

Immunization Newsletter

Pan American Health Organization

VOLUME XXX, NUMBER 1 ► FEBRUARY 2008

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27th Pan American Sanitary Conference Adopts Resolution for the Elimination of Rubella and CRS in the Americas

During the 27th Pan American Sanitary Conference held in October 2007 in Washington, D.C., Member States of the Pan American Health Organization (PAHO) expressed strong support for the rubella and congenital rubella syndrome (CRS) elimination initiative currently underway in the Region. As all countries of the Americas implement supplementary immunization activities to complement routine vaccination programs, the combined strategy has resulted in a substantial decrease in rubella incidence. The number of confirmed rubella cases decreased by nearly 98% between 1998 and 2006 (from 135,947 to 2,998), and the number of confirmed CRS cases from 23 in 2002 to 14 in 2006. The impact on reducing rubella incidence has been greater in countries that vaccinated men and women in their campaigns.

In addition to interrupting rubella transmission, mass vaccination campaigns have greatly contributed to consolidating measles elimination. All 402 measles cases reported in the Americas since 2006 (2007 provisional data) have occurred in countries that had not yet implemented or completed a mass measles/rubella vaccination campaign among adolescents and adults.

By adopting Resolution CSP27.R2 (see Resolution page 2), PAHO Member States seek to build on the success achieved in the Region. Two previous resolutions calling for rubella and CRS elimination in the Americas by 2010 (2003) and reaffirming the elimination initiative as a Regional priority (2006) have been passed. Resolution CSP27.R2 also calls for national commissions to be formed to verify rubella and CRS elimination, under the guidance of an Expert Committee (see box page 2).



Dr. Margarita Cedeño de Fernández (right), First Lady of the Dominican Republic, receiving a plaque from Dr. Mirta Roses Periago, PAHO Director, during the 27th Pan American Sanitary Conference. Dr. Cedeño was recognized as goodwill ambassador for her humanitarian work in favor of rubella elimination and her advocacy efforts to avoid disabilities caused by the rubella virus throughout the Americas. In her speech, Dr. Cedeño called for all governments of the Region to intensify their efforts in the fight against vaccine-preventable diseases.

(Photo: David Spitz, PAHO/WHO)

Paving the Road for Pneumococcal Vaccine Introduction

The World Health Organization (WHO) estimates that pneumococcal disease causes 1.6 million deaths annually, of which 800,000 occur among children aged <5 years. Therefore, pneumococcal disease ranks as one of the greatest public health priorities. Pneumonia is one particular presentation of invasive pneumococcal disease that accounts for most of the disease burden. When considering the results of the vaccine efficacy trials, it is critical to understand the challenge in diagnosing pneumonia and other invasive presentations caused by pneumococcal infection. The end points used for measuring vaccine efficacy range from serotype results of cultures (the most specific, but less sensitive) and case definitions limited to clinical data (more sensitive and less specific) (Figure 1).

The currently available pneumococcal vaccine contains 7 serotypes (of the known 90) polysaccharides individually conjugated to carrier proteins. In the United States, the 7 serotypes contained in the vaccine account for >80% of the disease burden of invasive pneumococcal infection. Controlled, clinical trials have been conducted in Finland and the United States (in Northern California and among Native American populations of Alaska and the Southwest). Efficacy against invasive pneumococcal disease caused by serotypes contained in the vaccine is >93%. Protection against pneumonia docu-

See **PNEUMO** page 5



PAN AMERICAN HEALTH ORGANIZATION
WORLD HEALTH ORGANIZATION

27th PAN AMERICAN SANITARY CONFERENCE 59th SESSION OF THE REGIONAL COMMITTEE

Washington, D.C., USA, 1-5 October 2007

CSP27.R2 (Eng.)
ORIGINAL: ENGLISH
5 October 2007

RESOLUTION

CSP27.R2

ELIMINATION OF RUBELLA AND CONGENITAL RUBELLA SYNDROME IN THE AMERICAS

THE 27th PAN AMERICAN SANITARY CONFERENCE,

Having considered the progress report presented by the Director on the elimination of rubella and congenital rubella syndrome (CRS) in the Americas (Document CSP27/7);

Noting with satisfaction that tremendous progress has been achieved in obtaining the interruption of endemic rubella virus transmission, thus reducing the number of rubella cases in the Region by 98%, and that incidence is at its lowest to date in the Americas; and

Recognizing that considerable efforts will be needed to support and reach the elimination goal by 2010, requiring further commitment on the part of governments and the partner organizations that are collaborating on the elimination initiative, and the strengthening of ties between public and private sectors,

RESOLVES:

1. To congratulate all Member States and their health workers on the progress achieved to date in the elimination of rubella and congenital rubella syndrome (CRS) in the Americas, which demonstrates their level of commitment to the health of the population of the Western Hemisphere.
2. To express appreciation and request continued support from the various organizations that, together with PAHO, have offered crucial support to national immunization programs and national endeavors to eliminate rubella and CRS, including the U.S. Department of Health and Human Services Centers for Disease Control and Prevention, the Canadian International Development Agency, the Global Alliance for Vaccines and Immunization, the Inter-American Development Bank, the International Federation of Red Cross and Red Crescent Societies, the Japanese International Cooperation Agency, the March of Dimes, the Sabin Vaccine Institute, the United Nations Children's Fund, the United States Agency for International Development, and the Church of Jesus Christ of Latter-day Saints.
3. To urge all Member States to:
 - (a) Achieve the elimination of rubella and CRS in the Americas by finalizing the implementation of vaccination strategies, intensifying integrated measles/rubella surveillance, and strengthening CRS surveillance;
 - (b) Establish national commissions to compile and analyze data to document and verify measles, rubella and CRS elimination, for review by an expert committee.
4. To request the Director to:
 - (a) Continue efforts to mobilize additional resources necessary to surmount the challenges described in the progress report;
 - (b) Form an Expert Committee responsible for documenting and verifying the interruption of transmission of endemic measles virus and rubella virus.

(Second plenary meeting, 1 October 2007)

Documenting the Interruption of Endemic Rubella and Measles Virus Transmission in the Americas

By the end of 2008, all countries and territories of the Region of the Americas will have implemented strategies to reduce populations susceptible to measles and rubella and reduce the incidence of the devastating birth defects associated with congenital rubella syndrome (CRS). The approval of Resolution CSP27.R2 by the 27th Pan American Sanitary Conference in October 2007 defined the final steps for reaching the goal of rubella elimination by 2010, calling for the formation of an Expert Committee responsible for the documentation and verification of the interruption of the endemic rubella and measles virus transmission in the Americas.

High quality and integrated measles/rubella surveillance, CRS surveillance, and vaccination coverage results, supported by sustained technical cooperation, are required to verify the interruption of virus transmission. PAHO staff, in collaboration with consultants from the US Centers for Disease Control and Prevention (CDC), considered several information components to be included in a Regional protocol for verifying the interruption of endemic transmission. It is essential that the data collected for each component be complete and consistent with other available data sources. The information components included were as follows:

- The development and evolution of national immunization programs;
- Measles, rubella, and CRS epidemiological data (impact of vaccination interventions);

- The analysis of protected cohorts, which includes vaccination coverage, routine immunization, follow-up campaigns, adolescent and adult mass campaigns, and post-partum vaccination (post-campaign);
- The quality of the surveillance system, including completion of indicators, active case searches, compatible cases (surveillance error), and excluded cases;
- Molecular epidemiology; and
- Available seroprevalence studies when needed.

The protocol will be tested in a pilot country. A panel of experts will convene to review the results from the pilot study and finalize the regional protocol for dissemination and implementation at country level.

In accordance with Resolution CSP27.R2, an international Expert Committee will independently verify that endemic rubella and measles virus transmission has been interrupted in the Western Hemisphere. Special national commissions in each country will assess country-specific situations and prepare the required documentation, as defined by the protocol. The international Expert Committee will be charged with completing the final analysis of all available data to determine definitive verification and report the findings to PAHO's Directing Council in 2010. ■

Aide-memoire for Prevention of Freeze Damage to Vaccines

Cold-chain storage is necessary to prevent damage to vaccines caused by heat exposure. However, some vaccines may be damaged by freezing them below 0°C. As a result, the vaccine's effectiveness can be diminished and the risk of adverse events following immunization—such as sterile abscesses—may increase.

Although reports from many countries document inadvertent freezing temperatures at all levels of the cold chain, protecting vaccines from freeze damage remains one of the most poorly addressed problems in vaccine management. Using freeze-damaged vaccines will make it harder to achieve disease-prevention goals. The cost associated with wastage of vaccines damaged by freezing is high and increases with the introduction of expensive, freeze-sensitive combination vaccines.

Studies conducted in several diverse countries demonstrate frequent occurrences of sub-zero temperatures in the cold chain. Health workers and cold-chain managers are often unaware of how vaccine freezing occurs and the significance of its consequences.

The most common cause of exposure to freezing temperatures is improper use of ice packs prior to transport. The practice of immediately placing deep-frozen ice packs, which can reach temperatures as low as -20°C, in well-insulated cold boxes places freeze-sensitive vaccines at the greatest risk.¹ Other common causes of vaccine freezing include:

- Cold rooms or refrigerator thermostats that are adjusted improperly;
- Vaccines that are incorrectly positioned in cold rooms or refrigerators;
- Inadequate temperature monitoring of cold chain equipment.

