EPI Newsletter

Expanded Program on Immunization in the Americas

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Epidemiology

Poliomyelitis: Cuba, 1962-1978

Poliomyelitis was unknown in Cuba until the last century, and the first reported cases date back to the early years of this century.

Before the Revolution, the disease was endemo-epidemic, with great epidemic peaks occurring at intervals of five to seven years, and subsiding epidemic peaks in the intervals in between. The amplitude of these epidemic peaks was observed to be progressively and spontaneously declining.

1958 was the beginning of a progressively rising epidemic curve which then leveled off in an abnormal departure from the historical pattern of the disease.

The first mass oral poliomyelitis vaccination campaign abruptly altered the slowly rising curve of morbidity and mortality from poliomyelitis in May 1962; since then there have been no new epidemic peaks and only six sporadic cases have been notified, one each in 1963, 1964, 1970, 1971, 1972, and 1973.

A total of 18 mass poliomyelitis vaccination campaigns have been conducted; in each of them vaccine administration was preceded by a study of the level of immunity to polioviruses in a sample of the national population aged 30 days to 14 years.

The age of vaccination and the type of vaccine used varied from one campaign to another, according to the results of the preceding serological studies. Since the eighth campaign, the trivalent vaccine has been administered in candy form in two doses to children aged 1 month to 3 years; starting with the ninth campaign, when it was found that this immunization schedule caused a drop in immunity levels at approximately 9 years of age, it was decided to administer an additional booster to children at that age in order to reactivate their immunity.

The success of all the campaigns is evident from the fact that, except for the year 1962, when 98.6 per cent coverage was achieved, in all other campaigns the coverage achieved was more than 100 per cent.

These high rates of coverage achieved (above 110 per cent during the sixties) have been dropping with improvements in campaign organization, basic statistical data, and census accuracy, among other measures. Not since 1973 has the coverage attained been above 110 per cent.

Throughout the years the age group with the lowest percentage of immunized members has been that of infants under 1 year old; the least successful immunization year in this respect was 1976, when only 87.1 per cent of the target was achieved. In all other years more than 80 per cent of the total population studied was vaccinated, which guarantees that an epidemic outbreak will not occur.

In the other age groups vaccinated, the proportion of the target achieved has always exceeded 80 per cent of the estimated total population.

Altogether, 19 nationwide serological studies of antibody levels have been conducted on the basis of samples of not less than 1 per 1,000 inhabitants of the country aged 6 months to 3 years, and of 1 per 2,000 inhabitants aged 6 to 14 years. The results of this sampling are only valid for these age groups nationally.

For all polioviruses and all years generally, the proportion of resistant individuals is rising progressively with age. The highest proportion of resistant individuals was obtained for poliovirus II; the proportion was somewhat lower for poliovirus III, and lowest for poliovirus I, although between the latter two viruses variations are observed among the different age groups.

The average yearly proportion of individuals resistant to the different polioviruses varies from one

Contents

age group to another, being lowest among infants under 1 year of age. The average proportion of resistant individuals rises as the third year of age is approached and in that year levels off at very closely similar figures, which means that, once a given level of immunity has been attained, it is very difficult to raise it.

The levels of immunity obtained from the first vaccination, the three subsequent annual booster vaccinations, and the booster vaccination at 9 years of age, guarantee protective levels of immunity up to 14 years of age.

An extension of the serological survey to persons older than 14 years of age has demonstrated the existence of protective antibody levels against the three polioviruses in more than 90 per cent of these individuals; this finding cannot be generalized, however, because it has only been obtained once.

Source: Dr. Gabriel Toledo Curbelo, Resident Coordinator for Epidemiology, INHEM; M.S.P. Cándido López Parodó, Researcher, Population and Health Department, I.D.S.; and Dr. Josefa Fernández Torres, Chief, National Department of Epidemiology, Ministry of Public Health; in Bol. Epidem., National Institute of Hygiene, Epidemiology and Microbiology, Cuba, Vol.2, No. 6, June 1980.

