macara	1996-2001**	3,954	0	0	0	N/A
Manabí	Provincial	1996-2001**	60,660	0	0	0	N/A
	Manta	1998-2001**	29,031	2	1	1	0
	Chone	1998-2001**	16,438	0	0	0	N/A
Esmeraldas	Provincial	1996-2001*	27,262	0	0	0	N/A
	Quininde	1996-2001*	6,878	0	0	0	N/A
Napo	Provincial	1996-2001**	12871	1	1	0	N/A
	Baeza	1996-2001**	3501	0	0	0	N/A
Total			**326,752**	**8**	**6**	**4**	

* April 2001 ** May 2001

Results

Five provinces were determined to be at highest risk: Cotopaxi, Bolivar, Loja, Esmeraldas (which was in Category 3) and Napo (Table 1). Although not in Category IV, Manabí was also selected because of its high population, poor sanitary conditions, inadequate surveillance, and having only one year with coverage above 80%. Active search was conducted in two national referral hospitals (one pediatric and one general), and in the provincial hospital and at least one cantonal hospital in each selected province. The catchment population of the selected hospitals comprised at least 40% of the total population for that province.

A total of 326,752 diagnoses from at least the year 1998 onward were reviewed. However, most sites had data starting from 1996. Fourteen patients with a potential AFP diagnosis were found (Table 2), 8 (57%) had been previously reported. There was no clustering of cases. Four of the six unreported patients were located and visited; none had polio-compatible sequelae. Two unreported AFP cases occurred in 1996, 3 in1998 and one was detected in 2000. Four of the unreported AFP cases were diagnosed as Guillain Barré syndrome.

Based on national surveillance data, during 1996-2000, only one poliovirus (Sabin type 1) and a few enteroviruses were isolated from AFP cases in the study areas. The Sabin virus was islolated from an individual with vaccine-associated poliomyelitis in Loja. There was no evidence of further viral circulation in the area. Nonpolio enteroviruses were isolated in Manabí province from two patients with meningitis and encephalitis in 1997 and 1998, respectively, and one in 1997 in Esmeralda province from a patient with meningitis.

Conclusions

Assessment of selected high-risk provinces in Ecuador revealed no evidence of undetected polio cases/outbreaks over the past 5 years. Even though no undetected viral transmission resulting in clinical cases were identified, low coverage with three doses of OPV, as well as poor sanitation, increases the potential for vaccine-derived polio outbreaks in the future. Furthermore, the inadequate surveillance would mean that if cases were to occur, they could be undetected for a long time, thus increasing their potential to cause important outbreaks. In 2000, OPV3 coverage in Ecuador was <80% in 10 (48%) of 21 provinces. Furthermore, the provinces evaluated here had coverage rates below 80% during all of the last five years. Moreover, most of the areas visited during the evaluation reported coverage levels in 2000 of <50%, levels that could easily allow poliovirus circulation. These findings highlight the need for increasing vaccination coverage through supplemental immunization activities. Additionally, monitoring of vaccination coverage should be conducted regularly as part of supervisory visits.

This evaluation detected several unreported AFP cases, highlighting the need for improving AFP surveillance. Nevertheless, undetected circulation of poliovirus in these areas was unlikely since none of the unreported cases were compatible with polio. Importantly, the unreported cases were more likely to have occurred in the first half of the 5-year study period, suggesting that the surveillance system has improved. The methodology used in this evaluation is useful for identifying areas at risk for poliovirus viral transmission.

Source: Gustavo H. Dayan, Centers for Disease Control and Prevention (CDC); Nancy Vasconez, EPI, Ecuador; Luis Paredes, EPI, Ecuador; Fátima Franco, EPI, Province of Guayas, Ecuador; Rodrigo Rodríguez, PAHO/Ecuador; Víctor Cáceres, CDC; Mauricio Landaverde, PAHO/Washington.

Cross-learning: sharing experiences of a rubella campaign

Costa Rica became the first country of Central America to implement the recommendations on rubella of PAHO's Technical Advisory Group on Vaccine-Preventable Diseases (TAG). Following an analysis of the epidemiological situation of rubella and congenital rubella syndrome (CRS) in the country, the Ministry of Health and the Social Security System of Costa Rica (CCSS) adopted a strategy of accelerated rubella control and prevention of CRS, and carried out a one-month National Immunization Campaign against rubella and measles, targeting men and women between the ages of 15-39 years, regardless of their immunization status (refer to *EPI Newsletter*, February and June, 2001). Recommendations on rubella vaccination strategies at the 1999 TAG (XIII Meeting of the PAHO Technical Advisory Group on Vaccine Preventable Diseases, Hull, Quebec, Canada, April 12-16, 1999) state that "countries wishing to prevent and control both rubella and CRS promptly should conduct a one-time mass campaign to vaccinate **both** males and females 5-39 years of age with measles and rubella containing vaccine."