To reduce the risk of freeze damage to vaccines, programmes should follow the best practices outlined in this aide-memoire, increase awareness about the issue, and implement clear operational guidelines and training for staff working at all levels of the cold chain. A study protocol is available from WHO for national programmes to assess the extent of the vaccine-freezing problem in their cold chain systems and to implement corrective measures when necessary.³

How to Prevent Freeze Damage

1. During domestic transport to the health facility:

Do not load cold boxes or vaccine carriers with deeply frozen ice packs, and always use a freeze indicator in the transport container. Be aware that vaccine vials are not adequately protected from freezing if wrapped with newspaper or cardboard. Therefore, apply the following options where appropriate:

- **Properly condition ice packs:** Remove ice packs from the freezer and let them defrost at room temperature. Shake frequently until you can hear water inside the pack, and then place in the cold box. For more information, see *Immunization in Practice*, 2004 Update, Module 3 (WHO/IVB/04.06), page 19: www.who.int/vaccines-documents/iip/PDF/Module3.pdf
- **Use cool-water packs instead of ice packs:** Cool-water packs will keep vaccines safe during distribution in most weather conditions. Cool-water packs are regular packs filled with

water and cooled in a refrigerator. Note: If vaccine vial monitors (VVMs) are not available on oral poliovirus vaccine (OPV), transport OPV separately with frozen ice packs and freeze-sensitive vaccines with cool-water packs.

- **Use no ice packs:** Vaccines with VVMs can be used without ice packs in certain settings and with proper training. For more information, see *Getting started with vaccine vial monitors* (WHO/V&B/02.35): www.who.int/vaccines-documents/DocsPDF02/www716.pdf

2. In vaccine cold rooms:

- Keep temperatures between 2°C and 8°C at all times. Set the thermostat to maintain a generally consistent temperature of 5°C.
- Check and record temperatures at least twice every 24 hours. Monitor temperatures seven days a week.
- Do not store vaccines in front of the refrigeration cold air stream. Remove or close-off shelving in this zone.
- Do not store freeze-sensitive vaccines on or within 20 centimeters of the floor.
- Place thermometers and freeze indicators at several locations in the cold room, including the highest and lowest vaccine storage points.

3. In refrigerators:

- Check and record temperatures at least twice every 24 hours. Monitor temperature seven days a week.
- Put a freeze indicator in every refrigerator at the level where freeze-sensitive vaccines are stored.
- Place the thermometer in the coldest part of the refrigerator: at the bottom of top-loading chest refrigerators and close to the evaporator in upright models.
- Place freeze-sensitive vaccines at least 5 centimeters away from the evaporator.
- Do not adjust the thermostats after an electricity outage or if it is believed that the vaccines need a burst of cold air.
- Set the thermostats at 5°C in the morning and then seal the thermostat in place with tape,

Vaccines damaged by freezing are:²

- Diphtheria toxoid
- Hepatitis A
- Hepatitis B
- Influenza
- Liquid Hib conjugate
- Pertussis
- Pneumococcal conjugate
- Poliovirus (inactivated)
- Tetanus toxoid
- Typhoid (inactivated)
- Combinations containing these vaccines.

In addition, vaccine diluents should not be frozen as the ampoules may crack or break.

¹ WHO is further evaluating the recommendation to use conditioned ice packs during domestic transport and continues to explore best practice alternatives to preserve the quality of all temperature-sensitive vaccines.

² Temperature sensitivity of vaccines, WHO/IVB/06.10

³ Study protocol for temperature monitoring in the vaccine cold chain, WHO/IVB/05.01

What to do if freezing occurs?

- Report evidence of freezing to supervisors for corrective action.
- If a freeze-sensitive vaccine is frozen solid, discard it immediately.
- If an indicator signals that freezing has occurred, immediately conduct the shake test on a sample of all affected vials. For guidance on conducting the shake test, see *Temperature sensitivity of vaccines* (WHO/IVB/06.10): www.who.int/vaccines-documents/DocsPDF06/847.pdf.
- If freezing problems are detected, consult with experts to minimize the impact on the disease control objectives.