Measles: United States

For 34 consecutive weeks, fewer than 100 measles cases per week have been reported for the United States. The number reported per week in this period has ranged from 13, an all-time low for any given week, to 88, and has averaged 44 cases per week.

For the first 14 weeks of 1981, a total of 778 cases have been reported. This represents an 80% decrease from the 3,897 cases reported for the same period in 1980 (Table 1).

Table 1

Measles: United States, 11 April 1981.

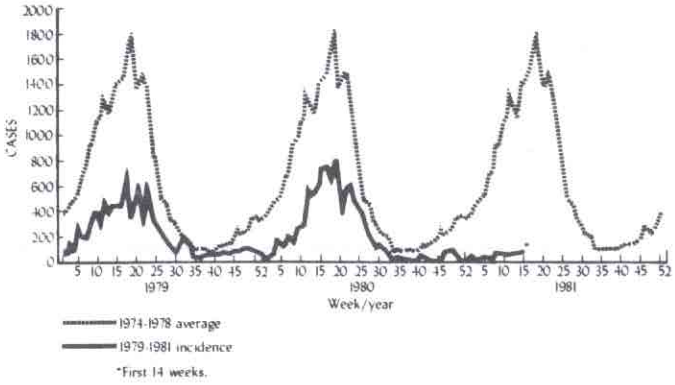
Year	Week 14	Weeks 1-14
1981	82	778
1980	578	3,897
1970	1,976	16,702
1960	19,197	166,930

Reported by Surveillance and Assessment Br. Immunization Div., Center for Prevention Services, Centers for Disease Control, Atlanta, Ga., U.S.A.

Editorial Note: This extended period of low measles activity is unprecedented in the United States. The previous record low period was in 1979 when for 12 consecutive weeks fewer than 100 measles cases per week were reported. If present trends continue, fewer than 3,000 measles cases will be reported in 1981, an average of less than one case per county.

Particularly striking through week 14 of 1981 is the absence of the expected seasonal increase in numbers of reported cases of measles (Figure 1). Thus, the current nationwide Measles Elimination Program appears to have brought about dramatic reductions in measles incidence and to have altered one of the characteristic features of the epidemiology of measles in the United States.

Figure 1. Measles incidence, United States, 1979-1981, and 1974-1978 average.



Source: Morbidity and Mortality Weekly Report 30(15): 182-183, 24 April 1981.

Measles: Costa Rica, 1980

Following the 1979 outbreak of measles in Costa Rica (see EPI Bulletin, Vol. III, No. 1, p. 5), the incidence of measles dropped to endemic levels. However the Atlantic region, one of those least affected during 1979, with 143 cases per 100,000 inhabitants, was the scene of an outbreak in 1980 in the area of Guácimo and Pococí; these two cantons reported a combined total of more than 200 cases, or 20 per cent of the national total, for a rate of 445 per 100,000 inhabitants.

Table 1 presents data on the different regions and the rates per 100,000 inhabitants.

Table 1

Reported cases of measles and rates per 100,000 inhabitants, by region. Costa Rica, 1980.

Region	No. of cases	Rate/100,000 inhab.
Central	298	40.0
Huetar Norte	135	26.8
Chorotega	86	27.2
Huetar Atlántica	325	90.3
Brunca	128	63.7
Total	972	45.7

The pattern of age distribution is the same in all regions, as shown in Table 2.

Table 2

Reported cases of measles, by region and age group. Costa Rica, 1980.

Region	Age Group					
	< 1 year	1 year	2-4 years	> 4 years	Unknown	Total
Central	100	44	47	99	99	298
Huetar Norte	37	24	24	50	-	135
Chorotega	22	19	14	27	4	86
Huetar Atl.	66	68	89	94	8	325
Brunca	27	25	19	57	-	128
Total	252	180	193	327	20	972

As can be seen in Table 3, the frequency is still highest among infants under 1 year of age. Since there are no cases in infants under 6 months, the specific rate is double.

Table 3

Number of measles cases by age group, and specific rate per 1,000 inhabitants. Costa Rica, 1980.

