EPI Newsletter

Expanded Program on Immunization in the Americas

Volume I, Number 1 IMMUNIZE AND PROTECT YOUR CHILD May 1979

Introducing The EPI Newsletter

by Dr. Luis Carlos Ochoa
Chief, Division of Disease
Prevention and Control

This newsletter is the first edition of a periodic publication, created in response to the suggestions and recommendations of more than 130 nationals from all the Latin American countries that participated in the four regional EPI courses held from May 1978 to January 1979. Its purpose is to continue the process begun at these courses, of exchanging skills, knowledge and information relevant to the Expanded Program on Immunization in the Region of the Americas.

The Program was established by Resolution XXVII of the XXV PAHO Directing Council Meeting in September 1977. This resolution consolidates recommendations made by the III Special Meeting of Ministers of Health which convened in Santiago, Chile in 1972, at which it was noted that in extensive areas of the Region, immunization is available to only a small proportion of the children in susceptible age groups.

The resolution calls on Member Countries to expand their immunization programs. PAHO/WHO is requested to collaborate closely with governments in developing their programs in order to:

* undertake training activities;
* make available good quality vaccines and supplies to meet country needs;
* support applied research;
* mobilize funds from extra-budgetary sources;
* establish a revolving fund for the purchase of vaccines and related supplies.

The resolution further recommends that Member Countries formulate specific plans for carrying out immunization activities on a long term basis, within the framework of primary health care and expansion of coverage of health services.

The Program is initially concentrating on six diseases: diphtheria, pertussis, tetanus, measles, poliomyelitis and tuberculosis, seeking to reduce morbidity and mortality from these diseases to a level where they cease to be of public health significance. The goal of the Program is to provide immunization against these diseases to all children by 1990, within the framework of the Alma Ata Declaration of "health for all by the year 2000".

Immunization programs have not been more widely implemented in developing countries because of inadequate application of present knowledge. Although gaps do exist in some technical and operational areas, and RESEARCH will be necessary to answer questions, the most important concern is transferring already available knowledge and skills to national staff through TRAINING.

At the present time, staff at all levels need training in program management, cold chain logistics and supervision skills. This will be a major emphasis of the Program during the period 1979-1983. Training needs and methods will be checked and revised as new information and technology become available. Additional training will permit improved planning of programs and an expansion of OPERATIONS.

Program EVALUATION will also assume increased importance as operations expand. It will provide guidelines for future planning, and identify areas requiring additional operational research.

This newsletter is intended to create a flow of information in the Region about these facets of EPI. All aspects of program implementation, from scientific articles on the target diseases and vaccination to practical matters on the day-to-day running of an immunization program, will be covered.

New procedures, techniques and practices are constantly being developed in the various disciplines that are involved with the implementation of the Expanded Program on Immunization. As yet there are no universal answers to many of the problems encountered by field staff.

Contents

Solutions being applied in some countries, to solve problems related to the cold chain or community participation, for example, may not be applicable elsewhere.

The EPI Newsletter will serve as a means to distribute these ideas so that program workers at all levels can learn from the experiences of others. It is not the purpose of this newsletter merely to disburse information, but rather to act as a regional forum for the suggestion of new ideas and strategies and their discussion among readers.

Attaining this objective, however, will require a flow of information not only from PASB to Member Countries, but also from Member Countries to PASB and, thus, between the Member Countries themselves. Contributions from readers will be essential to enrich the EPI Newsletter in issues to come.

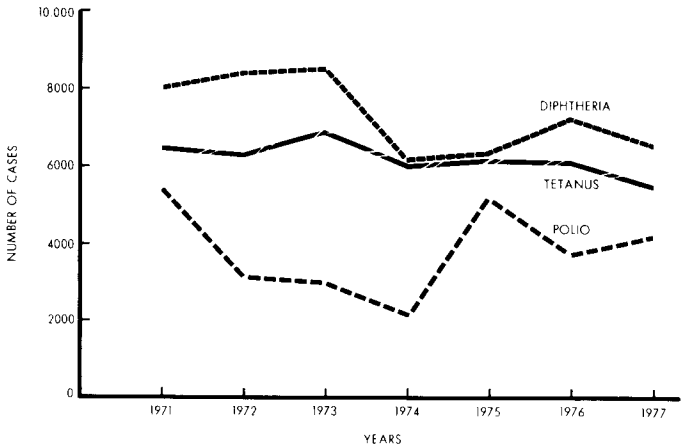
Epidemiology

Between 350,000 and 400,000 cases of diseases preventable by vaccination (measles, pertussis, diphtheria, tetanus and poliomyelitis) are reported annually in the Region of the Americas.