The campaign presented several challenges for Costa Rica's health services network: foremost was the size of the target group for vaccination (42% of the country's total population), followed by its composition – men, women, teenagers and young adults. Furthermore, a vaccination campaign aimed at adults called for an entirely different set of planning and logistical tools than those generally used for campaigns aimed at children.

The Costa Rica campaign has been a unique opportunity to gaining useful experiences in the implementation of the rubella accelerated vaccination strategy. In order, to optimize this experience with other countries in the subregion, PAHO convened the managers of national immunization programs of all Central American countries for a two-day session during the May campaign in Costa Rica. Managers of neighboring Central American countries had a first-hand view of a rubella immunization campaign targeting adults from a managerial, administrative and operational perspective. Disseminating these best practices among immunization managers will be key as other countries embark on similar rubella campaigns targeting both men and women.

Immunization managers were given a presentation by Costa Rica's entire multi-disciplinary and inter-sectoral team involved in the planning and organization of the campaign. They also visited health establishments at the various levels of the health system where the campaign had taken place (regional, health areas, health posts, hospitals and clinics). Here they were able to review all the technical and managerial aspects that came into play during the implementation of the campaign. Finally, immunization managers met with the central Coordinating Commission, which had oversight responsibilities over the vaccination campaign (logistics, cold chain and immunization safety, mass media, social communications, social participation, registries, staff training and supervision) and epidemiological surveillance (rubella and measles), as part of the Action Plan developed by the Ministry of Health and the CCSS.

Participants welcomed the opportunity to monitor the implementation of all components of the campaign while it was being carried out. Managers of immunization programs learned of the importance of harnessing the support of health authorities and members of government at the highest level for the national campaign, of having readily-available epidemiological information on disease burden, as well as analyses on cost-effectiveness. Equally important were the active involvement of the country's medical and scientific societies, the implementation of adequate strategies of social mobilization, the availability of simple instruments that allow for the registration of the target population by age group, and the effective management of particular situations, such as monitoring of post-vaccine events during the campaign, planning for safe injections and disposal of hazardous material, and coordination with blood banks.

During the two-day meeting, the following plans were outlined for rubella control and CRS prevention in Central American countries:

- **Guatemala:** Following an external evaluation of the national immunization program in October 2001, a plan has been proposed to implement a strategy of rubella control and CRS prevention in stages, commencing in 2002 with the vaccination of the < 5 years age group.
- **Honduras:** A National Immunization Day in support of the accelerated control of rubella and prevention of CRS will be carried out in 2002, targeting men and women ages 5 to 39.
- **Nicaragua:** A National Immunization Day, supporting the accelerated control of rubella and CRS prevention is to be carried out in 2002 , aimed at men and women ages 7 to 39 years years using the rolling campaign strategy.
- **El Salvador:** An analysis of vaccination coverage reached against measles and rubella during previous campaigns will be undertaken, to determine susceptible groups and age groups to vaccinate.
- **Panama:** An analysis of existing rubella vaccination coverage data, investigation of cases of CRS starting from the last outbreak will be carried, as well the planning of a National Immunization Day targeting men and women in at-risk age groups.
- **Costa Rica:** Results and experiences of the successful rubella campaign will be disseminated in a final report and scientific journals.

Final Measles Surveillance Data, 2001

Region	Country	Final 2001 Data					Total Confirmed Cases 2000
		Total Suspected* Cases Notified	Discarded	Confirmed Cases			
				Clinical	Laboratory And EPI Link	Total	
Andean Region	Bolivia	1,673	1,673	0	0	0	122
	Colombia	1,521	1,514	1	1	2	1
	Ecuador	1,578	1,575	0	2	2	0
	Peru	3,574	3,338	0	0	0	1
	Venezuela	1,657	1,544	9	104	113	22
Brazil	Brazil	38,680	36,347	0	1	1**	36
Central America	Belize	32	32	0	0	0	0
	Costa Rica	43	43	0	0	0	0
	El Salvador	374	372	0	2	2**	0
	Guatemala	539	538	0	0	0	0
	Honduras	322	322	0	0	0	0
	Nicaragua	479	479	0	0	0	0
	Panama	366	363	0	0	0	0
English-Speaking Caribbean	Anguilla	2	2	0	0	0	0
	Antigua & Barbuda	3	3	0	0	0	0
	Bahamas	2	2	0	0	0	0
	Barbados	27	27	0	0	0	0
	Cayman Islands	0	0	0	0	0	0
	Dominica	0	0	0	0	0	0
	Grenada	11	11	0	0	0	0
	Guyana	50	50	0	0	0	0
	Jamaica	159	159	0	0	0	0
	Montserrat	0	0	0	0	0	0
	Netherlands Antilles	0	0	0	0	0	0
	St. Kitts & Nevis	8	8	0	0	0	0
	St. Lucia	4	4	0	0	0	0
	St. Vincent & Grenadines	0	0	0	0	0	0
	Suriname	10	10	0	0	0	0
	Trinidad & Tobago	39	39	0	0	0	0
	Turks & Caicos	2	2	0	0	0	0
	British Virgin Islands	3	3	0	0	0	0
	U.S. Virgin Islands	0	0	0	0	0	0
Latin Caribbean	Cuba	1,093	934	0	0	0	0
	Dominican Republic	1,169	1,056	2	111	113	253
	French Guyana	…	…	…	…	…	…
	Guadeloupe	…	…	…	…	…	…
	Haiti	222	63	12	147	159	990
	Martinique	…	…	…	…	…	…
	Puerto Rico	0	0	0	0	0	0
Mexico	Mexico	1,204	717	0	3	3**	30
North America	Bermuda	0	0	0	0	0	0
	Canada	34	0	0	34	34**	206
	United States	129	20	0	109	109**	85
Southern Cone	Argentina	498	482	0	0	0	6
	Chile	105	105	0	0	0	0
	Paraguay	278	278	0	0	0	0
	Uruguay	25	25	0	0	0	…
Total		55,915	52,140	24	514	538	1,752