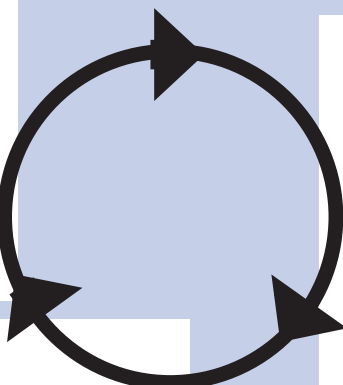
Actions to Prevent Freezing:

Collect and analyse the evidence

Record temperatures during storage and transport and ensure regular supervision. Conduct periodic assessments in all countries as recommended in *Study protocol for temperature monitoring in the vaccine cold chain* (WHO/IVB/05.01): www.who.int/vaccines-documents/DocsPDF05/795.pdf

Increase awareness

All immunization programme staff need to understand that vaccine freezing is a common occurrence that, if it occurs, may damage the vaccines. Provide education and training materials to immunization program staff to increase awareness about inadvertent vaccine freezing, potential damage to vaccines, and proper vaccine management at all levels of the cold chain.



Implement best practices

Follow the guidelines outlined in this aide-memoire to help prevent vaccine freezing in cold rooms, refrigerators, and cold climates. Most of these preventive measures are straightforward and inexpensive. Training and supportive supervision are also critical to ensuring that freeze prevention remains a high priority and that best practices are implemented. Additional information about the proper use and maintenance of cold chain equipment is available in *Immunization in Practice*, 2004 Update, Module 3 (WHO/IVB/04.06), page 19: www.who.int/vaccines-documents/iip/PDF/Module3.pdf

even if this action results in temperature occasionally rising above 8°C.

- When ice-lined refrigerator (ILR) thermostat are adjusted properly, ice linings will not be fully frozen. In ILRs, do not store freeze-sensitive vaccines within 20 centimeters of the bottom and place freeze-sensitive vaccines in the storage baskets provided with the unit.
- Use refrigerators specifically designed for vaccine storage.⁴

4. In cold climates:

- Keep cold rooms and vaccine refrigerators in heated rooms.
- Use room-temperature water packs for vaccine transport. Fill ordinary ice packs with tap water; do not freeze or chill them. In extremely cold conditions, use packs filled with warm water at 20°C.
- Use freeze indicators in all refrigerators and cold boxes.
- Use a heated vehicle. Never leave cold boxes in an unheated vehicle, especially overnight.

- Do not leave cold boxes outdoors, or in unheated rooms. ■

This article is adapted from a WHO Aide-memoire, which may be requested (Ordering Code: WHO/IVB/07.09) along with other materials on immunization, vaccines and biologicals from the Department of Immunization, Vaccines and Biologicals of the World Health Organization, by fax at + 41 22 791 4227 or by E-mail at vaccines@who.int. It can also be consulted on the web at http://whqlibdoc.who.int/hq/2007/WHO_IVB_07.09_eng.pdf.

⁴ See Product Information Sheets for information, available at http://www.who.int/immunization_standards/vaccine_quality/pis/en/index.html.

Vaccine Freezing: Results from a Study Conducted in Bolivia

A study conducted in Bolivia (2005) monitored vaccine cold chain temperatures during routine pentavalent (DTP-HB-Hib) vaccine shipments from central stores to local health units, as well as vaccine carriers used for outreach vaccination. The authors adapted a protocol for monitoring vaccine temperatures developed by PATH and recommended by the World Health Organization (WHO).¹ They used miniature temperature recording devices in boxes containing the liquid

component of the pentavalent vaccine. Interestingly, the vaccines were less exposed to heat (>8°C) than to freezing, even in warm areas of Bolivia. Freezing was more common at local level storage, such as health unit and during transport to the province and district levels. Bolivia has since intensified training on cold chain and plans to conduct a follow-up assessment.

The results of this study highlight the risk of vaccine freezing, especially when considering the introduction of new, more expensive, freeze-sensitive vaccines. Health workers must be

aware of the importance of properly adjusting refrigerator thermostats, avoiding that vaccines touch the refrigerator walls, and defrosting the ice packs before packing them in cold boxes. Training and supervision are key to ensure that health care workers understand and manage cold chain concepts. Studies monitoring vaccine temperature are a useful tool to assess the situation in a given country or province. ■

References:

- (1) Nelson C, Froes P, Dyck AM, Chavarria J, Boda E, Coca A, Crespo G, Lima H. Monitoring temperatures in the vaccine cold chain in Bolivia. *Vaccine*. 2007;25:433-7.
- (2) Matthias DM, Robertson J, Garrison MM, Newland S, Nelson C. Freezing temperatures in the vaccine cold chain: a systematic literature review. *Vaccine*. 2007;25:3980-6.

¹ Available at: <http://www.who.int/vaccines-documents/DocsPDF05/795.pdf>

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mented by consolidation on an X-ray was found to be 20.5%.