In a period of seven years (1971-1977), 28 countries of the Region reported to PASB an annual average of 258,634 cases of measles, 123,498 cases of pertussis, 7,317 cases of diphtheria, 6,201 cases of tetanus and 3,808 cases of poliomyelitis. Graphs Nos. 1 and 2 show the number of cases reported, by year, for the five diseases.

If one considers that these cases represent only a part of the cases actually occurring, it is possible to have an idea of the importance of these diseases in terms of morbidity, especially for the infant population, which is at greatest risk.

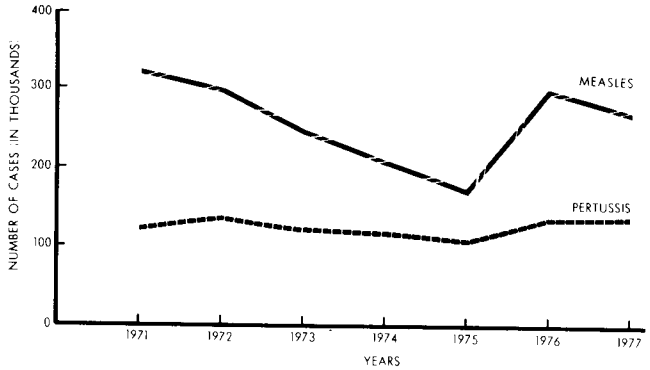
GRAPH No.1 REPORTED CASES OF DIPHTHERIA, TETANUS AND POLIO IN THE AMERICAS*, 1971-1977**



*28 Countries data not available for Suriname

** Provisional data for 1977

GRAPH No. 2 REPORTED CASES OF MEASLES AND PERTUSSIS IN THE AMERICAS*, 1971-1977**



* 28 Countries data not available for Suriname

** Provisional data for 1977

Research: Measles Vaccination

Vaccinating a child is a time-consuming and costly process. With so much effort and cost going into each vaccination, it is most important that the vaccinations given be as effective as possible in terms of greatest protection for the child. Scientific discussion has arisen as to the best time to give measles vaccine, presently the most expensive of the EPI vaccines, to protect the child at the earliest possible age, yet after the protection and interference of maternal antibodies has ended.

Maternal antibodies against measles are transmitted through the placenta. These antibodies provide infants with some protection against measles in the first several months of life and also interfere with production of measles antibody following vaccination in very young infants.

Several recent studies in the United States have revealed that these maternal antibodies may persist in infants and interfere with the infant's response to measles vaccine even beyond the 12th month of extrauterine life. Up to 22% of infants in these studies failed to develop antibodies to measles when vaccinated at 12 months of age. Children vaccinated at or after 14 months of life had seropositivity rates or seroconversion rates of at least 93%. Since measles infection is unusual in the first year of life in U.S.A. children, the recommended age for routine administration of measles vaccine has recently been changed to 15 months.

However, in many other countries, 30% or more of the children will have already developed measles by 12 months of age. The highest incidence of death due to measles occurs in the first two years of life, and measles case fatality rates in excess of 10% have been noted in children under 12 months of age, especially in areas with a high prevalence of malnutrition. Therefore, delay of measles vaccination until after 12 months of age would allow a significant percentage of the morbidity and mortality due to measles to continue in these countries. A recent study in Kenya revealed that 92% of infants beyond 7 1/2 months of age did not have detectable hemagglutination-inhibition (HI) antibodies to measles, and over 90% seroconverted after administration of measles vaccine. In separate studies in Rhodesia and South Africa, 97% of

children seroconverted to measles vaccine at 9 months of age. The age incidence of clinical measles in Latin America is reported to be similar to that found in African countries.

The vaccines used in the U.S.A. and African countries were all further attenuated measles vaccines. Why children from African and Latin American countries become susceptible to measles and respond to measles vaccination at younger ages than do children from the United States is not known. The level of maternal antibody has been shown to correlate with the level of measles antibody in cord blood, and infants whose mothers had lower levels of measles antibody seroconverted to measles vaccine at younger ages. Infants born prematurely have been shown to seroconvert to measles vaccine at younger ages than term infants, presumably because they receive less maternal antibody before birth. Other as yet undetermined factors probably influence the rate at which children lose maternal antibody and become susceptible to measles or responsive to measles vaccine. Race, anemia and underlying nutritional status may be some of these factors, but have not yet been evaluated in this regard. It is important to identify the factors influencing the persistence of maternal antibody so that every country does not have to carry out an independent study to determine the earliest age at which measles vaccine can be effectively administered.