... No information provided
* Suspected cases include all suspected measles and rubella cases. Canada reports only measles cases.
** Imported cases
Source: MESS/HVP except for Brazil, Canada, Costa Rica, Cuba and USA

Environmental sampling in Hispaniola

On August 28, 2000, a case of acute flaccid paralysis (AFP) was reported from the Northwest department in Haiti. Laboratory analysis of the stool sample from an unvaccinated child showed the presence of a type 1 OPV-derived poliovirus. A total of 21 laboratory-confirmed poliomyelitis cases attributed to this virus were identified on the Caribbean island of Hispaniola, divided between Haiti and the Dominican Republic[1]. As a complement to the active search for cases of AFP, environmental sampling was conducted during November and December 2000 in Hispaniola, in order to test for type1 OPV-derived viruses in sewage, canals, and public latrines. In total, 55 environmental samples were collected and analyzed for the presence of polioviruses in Haiti and the Dominican Republic . The samples were first concentrated by PEG precipitation and chloroform extraction and subsequently inoculated into confluent layers of L20B and RD cell cultures. Of these samples, 47 (85%) were CPE positive on RD, and 20 (36%) were CPE positive on L20B cells. The presence of polioviruses could be confirmed in 19 of the 20 L20B positive cell cultures by RT-PCR using pan-poliovirus specific primers. Of these 19 samples, 10 tested positive for poliovirus type 1. The remaining L20B cell-cultures were positive for Sabin type 2 (6 samples), Sabin type 3 (2 samples) or both (1 sample). In addition, 7 of the 10 poliovirus type 1 strains - one from Port Au Prince in Haiti, as well as five from Santiago and one from St. Domingo in the Dominican Republic – tested positive for drifted-vaccine-derived poliomyelitis, and grew in cell culture at elevated temperature (i.e., 39.5 °C), indicating the possibility that they were neurovirulent poliovirus strains.

The presence of type 1 OPV-derived poliovirus was further confirmed by sequence analysis of the complete VP1 major capsid gene. A 3% genetic sequence difference between these strains and Sabin virus type 1 was found. Phylogenetic analysis of VP1 sequences from OPV-derived polioviruses isolated from environmental samples and from AFP cases in Hispaniola showed that they are genetically highly related in this region of the poliovirus genome. In addition, strains isolated from different geographic areas (Port-au-Prince in Haiti and Santo Domingo and Santiago in the Dominican Republic) form distinct sub-clusters.

In conclusion, the study shows the importance of environmental surveillance as a complement to AFP surveillance for monitoring the presence of polioviruses in community fecal waste, and thus, in the population. The findings demonstrate a useful role for environmental surveillance of neurovirulent polioviruses in the overall eradication program. The recent report of neurovirulent, vaccine-derived polioviruses in the Philippines[2]; adds perhaps another reason to determine how to best detect and control these viruses, and how environmental surveillance may contribute to detecting, understanding and ultimately controlling them.

Source: J. Vinjé, University of North Carolina at Chapel Hill (UNCCH); L. Venczel, PAHO/Bolivia; C. Burns, Centers for Disease Control and Prevention (CDC); D. Wait, UNCCH; M. Landaverde, PAHO/Washington; H. Izurieta, PAHO/Washington; G. Ko, UNCCH; O. Kew, CDC; M. Sobsey, UNCCH.

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1 JAMA 2001 Dec 12;286 (22): 2802 (Update: outbreak of poliomyelitis- Dominican Republic and Haiti 2000-2001)

2 CDC, MMWR 2001; 40 874-5 (AFP in 2001 in the Philippines)

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