Age Group	No. of cases	Specific rate/1,000
< 1 year	252	3.6
1 year	180	2.8
2-4 years	193	1.6
> 4 years	327	0.2

The norm for measles immunization in Costa Rica is to vaccinate children against measles at 6 months of age and to administer another dose against measles-rubella one year later.

Source: Semana Epidemiológica, Epidemiological Division, Ministry of Health, Costa Rica, Vol. 9, No. 5, 31 January 1981.

PAHO forms for quarterly vaccination reports

In April 1980 all PAHO Member Countries received new Quarterly Report Forms (AD-SSC/002-0/AMR/0170) which they were requested to complete and return to PAHO in order to ensure the systematic collection of uniform data on the number of vaccinations administered to different age groups. The form is used to report the number of doses of DPT, measles, polio and BCG vaccines administered to four different age groups, as well as the number of doses of tetanus toxoid given to pregnant women.

This information is important in order to measure the achievements of the countries in the Region with regard to vaccination coverage, particularly with respect to the goals for coverage of children under one year of age and pregnant women.

As of April 1981, thirteen countries have submitted their Quarterly Report Forms for all four quarters of 1980: Barbados, Belize, Bolivia, Brazil, Chile, Ecuador, El Salvador, Guatemala, Honduras, Suriname, Trinidad and Tobago, Venezuela and Uruguay. Five countries and territories have submitted their forms for the first three quarters of 1980: Argentina, Bahamas, Colombia, Cuba, and Paraguay. Finally, the following countries have not yet submitted any Quarterly Report Forms for 1980: Canada, Dominican Republic, Grenada, Jamaica, Mexico, and Peru.

Table 1 gives a complete breakdown of the quarters for which these statistics have been submitted from each country.

Table 1

1980 Quarterly Report Forms received from PAHO Member Countries

Country	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Argentina	X	X	X	
Bahamas	X	X	X	
Barbados	X	X	X	X
Belize	X	X	X	X
Bolivia	X	X	X	X
Brazil	X	X	X	X
Canada				
Chile	X	X	X	X
Colombia	X	X	X	
Costa Rica	X			
Cuba	X	X	X	
Dominican Republic				
Ecuador	X	X	X	X
El Salvador	X	X	X	X
Grenada				
Guatemala	X	X	X	X
Guyana	X	X		
Haiti			X	
Honduras	X	X	X	X
Jamaica				
Mexico				
Nicaragua	X	X		
Panama	X			
Paraguay	X	X	X	
Peru				
Suriname	X	X	X	X
Trinidad and Tobago	X	X	X	X
United States	X			
Uruguay	X	X	X	X
Venezuela	X	X	X	X
Total Number of Countries = 30	23	20	19	13

Countries are encouraged to submit these forms on a routine and timely basis as this information provides a good indication of the progress of national immunization activities. The availability of these figures at the national and international levels is vital in order to monitor progress towards the goal of complete coverage of the target groups with the EPI vaccines.

Epidemic outbreak of measles in three central provinces of Chile

Vaccination against measles has been systematically practiced in Chile since 1964. Nationwide coverage has been satisfactory, reaching 81 per cent of infants. Vaccination is indicated at the age of eight months, and is confined to a single dose.

Mortality has declined remarkably, from 3,264 deaths when the program was launched (a rate of 38.6 per 100.000), to only five deaths in 1977 and 55 in 1978. However, morbidity and mortality took a sudden upturn in 1978 and rose steeply through 1979 (See Table 1), during which year the number of deaths tripled to a total of 154. These deaths were associated with an epidemic that struck with varying intensity in different parts of the country and was of considerable magnitude in the Maule region, which consists of the provinces of Talca, Curicó and Linares, with mainly rural populations.

Table 1

Morbidity from measles. Number of cases and rates per 100,000 inhabitants.
Chile, VII Region and its provinces, 1977-1979.