Measles vaccine is expensive. In order to gain the maximum benefit from this investment, children should be vaccinated as soon as possible after maternal antibody will no longer interfere with the antibody response following vaccination, but before the children have had an opportunity to develop measles. Therefore, the final decision as to the optimal age of vaccination is also dependent on the morbidity and mortality caused by measles in the first year of life in a particular geographic area.

With the primary objective of determining the immunological effectiveness of administering measles vaccine to children between six and twelve months of age in Latin America, investigators in four countries -- Brazil, Chile, Costa Rica and Ecuador -- are conducting an Inter-American study with the cooperation of PAHO/WHO. Results of this study are expected by the end of 1979. The information obtained, together with data from epidemiological surveillance of measles, will permit determination of the optimum age for measles vaccination in the Region of the Americas.

EPI Revolving Fund

The EPI Revolving Fund for the purchase of vaccines is off to a successful start. During the first quarter, more than 85 shipments of vaccines valued at over $400,000 were made to 15 countries and territories in the Region. Orders for the second quarter have already been placed, with deliveries scheduled for prior to 30 June 1979.

The EPI Revolving Fund was authorized by the XX Panamerican Sanitary Conference, with an initial capitalization of US$1.000.000. All PAHO member countries are eligible to participate in the Fund provided they meet the five criteria set forth in paragraphs 3.1.1 to 3.1.5 of the Outline of Operating Procedures. These criteria include the appointment of a National Program Manager with the authority to develop and implement the program, and the establishment of adequately functioning vaccine cold storage facilities.

The 19 countries and territories which have elected to participate in the EPI Revolving Fund as of May 1979 are shown on map No. 1.

Map No. 1 Countries and Territories participating in the EPI Revolving Fund for the purchase of Vaccines, 1979

Annual contracts for 1979 were awarded by PAHO in December 1978 based on sealed bids submitted by suppliers from the world-wide market. Awards were made on the basis of low price to suppliers able to meet WHO quality standards, taking into consideration transportation costs.

Most vaccines ordered through the Fund have been delivered on or ahead of schedule. In some cases vaccine deliveries were expedited to meet emergencies or special requests. For example, 265,000 doses of polio vaccine were sent to Bolivia to help fight a polio epidemic, and 80,000 doses of measles vaccine were shipped to Peru in time for a special vaccination campaign. This rapid handling of urgent orders was aided by PAHO's contractual relationship with the various suppliers.

Since the value of second quarter orders will be greater than the first, the total value of orders placed in only the first two quarters will closely approach the Fund's present capitalization of $1,000,000. It is imperative, therefore, that countries reimburse the Fund as soon as possible after receipt of the PAHO invoice. Time-

ly reimbursement will ensure availability of funds for third quarter orders. According to the procedures for the utilization of the Fund, participating countries must deposit funds to PAHO's account within two months of receiving the invoice. Payment can be made in local currency. Special attention to reimbursement must continue until additional funding is found to increase the original capitalization.

Because of the limited capitalization of the Fund, the present policy is to concentrate its use on the six EPI target diseases. Accordingly, during the second quarter, the Fund will be used only for the five EPI vaccines: BCG, measles, polio, DPT and TT. In the first quarter a few exceptions were made to this policy, and some non-EPI vaccines were purchased through the Fund. However, it will not be possible to make similar exceptions in future quarters.

A summary of the vaccine purchases made in the first quarter is shown on the following chart.