In the USA, the vaccine was licensed in February 2000, followed in the same year by recommendations for administration to all children aged <2 years and high-risk children aged 2-4 years. The initial vaccination stages were complicated with vaccine supply shortages from August 2001 to May 2003. By 2004, 73% coverage had been achieved in the USA. As a consequence, invasive pneumococcal disease among children aged <1 year declined 77% from baseline levels, 82% among children aged 1 year, and 75% among children aged 2 years. Data also suggested a substantial decline in isolates resistant to penicillin. Secondary benefits through herd immunity were also documented as a 34% reduction in invasive disease incidence among persons aged >65 years, and a 48% reduction among persons aged 18-39 years.

Surveillance data from PAHO's laboratory network throughout the Caribbean and Latin America suggests that the 7-valent vaccine could potentially prevent 59% of all isolates detected from patients with invasive disease (Figure 2). In these countries, it has been estimated that 2 children aged <5 years die every hour of pneumococcal infection. Therefore, the currently available vaccine could potentially prevent at least one of those deaths every hour. It is expected that WHO will pre-qualify the vaccine for Revolving Fund purchase by the end of this year. In addition, 10- and 13-valent pneumococcal vaccines are entering the final phases of development and testing.

PAHO recommends that the introduction of pneumococcal vaccine be governed by the guiding principles of Pro-Vac, which helps ensure sustainable immunization approaches to address public health priorities. Surveillance is a key underpinning of this process, and PAHO is strongly supporting countries in their surveillance efforts. In addition, the GAVI Alliance has already com-

Figure 1. Possible Surveillance Definitions for Bacterial Pneumonia

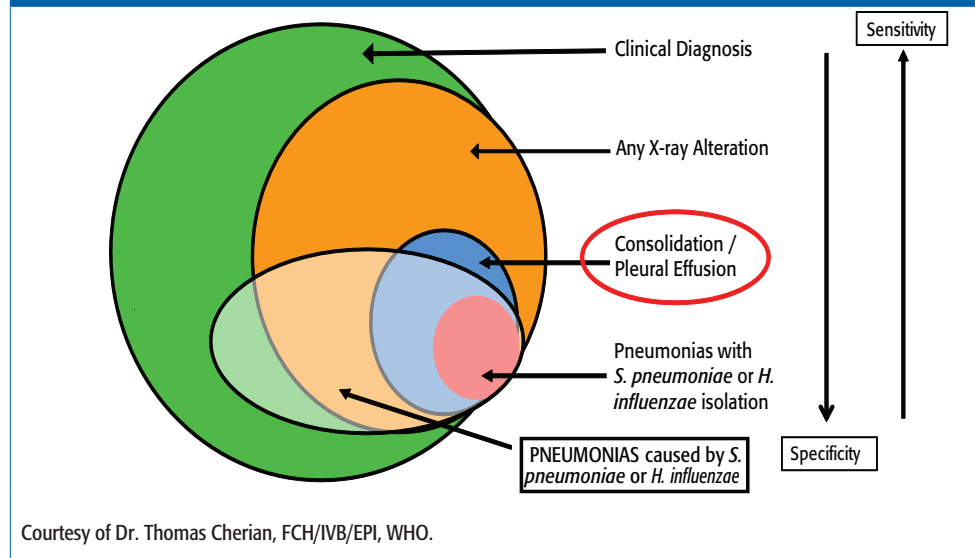
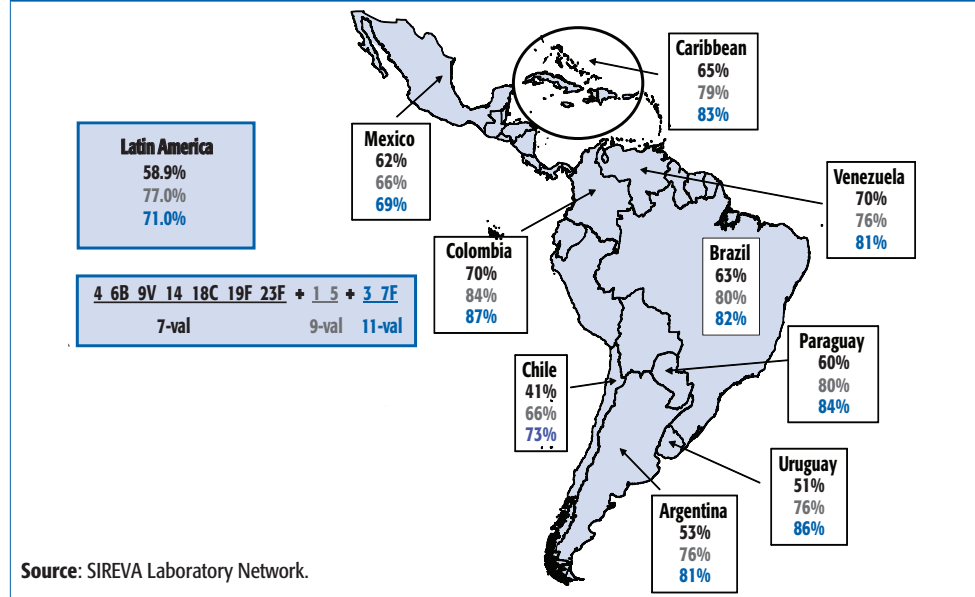