Year	Country	Rate	VII Region	Rate
1977	1,062	10.0	25	4.1
1978	15,381	141.7	609	86.1
1979	34,573	316.7	3,403	558.3

Year	Curicó	Rate	Talca	Rate	Linares	Rate
1977	7	4.0	7	2.4	11	4.6
1978	331	187.3	233	80.4	45	18.7
1979	777	443.1	1,005	351.8	1,621	679.9

The epidemic outbreak began in the second half of 1978 and continued through 1979, reaching its severest intensity in the second half of that year. The highest number of cases was 1,196 (a rate of 1,338.2) which was recorded in an area of Linares-Maule Province (the communes of Parral, Cauquenes and Chanco, with a total population of 89.777), the smallest in the region.

In regard to age distribution, 10.9 per cent of the cases were infants under 1 year and 10.1 per cent were children 1 to 2 years old. The 2-5 year age group accounted for 26 per cent of the cases, giving an average distribution per age cohort of 8.5%; the 6-14 year age group accounted for 39 per cent, giving an average of 4.9 per cent per age cohort.

The most frequent complications were bronchopneumonia, laryngotracheitis, tracheitis and other lesser conditions. Of the total number of patients reported, 39.3 per cent required hospitalization in Curicó, 19.2 per cent in Talca, and 22.6 per cent in Linares-Cauquenes. There were no deaths.

It is interesting to note that a sizable proportion of the children who fell ill had previously been vaccinated, as shown in Table 2.

Table 2

Number of measles cases, according to vaccination history, Region VII.

Vaccination history	Curicó		Talca		Linares		Cauquenes	
	No.	%	No.	%	No.	%	No.	%
Vaccinated	53	54.0	197	63.4	...		135	33.5
Not vaccinated	32	32.9	32	10.6	...		110	27.3
Unknown	12	10.3	80	25.9	...		158	39.2
Total	97	100.0	309	99.9			403	100.0

... Data not available

To appreciate the true significance of these figures, cohorts must be studied on the basis of their age and year of vaccination.

This apparent partial failure of the vaccination programs should be analyzed in relation to the following possible factors:

a) Low levels of vaccination coverage in previous years, which placed sizable populations at risk and increased the number of susceptible individuals from year to year. (See Table 3.)

b) Defective preservation of the vaccine, particularly in regard to refrigeration during shipment and subsequent storage.

c) Defective vaccination technique (use of alcohol, inaccurate dosages, etc.).

d) Deficient immune response in the individual.

Table 3

Measles vaccination coverage, by year.
Region VII, 1969-1979.

Year	8-11 months		
	Number scheduled	Number administered	%
1969	27,695	20,117	72.6
1970	15,555	10,471	67.3
1971	16,545	10,577	63.9
1972	15,620	8,099	51.9
1973	15,820	8,577	54.2
1974	16,138	13,629	84.5
1975	14,350	12,864	89.6
1976	14,264	12,758	89.4
1977	14,360	14,436	100.5
1978	14,912	14,686	98.5
1979	14,278	15,061	105.5

This situation, which coincides with an epidemic increase in the incidence of measles throughout the country during 1978 and 1979, has prompted the authorities to review carefully all the stages of the cold chain; they have requested additional resources and are subjecting vaccines to an on-going potency control.

Source: Dr. Jorge Toro A., Ministry of Health, and Mrs. María Machuca R., Regional Nurse, Region VII; in Boletín de Vigilancia Epidemiológica, Ministry of Health, Republic of Chile, Vol. VII, No. 7-8, July-August 1980.

The Cold Chain

Accuracy of the WHO/EPI liquid crystal thermometer tape: Summary report

The WHO/EPI thermometer pictured in Figure 1 was developed for use in health center refrigerators in order to provide an accurate measurement of the temperatures at which vaccines are stored. (See EPI Newsletter Vol. II, No. 3, June 1980.)

Tests have been conducted at the CSIRO laboratories in Tasmania, Australia, to check the accuracy, ease of interpretation and resistance to extreme storage temperatures of this refrigerator thermometer.