EPI REVOLVING FUND FOR THE PURCHASE OF VACCINES

Vaccine orders placed (in thousands of doses) by participating countries and territories for first quarter 1979 (provisional data)

COUNTRY	BCG	MEASLES	POLIO	DPT	TT
ARGENTINA		NO FIRST QUARTER REQUIREMENTS			
ANGUILLA	--	--	2.0	2.0	0.6
ANTIGUA	0.2	--	6.0	6.0	10.0
BAHAMAS (a)	7.0	8.0	26.3	34.2	5.3
BARBADOS	2.5	2.0	5.0	4.5	6.2
BELIZE (a)	14.0	--	--	--	60.0
BOLIVIA	--	20.0	265.0	--	--
CAYMAN ISLANDS	1.0	1.6	1.2	1.2	1.6
COLOMBIA	250.0	500.0	1,500.0	1,500.0	--
DOMINICA		NO FIRST QUARTER REQUIREMENTS			
DOMINICAN REP.	70.0	50.0	200.0	200.0	100.0
ECUADOR		NO FIRST QUARTER REQUIREMENTS			
GUYANA (b)	--	--	155.8	176.1	11.4
HAITI (c)	75.0	--	--	125.0	112.5
PANAMA	60.0	20.0	--	--	--
PERU	750.0	250.0	1,000.0	250.0	--
ST. VINCENT	11.2	9.7	19.8	29.1	11.1
TURKS & CAICOS ISL.	0.4	0.3	0.4	0.8	0.4
URUGUAY		NO FIRST QUARTER REQUIREMENTS			
TOTAL DOSES:	1,241.3	861.6	3,181.5	2,328.9	319.1
COST (excluding shipping)	$ 53,211	$ 187,024	$ 63,223	$ 80,645	$ 4,467

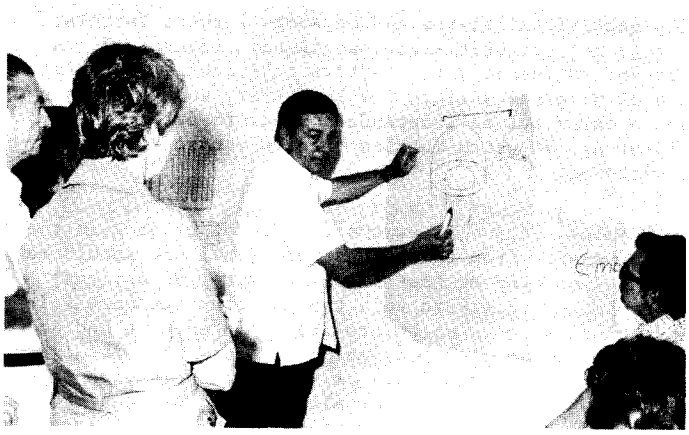
TOTAL COST OF EPI VACCINES:	$ 388,571
COST OF OTHER VACCINES:	$ 24,641
ESTIMATED SHIPPING COSTS PLUS 3% SERVICE CHARGE:	$ 62,000
TOTAL OF VACCINES PLUS SHIPPING:	$ 475,212

(a) Order for all 1979 placed to save on shipping costs.
(b) Order for first six months of 1979 placed to save on shipping costs.
(c) Requisition placed on form EPI-RF-1, but country allotment number given so purchase not charged to Revolving Fund.

Training Activities

During the first phase of regional training activities, completed in January 1979, 132 health officials from 20 countries and territories of the Americas have attended regional courses on the Expanded Program on Immunization. Included under this phase were two courses in the planning, management and evaluation of EPI, held in San Jose, Costa Rica (July 1978) and Lima, Peru (January 1979), as well as two courses in cold chain logistics and management, held in Quito, Ecuador (May 1978) and San Jose, Costa Rica (July 1978). Map No. 2 shows the countries which had participated in regional and national training courses as of 30 April 1979.

The main purpose of the first phase training was to encourage countries to place a high priority on immunization programs, by exposing senior public health officials to the benefits of expanding immunization coverage and giving them the conceptual tools to evaluate and improve their country programs. All participants in the courses have national-level responsibilities for activities related to immunization programs, such as maternal and child health, epidemiology and the storage and distribution of vaccines.



A group of participants in the II EPI Regional Course, held in Lima, Peru in January 1979, observes Mr. Alberto Uribe, PAHO Technical Officer for EPI, demonstrating the construction of a vaccine carrier utilizing local materials.

The material developed for these courses is divided into self-instruction modules covering the principal components of an immunization program: identification of the vaccine-preventable diseases, vaccine administration, the cold chain, programming and epidemiological surveillance. Participants are assigned to groups of eight to ten persons, with one or two monitors with wide experience in the field. These small workshops allow participants to learn by exchanging ideas and experiences among themselves and confronting actual problems in the field, rather than the traditional lecture-type approach.