Figure 2. Pneumococcus Conjugated Vaccine Coverage



mitted to providing resources to PAHO's GAVI-eligible countries for the introduction of pneumococcal vaccine. PAHO wishes to acknowledge the support of its partners towards accelerated

control of pneumococcal disease in the Americas, including PneumoADIP, the Centers for Disease Control and Prevention of the United States, WHO, and its network of experts. ■

Evaluation of Sentinel Surveillance System of Diarrhea Due to Rotavirus in Paraguay

The Ministry of Health (MOH) of Paraguay, in collaboration with the Pan American Health Organization (PAHO), conducted an evaluation of the sentinel surveillance system for diarrhea caused by rotavirus in Paraguay from 6-16 November 2007.

The evaluation had two primary objectives: (1) to provide technical support to identify the strengths and weaknesses of the rotavirus surveillance system, and (2) to make recommendations allowing the country to overcome challenges. The goal was to assess the system's performance and pro-

vide Paraguay with useful information to decide whether or not to introduce the vaccine against rotavirus.

Background

The sentinel surveillance system for diarrhea due to rotavirus in Paraguay began in August 2004 as a joint initiative between PAHO and the MOH. As the first country in Latin America to

participate in the sentinel rotavirus surveillance system, Paraguay published its own operational manual for rotavirus surveillance, which forms a strong foundation for the system's structure and standardized procedures.

Surveillance is managed at three levels: local, national, and international. At the local level, four hospitals currently serve as sentinel sites for rotavirus surveillance. They are located in one of the country's 17 departments (Departamento Central) or in the nation's capital, Asunción. The MOH provides supervision at national level, while PAHO provides technical support at the international level.

The rotavirus surveillance process begins in the sentinel hospitals with hospitalized cases, defined as children aged <5 years who have spent more than six hours in the emergency room. If hospitalized children have acute diarrhea (more than three times per day) over a period of less than 15 days, they meet the criteria of a suspect rotavirus case. A case file is then opened and a stool sample is taken. The laboratories of the sentinel hospitals use rotavirus ELISA testing and report confirmed cases to the coordinator at the MOH, who then forwards the results to PAHO for inclusion in the international database.

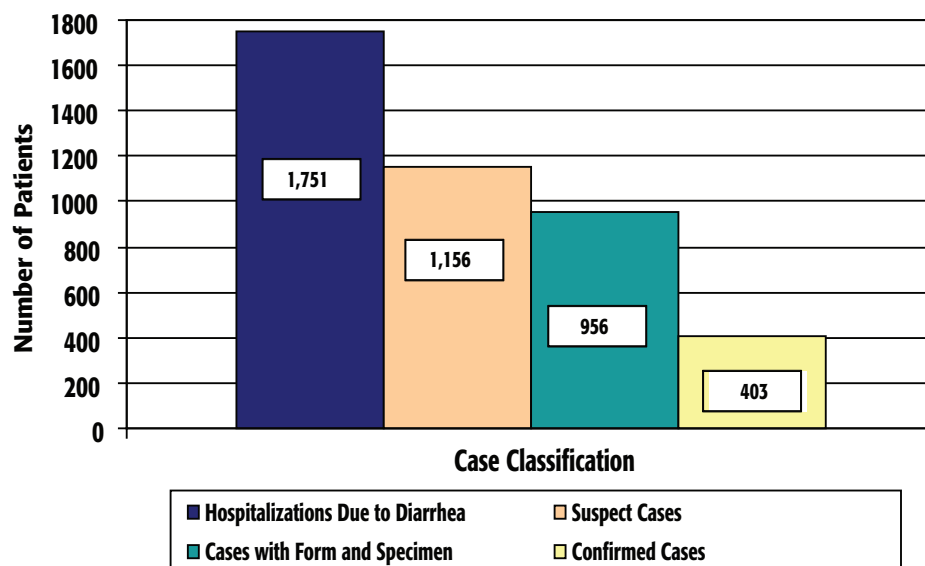
Methods

A team of investigators from PAHO and the MOH conducted focus groups at all four sentinel hospitals. Participants in each meeting included five to nine rotavirus surveillance leaders, ranging from the directors of the hospital, emergency room, and pediatrics to the surveillance coordinators, epidemiologists, laboratory technicians, doctors, nurses, and medical residents.