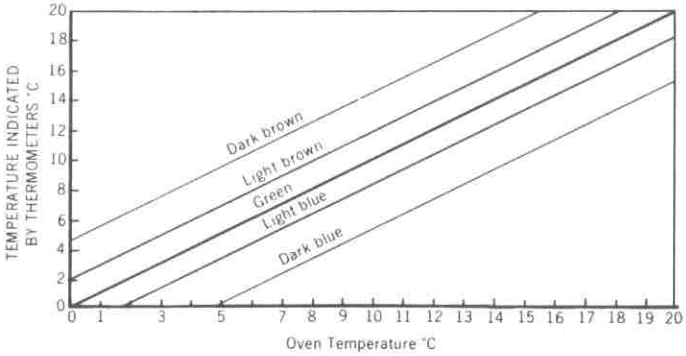
Figure 1

The WHO/EPI thermometer

The appearance of a green color in the spot identified as a certain temperature is accurate to within ±0.5°C. Moreover, the color change is linear with respect to temperature over the whole temperature range (regression coefficient on green color 0.997).

Figure 2 demonstrates that, in order to interpret the thermometer to within 1°C accuracy, the green spot next to the blue one must be selected. If these two colors are not considered, interpretation is still within 2°C, which is sufficiently accurate for vaccine storage purposes.

Figure 2. Agreement of Measured and Actual Temperature (Results of Least Squares Regression Analysis)



The thermometers were exposed to -30°C and +43°C for one week with no effect on the response characteristics. Lifetime is known to be longer than three years in a refrigerator and could be very much longer. Exposure to direct sunlight does not have an immediate harmful effect, but should be avoided.

(Purchasing information can be found in the FPI Product Information Sheets, Ref: SUPDIR 55 AMT. 2, Product No. E6/11.)

Source: WHO Document EPI/CC/THER, 21 October 1980.

Kerosene for vaccine refrigerators in developing countries

It has been suggested that a major cause of poor performance of kerosene powered refrigerators in developing countries may be low grade and pollution of kerosene fuels.

In order to test this hypothesis, WHO requested that samples of kerosene from three countries in Africa and one in the Middle East be tested. One reference fuel was also analyzed in order to provide a basis for comparison. The fuel samples were tested for the parameters listed below, in accordance with the specifications of British Standard BS2869.

1. Smoke point
2. Flash point
3. Sulphur content
4. Copper strip corrosion
5. Water content
6. Sediment presence
7. Flock test
8. Distillation recovery +200°C.

The specification particularly stipulates a "smoke point" which is of vital importance to the performance of kerosene refrigerators. The smoke point is defined as the maximum height of the flame, in millimeters, at which kerosene will burn without smoking under the test conditions. In other words, the higher the smoke point, the cleaner the flame will burn and the flame height can be increased to obtain more heat without the risk of smoking and sooting the chimney.

All samples showed very low smoke points, and in some cases relatively high sulphur contents were recorded. The consequences of this for the kerosene burner in a refrigerator are:

- accelerated deterioration of the wick;
- a crust forms on the wick surface which prevents proper burning;
- soot forms inside the chimney or flue, reducing the cooling power of the refrigerator.

Although some sediment was observed in the fuel during the distillation tests, no evidence was found of other contamination, such as diesel oil.

The main conclusions

None of the kerosene fuel samples submitted by the four countries were of a sufficient quality to operate a kerosene refrigerator. Most samples were industrial low grade fuel and some were even below this grade.

The results to date suggest that contamination of the fuel during distribution is not a significant cause of poor burning, although some evidence for this was found.

Actions to be taken

It is of the utmost importance that the best available quality of kerosene is purchased for use in vaccine refrigerators. However, recognizing that best quality kerosene may continue not to be available, WHO has initiated the following actions:

- Inquiries will be made with the major oil companies to discover what prospects exist for the user to raise the quality of locally purchased fuel. Consultation will continue with fuel chemistry experts on this problem.

- A special kerosene burner for low grade fuel has been developed but design problems remain which prevent it from being manufactured immediately. Efforts are being made to ensure that this burner is available by the end of 1981.

- A special burner using diesel fuel is being developed that can replace a kerosene burner in cases where fuel supplies are poor.

Tests are continuing, as further samples are provided by other developing countries, and a further report will be written.