In the evaluation of the regional course in Lima, both participants and monitors strongly endorsed the materials and methodology used, while providing many useful suggestions for improving future courses. In cooperation with the Latin American Center of Educational Technology for Health (CLATES), these modifications are now being incorporated into courses being developed for training lower-level health workers. The revised materials were given a first trial in Peru and Honduras in February 1979, and reruns of the courses are tentatively scheduled for Bolivia in June 1979, and Colombia and Nicaragua in July 1979.

These courses will continue to evolve as new program experience is acquired, and it is hoped that the direct participation by health officials at all levels will give new impetus to immunization programs in the Region.

Map No. 2 Countries participating in EPI Regional and National Training Courses (as of 30 April 1979)

The Cold Chain

The cold chain is a vital link in any immunization program. The most organized field program, reaching a high percentage of the target population, is all for naught if the vaccine is not potent due to improper refrigeration somewhere along the chain from manufacturer to vaccinee.

In the field of cold chain equipment, PAHO/WHO has encouraged research and development of new types of refrigerators and vaccine carriers applicable to immunization programs in the Region. Research is proceding on a prototype of a 30-liter capacity refrigerator for health center use, designed for production in various countries in the Region. A portable vaccine carrier developed in conjunction with PAHO/WHO, which is capable of maintaining vaccines for up to 48 hours after they are taken out of the refrigerator, is already being used in several countries.

A 22.5-liter capacity refrigerator, manufactured in Latin America especially for vaccines, has been sent to Consumers Association Laboratories in the United Kingdom for independent testing under PAHO/WHO auspices as part of a second phase of tests.

The first phase testing of cold chain apparatus was completed at Harpendon Rise Laboratory by the Consumers Association in November 1978. Further testing under the second phase began 1 February 1979. Some of the main points mentioned in the "Summary of Progress on the Cold Chain Equipment Testing Project, Consumers Association, U.K." report prepared by EPI, Geneva, on 18 January 1979, were as follows:

" - Performance results on electric freezers adapted to vaccine refrigerators are sufficiently encouraging to move towards a production phase.

- Performance results on a kerosene top-opening refrigerator/freezer are sufficiently encouraging to test a conversion to multi-fuel sources.

- Front-opening absorption refrigerators cannot be used in average ambient temperatures over approximately 35°C and need constant attention to operate adequately in 32°C.

- Icepacks and temperature-rise alarm systems are under test.

- Insulated containers are still under test."

Further information and the results of the second phase testing will be printed as they become available.

WHO/UNICEF are presently preparing specifications for the conversion of domestic, top-opening chest freezers into vaccine refrigerators designed for operation under conditions of poor electricity supply. Two advantages of the chest-type freezer are: 1) they require less energy to keep the vaccine between 4 and 8°C because heat extraction is more efficient than in a refrigerator, and 2) opening at the top, rather than sides, saves energy since less cold air escapes each time the door is opened.

When completed, the specifications will be sent, along with a letter explaining the importance of the project, to a selection of manufacturers of chest freezers.

WHO/UNICEF has also designed an ice lining for use with the converted chest freezer. The ice lining, fitted around the sides of the chest freezer cabinet, will be frozen during times of freezer operation and can then maintain temperatures of 4-8°C without further energy input. It was found that test freezers, fitted with this ice lining, required only 8 hours of electricity a day to maintain adequate storage temperatures.

Cold Chain Product Information Sheets, giving specifications and prices of equipment available on the world market, are prepared periodically by UNICEF and WHO, and may be obtained on request to the editor. Information Sheets relevant to the Americas will be reprinted in subsequent editions of the Newsletter.

The cold chain refers not only to equipment, but also to the people and procedures that move and monitor the vaccine. If a refrigerator runs out of kerosene and the rise in temperature is not detected because of a worker's error, the resulting loss of vaccine is just as serious as if the equipment had failed. The techniques for training, stimulating and supervising workers involved at all levels of the cold chain are just as important as choosing the right type of equipment.

In the future, this section will serve as a "clearing house" for new ideas and innovations in cold chain techniques and equipment. Information on new research and developments will be printed, as well as the experiences of field staff who work with the cold chain. Comments on any aspect of the cold chain are welcomed and should be sent to the editor for publication and discussion among our readers.

Newsbriefs

* AGREEMENT FOR TECHNICAL COOPERATION ON EPI: Colombia and PAHO

The first Technical Cooperation Agreement for the promotion of the Expanded Program on Immunization in the Region of the Americas was signed by the Government of Colombia and PAHO in April 1979. Under this Agreement, the Government will contribute the sum of $1,000,000 (one million Colombian pesos) to cover the costs of promoting EPI in Colombia. PAHO will cooperate in administrating expenditures resulting from use of the communications media for promotion of the Program, as indicated by the Government, up to the total of the funds assigned.