In addition, the investigators conducted separate interviews with key leaders involved at the local, national and international levels of the surveillance system. The Central Laboratory (Laboratorio Central de la Salud Pública-LCSP), the Expanded Program on Immunization, and the Office of Surveillance (Dirección de Vigilancia) are a few examples of the leadership levels interviewed.

The surveillance system was evaluated by using an integrated approach that measures both quantitative and qualitative indicators. By assessing system strengths and weaknesses in the areas of Research, Education, Action and Leadership, the evaluation makes recommendations on how rotavirus surveillance can be improved to make a R.E.A.L. difference in providing useful information for vaccine introduction decision-making.

Figure 1. Hospitalizations of Cases of Diarrhea due to Rotavirus, Paraguay, 2004-2007



Source: Ministry of Health, Paraguay.

Results

From 2004-2007, sentinel surveillance recorded 16,168 hospitalizations of children aged <5 years, 11% (1,751) of which were due to diarrhea. In cases of severe diarrhea, rotavirus was suspected to cause 66% (1,156) of cases and confirmed to cause 23% (403) of cases. Of the 83% (956) of suspect cases with completed epidemiological forms and stool samples, 42% (403) were confirmed positive for rotavirus (Figure 1). The results recorded in Paraguay are consistent with rates found in other Latin American countries.¹ Table 1 (page 8) summarizes key findings.

Recommendations

- **Strengthen management** by establishing functional modes of communication, improving the flow of information, and fostering collaboration between all levels of surveillance leadership.
- **Establish budget specific funds** for surveillance to increase system sustainability and ensure that all stakeholders have basic and necessary means of communication.
- **Create a plan of action** to complete the objectives in the Operational Manual by creating specific action items with deadlines, progress indicators, and feedback mechanisms.
- **Improve efficiency** by requiring all leader-

ship levels to provide regular feedback on system strengths and weaknesses.

- **Provide a reliable and representative measurement of disease burden** attributable to rotavirus by expanding the number and location of sentinel hospitals.
- **Deciding on specific criteria (by the political authorities)** necessary for a decision on the vaccine and communicate the criteria (written and verbally) to all stakeholders.
- **Limit the loss of cases** by providing adequate resources for each hospital to designate one person responsible for ensuring the timely completion of all case forms by following-up with doctors.
- **Plan ahead** to ensure that there is always an adequate and extra supply of reagents to test samples in every participating laboratory.
- **Determine genotypes** of rotavirus most prevalent in the population to verify whether these strains are covered.
- **Improve sample testing** by coordination, transparency, and reporting between sentinel and central laboratories.
- **Increase accountability** at each level by providing incentives and enforcing requirements.
- **Monitor mortality rate** by formulating and implementing a new strategy.
- **Prioritize short- and long-term goals** to implement recommendations provided by this evaluation.

¹ *Immunization in the Americas: 2007 Summary*. Immunization Unit, Pan American Health Organization available at http://www.paho.org/english/ad/fch/im/IM_Brochure.htm.

The editors wish to thank Ms. Lia Marshall for conducting this study.

2008 PAHO Revolving Fund Vaccine Prices

In 2008, the PAHO Revolving Fund for Vaccine Procurement (RF) is offering a total of 37 vaccine presentations to participating countries. This year the RF added lyophilized rotavirus vaccine. The RF promotes equity and helps ensure that the immunization programs of participating countries benefit from a continuous supply of vaccines at affordable prices. This is especially beneficial to smaller countries that would otherwise have to pay higher prices for lower quantities of vaccines required.

Table 1 shows 2008 RF prices for vaccines being offered (2008 syringe prices will be available in our next issue). The weighted average of price increase for 2008 compared to 2007 was 5.35%.

In some cases, the average vaccine price has decreased, such as for hepatitis B recombinant adult single dose (-3,98%), pneumococcal 23-valent single dose (-5,98%), hepatitis A pediatric single dose with prefilled syringe (-5,03%), and influenza Southern Hemisphere adult single dose with prefilled syringe (-12,33%). The price reductions were facilitated by new supply sources and more efficient working relationships between Member States, PAHO, and the suppliers to manage changes in demand forecasting and production process during 2007. Price increases, however, also occurred in 2008, most notably for dT adult (+10%), hepatitis B recombinant multidose adult (+17,69%), and MR multidose

(+11,35%), as a consequence of limited supply, low accuracy forecasting, and market behavior.

Not shown in Table 1 is influenza Northern Hemisphere, both adult and pediatric. It is anticipated that, due to low response from the strains, quantities offered by suppliers will be insufficient to attend PAHO's requirements.