* PERU: Manual of Operations

The Ministry of Health of Peru has just published a national Manual of Operations for the Expanded Program on Immunization. The manual, printed in April 1979, covers all aspects of EPI as they relate to Peru, with chapters on the six target diseases, vaccines, the cold chain, programming, evaluation and recording. It will provide a ready source of reference for Peruvian health workers dealing with EPI.

The Manual of Operations was prepared as a follow-up of the regional and national EPI courses which were held in Peru in January and February 1979. This manual is the second one to be published by a Member Country after Resolution XXVII of the XXV Directing Council established the EPI in the Americas in 1977. The Ministry of Health of Ecuador published an EPI Manual in late 1977.

* 1980 VACCINE ORDERS: EPI Revolving Fund

Requests for bids for the purchase of vaccines for 1980 will be made by the PAHO Purchasing Office in August 1979. In order to plan for next year, Purchase Authorizations (Form PAHO 173) have been sent out, through the PAHO Country Representatives, to all countries and territories in the Region so that they can request their 1980 requirements for DPT, polio, measles, BCG and TT vaccines through the Revolving Fund. All countries that wish to purchase these vaccines through the Fund must submit their completed Form PAHO 173 to PAHO, through the Country Representative, by 31 July 1979. Vaccine requirements must be compiled by that date so that PAHO can advise suppliers of the total quantity to be ordered when bids for 1980 are requested.

* BCG VACCINE: Storage Temperature

High quality freeze-dried vaccines, such as those purchased through the EPI Revolving Fund or supplied by UNICEF (Glaxo, Tokyo, Dakar), have a shelf-life of one year from the date of despatch from the manufacturing laboratory, provided they are kept refrigerated at 4-8°C. At room temperature the shelf-life is 30 days. This is an important practical advantage since the vaccine can be transported without refrigeration, that is, there is no necessity for an uninterrupted "cold chain".

However it should be emphasized that, insofar as possible, the vaccine should be kept under refrigeration during transportation, using the same methods and procedures as followed for transporting other EPI vaccines. The effects of heat on the vaccine during transporation and storage are cumulative. Often the temperature in the refrigerators of outlying health centers varies between 2 and 14°C. For this reason, it is also advisable to keep the storage time in outlying health posts to a strict minimum. The less the product is exposed to heat during its distribution from laboratory to the field, the greater is its tolerance to possible failures at the peripheral level.

Once the freeze-dried vaccine is reconstituted to the liquid form, it should be used only during that work day, after which the unused portion of the vaccine is discarded. Under no circumstances should the leftover vaccine be kept in the refrigerator to be used the following day.

Additional information on the use of BCG vaccine in country programs can be found in Technical Document WHO/TB/75.101, published in 1975 by the WHO Tuberculosis Unit in Geneva.

EPI National Program Managers

The following table lists the national officials responsible for EPI in each country of the Region, as well as the countries participating in the EPI Revolving Fund as of 31 May 1979. Readers are requested to advise the editor of any changes to this list.

COUNTRY	PARTICIPANT IN EPI REVOLVING FUND	EPI NATIONAL PROGRAM MANAGER
ARGENTINA	+	DR. RUBEN SMUD
BAHAMAS	+	DR. C. DAVIS
BARBADOS	+	DR. A.V. WELLS
BOLIVIA	+	DR. JOSE LUIS ZEBALLOS
BRAZIL	-	DR. FERNANDO GOMES
CANADA	-	DR. J.W. DAVIES
CHILE	-	DR. JOSE MANUEL BORGOÑO
COLOMBIA	+	DR. WILFREDO DAVILA
COSTA RICA	-	DR. EMILIA DE LEON COTO
CUBA	-	DR. JOSEFA FNDZ. TORRES
DOMINICA	+	MS. OLIVIA WILLIAMS
DOMINICAN REP.	+	DR. APOLINAR DIAZ ALVAREZ
ECUADOR	+	DR. MAGDALENA VANONI
EL SALVADOR	+	DR. EDUARDO NAVARRO RIVAS
GRENADA	+	MS. CYNTHIA TELESFORD
GUATEMALA	+	DR. OTTO ZEISSIG
GUYANA	+	MS. E. DOUGLAS
HAITI	+	DR. L. JASMIN
HONDURAS	+	DR. ALBERTO GUZMAN
JAMAICA	-	DR. ALMA DYER
MEXICO	+	DR. AUGUSTO FUJIGAKI L.
NICARAGUA	-	...
PANAMA	+	DR. CARLOS BRANDARIZ
PARAGUAY	+	DR. FIDEL MORENO GONZALES
PERU	+	DR. CARLOS QUEIROLO M.
SURINAME	-	DR. A. DE ROOY
TRINIDAD & TOBAGO	-	DR. RODERICK DOUGDEEN
URUGUAY	+	DR. LEONEL PEREZ MOREIRA
U.S.A.	-	DR. ALAN HINMAN
VENEZUELA	-	DR. JESUS LUQUE HERNANDEZ

VACCINATION SCHEDULES IN PAHO MEMBER COUNTRIES

The following table is based on information gathered from the latest available PAHO/WHO Form C Vaccination Questionnaires submitted by PAHO Member Countries. Please notify the editor of any additions, changes or corrections to your country's vaccination schedule.

COUNTRY	Year of latest available data	DPT					POLIOMYELITIS					MEASLES				BCG			
		No. of doses	Age at 1st dose: Minimum	Age at 1st dose: Maximum	Interval for subs. doses	Booster given? (interval)	No. of doses	Age at 1st dose: Minimum	Age at 1st dose: Maximum	Interval for subs. doses	Booster given? (interval)	No. of doses	Age at 1st dose: Minimum	Age at 1st dose: Maximum	Booster given? (interval)	No. of doses	Age at 1st dose: Minimum	Age at 1st dose: Maximum	Booster given? (interval)
ARGENTINA	78	3	2m	4y	4w	yes (18m)	3	2m	6y	4-8w	yes (18m)	2	9m	...	yes (6m)	1	1m	...	yes (6-16y)
BAHAMAS	77	3*	3m	5y	4-6w	yes (12m)	3*	3m	...	4-6w	yes (5y)	1*	1y	...	....	1*	NB	...	...
BARBADOS	76	3*	3m	...	6w	yes (18m)	3*	3m	...	6w	yes (18m)	...	...	...	...	1	5y	...	yes (a)
BOLIVIA	75	2*	3m	4y	8w	yes (12m)	2*	3m	4y	8w	yes (12m)	1*	1y	4y	...	1*	NB	15y	yes (a)
BRAZIL	77	2*	2m	4y	4-8w	yes (12m)	3*	2m	4y	8w	yes (12m)	1*	7m	3y	no	1*	NB	14y	yes (a)
CANADA	76	3	2m	...	6-8w	yes (12m)	3	2m	...	6-8w	yes (12m)	1	1y	...	(b)	...	...	...	...
CHILE	76	3*	2m	...	1m # 2m	yes (4y)	3	NB	...	2m # 13m	yes (4y)	1	8m	...	no	1*	NB	...	yes (a)
COLOMBIA	76	2*	3m	7y	4-6w	yes (4y)	2	2m	...	4-6w	...	1	6m	...	no	1*	NB	13y	no
COSTA RICA	76	3*	2m	4y	6-8w	yes (12m)	3*	2m	6y	...	yes (12m)	1*	1y	14y	(b)	1*	NB	14y	yes (a)
CUBA	78	...	...	...	...	...	2	1m	3y	6-8w	yes (9y)	...	...	...	...	1*	NB	...	yes (5y)
DOMINICA	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
DOMINICAN REP.	75	2	3m	4y	4-6w	yes (12m)	2	2m	4y	6-8w	yes (8m)	1	6m	4y	no	1	NB	14y	no
ECUADOR	78	3*	3m	3y	3m	no	3*	3m	3y	3m	no	1*	9m	3y	no	1*	NB	10y	yes (...)
EL SALVADOR	76	2	2m	5y	8w	yes (8-12m)	2	2m	...	8w	yes (12m)	1	6m	...	(b)	1	NB	...	yes (7-10y)
GRENADA	79	3*	3m	5y	3m	no	3*	3m	5y	3m	no	1*	9m	5y	no	1*	NB	...	...
GUATEMALA	79	3	2m	2y	8w	no	3	2m	2y	8w	no	1	9m	2y	no	1	NB	...	yes (a)
GUYANA	78	3*	3m	5y	4-6w	yes (12m)	3*	3m	5y	4-6w	yes (12m)	...	...	...	...	1*	NB	5y	yes (12y)
HAITI	78	3	3m	6y	4w	yes (12m)	3	3m	...	4-12w	yes (12m)	...	...	...	...	1	NB	14y	yes (6y)
HONDURAS	79	3	2m	2y	6-8w	no	3	2m	2y	6-8w	no	1	9m	2y	no	1	2m	2y	yes (6-12y)
JAMAICA	75	3	3m	...	8w	yes (18m)	3	3m	...	8w	yes (18m)	...	...	...	...	...	NB	...	...
MEXICO	76	3*	2m	6y	4w	yes (12-18m)	3	2m	6y	8w	(c)	1*	9m	18m	no	1*	3m	6y	(d)
NICARAGUA	76	3	3m	6y	4w	yes (12m)	3	3m	5y	6w	yes (12m)	1	9m	6y	...	1	NB	15y	...
PANAMA	77	3	2m	...	4-6w	yes (12m)	3	NB	...	8w	yes (12m)	1	9m	...	no	1	NB	...	yes (7-10y)
PARAGUAY	76	2	3m	5y	4-8w	yes (12m)	2	2m	6y	4-8w	yes (12m)	...	...	...	...	1	NB	7y	yes (5y)
PERU	79	3*	3m	3y	3m	no	3*	3m	3y	3m	no	1*	9m	3y	no	1*	NB	10y	yes (...)
SURINAME	77	3	3m	...	4-6w	yes (6-12m)	3	3m	...	4-6w	yes (6-12m)	1	1y	...	no	...	...	...	...
TRINIDAD & TOBAGO	76	3*	3m	...	6w	yes (6-18m)	3*	3m	...	8w	yes (6m)	...	...	...	...	1	5y	14y	...
U.S.A.	75	3**	6w	...	4w	yes (8m)	3**	6w	...	4w	yes (2y)	1**	1y	...	no	...	...	...	...
URUGUAY	76	3*	3m	...	4w	yes (12m)	2	3m	2y	8w	yes (12m)	1	9m	4y	no	1	NB	...	...
VENEZUELA	76	3	2m	3y	4w	yes (2y)	3	2m	3y	8w	no	...	9m	3y	no	...	NB	36y	yes (5y)