In anticipation of possible shortages in 2008 for yellow fever, polio, and influenza vaccines, the RF will continue to strengthen its working relationships with countries and suppliers to manage modifications of demand and supply, ensure a smooth and constant flow of vaccines, and avoid stock outs. ■

Table 1. Prices for Vaccines Purchased Through the PAHO Revolving Fund, 2008 (Prices shown in U.S. Dollars)

Vaccine			Doses per Vial	Average Cost
BCG			10	\$0.10975
DTP			10	\$0.16500
dT (Adult)			10	\$0.08250
DT (Pediatric)			10	\$0.09250
DTaP Triple Acellular Adolescent/Adult			1	\$12.00000
DTP-Hepatitis B-Hib	Lyophilized		1	\$3.92000
	Liquid		1	\$3.95000
Hib Lyophilized			1	\$3.35000
Hepatitis B Recombinant Pediatric			1	\$0.25180
Hepatitis B Recombinant Adult			1	\$0.41000
			10	\$0.27070
Measles-Rubella			1	\$1.35000
			10	\$0.52200
Measles/Mumps (Zagreb Strain)/Rubella			1	\$1.55000
			10	\$0.90000
Measles/Mumps (Urabe Strain)/Rubella			1	\$2.65000
			10	\$1.55000
Polio (Glass)			10	\$0.17000
Polio (Plastic)			10	\$0.17000
			20	\$0.15000
			25	\$0.16500
Polio Inactivated (with syringe)			1	\$3.40000
Rabies Vaccine Human Use/ Inactivated Purified Cell Culture	French Origin		1	\$11.25000
	Indian Origin		1	\$11.50000
Yellow Fever			5	\$0.06900
			10	\$0.08500
Influenza Adult Southern Hemisphere	(with prefilled syringe)		1	\$3.20000
	(with syringe)		1	\$3.45000
Influenza Adult Southern Hemisphere			10	\$2.95000
Influenza Pediatric Southern Hemisphere (with syringe)			1	\$3.35000
Influenza Pediatric Southern Hemisphere (10 vials per pack presentation)			20	\$1.47500
Pneumococcal (with syringe)			1	\$8.65000
Hepatitis A Pediatric (with prefilled syringe)			1	\$7.55000
Hepatitis A Pediatric			1	\$7.55000
Varicella			1	\$8.70000
Meningococcal A+C			1	\$14.00000
Rotavirus (10 vials per pack presentation)			1	\$7.50000

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Table 1. Key Findings of Rotavirus Sentinel Surveillance System Evaluation, Paraguay, 2007

Evaluation Area	Primary Strengths	Primary Weaknesses
System Characteristics	<ul style="list-style-type: none"> Surveillance structure includes local, national, and international levels of leadership. Three years of continued surveillance. 	<ul style="list-style-type: none"> Lack of economic and human resources. Number and location of hospitals may limit representativeness of national population
Research	<ul style="list-style-type: none"> All hospitals have up-to-date records for all solicited data indicators. Uses standardized case identification methods defined by the Ministry of Health in Paraguay's Rotavirus Surveillance Operational Manual. 	<ul style="list-style-type: none"> Difficulties with testing of samples and recording of results. Inconsistency in sending complete/timely data. Insufficient data analysis and communication of results
Education	<ul style="list-style-type: none"> Ministry of Health provides regular supervision/training for hospital leadership. Hospitals provide staff with training. 	<ul style="list-style-type: none"> Lack of training at highest and lowest levels of surveillance system. No integrated training of all leadership.
Action	<ul style="list-style-type: none"> Measures baseline burden of disease. Provides and records standardized treatment for diarrhea and rotavirus cases. 	<ul style="list-style-type: none"> No plan of action to achieve goals are outlined in the Rotavirus Operational Manual. Fails to give sufficient information for action.
Leadership	<ul style="list-style-type: none"> Leaders within each level of system fulfill responsibilities to the best of their abilities. Motivation and commitment, as most levels of leadership report that rotavirus surveillance is a high priority. 	<ul style="list-style-type: none"> Inadequate management. Lack of communication, coordination, and collaboration within and between all levels of leadership involved in surveillance.

The *Immunization Newsletter* is published every two months, in English, Spanish, and French by the Immunization Unit of the Pan American Health Organization (PAHO), Regional Office for the Americas of the World Health Organization (WHO). The purpose of the *Immunization Newsletter* is to facilitate the exchange of ideas and information concerning immunization programs in the Region, in order to promote greater knowledge of the problems faced and possible solutions to those problems.

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ISSN 1814-6244

Volume XXX, Number 1 • February 2008

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**Pan American
Health
Organization**



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