Symbols

* Vaccination compulsory by law
** Vaccination compulsory by law in most states
\# Top number = interval between 1st and 2nd doses; Bottom number = interval between 2nd and 3rd doses.
... Information not available

Abbreviations

w = weeks
m = months
y = years
NB = newborn

Footnotes

(a) BCG booster given at time of school entry.

(b) Measles booster given if child was vaccinated before first birthday.

(c) Polio booster given to children under five years of age during epidemics.

(d) BCG booster given to high risk and PPD negative individuals.

Selected Readings

The following articles on EPI diseases and vaccines have been selected for their possible interest to newsletter readers. Copies of these articles may be obtained, at no cost, upon written request to the editor.

1. "Inmunidad contra el sarampión en binomios madre-hijo". Calderón E, Martín Sosa S, Milovanovic M, et al. Bol Med Hosp Infant, XXXIV:1, 1977.
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4. "Goal: to eliminate measles from the United States". U.S. Public Health Service, Center for Disease Control. MMWR, 27(41), Oct. 1978.
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19. "Antecedentes epidemiológicos del tétanos en Chile, 1970-1975". Vicent P, Venturino H. Bol Of San Pan, 81:414-419, 1976.
20. "The role of cutaneous diphtheria in the acquisition of immunity". Gunatillake PDP, Taylor G. J Hyg Camb, 66:83-88, 1979.
21. "Algunos aspectos de difteria en Minas Gerais y algunas capitales brasileras". Melo SM. Hospital (Rio de J), 69:779-789, 1966.
22. "Estudio bacteriológico de enfermos diftéricos y sus contactos". Villalonga JF, de Nader OR, Masst AG, et al. Rev Lat Am Microbiol, 13:189 193, 1971.
23. "The Construction of Cold Boxes for the Transport of Vaccines". Lloyd, J. Mimeographed Document WHO/EPI/74.

The EPI Newsletter is a periodic publication prepared by the Expanded Program on Immunization (EPI) of the Pan American Health Organization, Regional Office for the Americas of WHO. Its purpose is to create a flow of ideas and information concerning immunization programs in the Region to facilitate a sharing of problems and solutions.

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