Source: WHO document EPI/CCIS/80.16

Editorial note

National EPI Program Managers are encouraged to undertake the testing of local fuels from different locations within their countries in order to identify the quality of the fuels being used. For those countries needing assistance in testing their fuels, PAHO/EPI can help coordinate this task with countries which are capable of performing the tests.

Vaccines

The last two issues of the EPI Newsletter (Vol. II, No. 6 and Vol. III, No. 1) contained notes on the heat stability of the EPI vaccines, which were based on an article published in the WHO Weekly Epidemiological Record. To assure our readers the most complete information on this subject, following is the complete text of the WHO article.

Heat stability of EPI vaccines

Knowledge concerning the heat stability of vaccines used in the Expanded Program on Immunization (EPI) remains incomplete. A summary, drawn from a survey of the current literature, is presented in Table 1 (see page 7). It suggests that diphtheria and tetanus toxoids (as monovalent vaccines or as components of DPT or DT vaccines) are the most stable, followed in order by the pertussis component of DPT vaccine, inactivated poliomyelitis vaccine, freeze-dried BCG vaccine, freeze-dried measles vaccine, and live poliomyelitis vaccine.

These vaccines are capable of withstanding exposure to temperatures as high as 37°C for periods of hours (reconstituted measles vaccine) to months (diphtheria and tetanus toxoids). However, each exposure to elevated temperatures has a cumulative impact in reducing vaccine potency and vaccines at peripheral health units will not be able to withstand the temperatures given in Table 1 if their potency has already been compromised by previous breaks in the cold chain. The cold chain for vaccines remains a highly vulnerable point for immunization programs in developing countries with tropical climates.

Developed countries with temperate climates can also have similar problems. In all countries, systems of refrigeration, temperature monitoring, and record keeping are required to assure that each vial of vaccine is maintained under appropriate conditions until it has been used, and that it is used before the expiry date shown on the label.

Source: Wkly. Epidem. Rec. No. 33:252-254, 15 August 1980.

Newsbriefs

Canadian National Advisory Committee on Immunization (NACI): Further statement on elimination of indigenous measles in Canada

In February 1980, the Committee issued a statement on measures it believed to be necessary to achieve elimination of indigenous measles in Canada.[1] The urgent need for full implementation of these recommendations is exemplified by the fact that in 1980 the reported rate was approximately 10 times higher in Canada than in the U.S.A. (Canada, cases: 13,750, rate: 58 per 100,000 population; U.S.A., cases: 13,430, rate: 6 per 100,000 population). Clearly, Canadian control programs are in need of improvement.

The Committee therefore advocates immediate implementation of its previously published recommendations, which are:

1) All children should be vaccinated against measles at one year of age or as soon as possible thereafter, unless contraindications exist.

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[1] Canada Diseases Weekly Report 6:33, 1980.

Table 1. Heat stability of vaccines used in the EPI

Vaccine	Storage Temperature			
	2-8°C	20-25°C	37°C	Over 37°C
Diphtheria and tetanus toxoids (as monovalent vaccines or components of DPT vaccine)	Stable for 2.5-6 years.	Stable for 6-12 months.	Stable for 2-6 months.	No loss of potency after 2 weeks storage at 45°C, marked loss after 8 weeks. Rapid potency loss at temperatures above 50°C.
Pertussis vaccine	Safe storage for 18-24 months, although with continuous slow decrease of potency.	Stability varies. Some DPT vaccines retained satisfactory potency after 4-12 months but monovalent pertussis vaccines stable only for 3 days.	Stability varies. Some vaccines retain satisfactory potency for 2-4 months; others lose acceptable potency during 4 weeks storage. Monovalent pertussis vaccines lose 14-54% of their initial value after 3 days storage.	Significant loss of potency during one week storage at 45°C; rapid loss of potency at 50-56°C.
Freeze-dried BCG vaccine	Safe storage for 12 months.	Stability varies. Vaccines supplied by UNICEF: 10% reduction of viability after 2 weeks storage and 20% reduction after 4 weeks storage.	Stability varies. Vaccines supplied by UNICEF: not more than 50% reduction of viability after 2 weeks storage and not more than 80% reduction of viability after 4 weeks storage. Vaccines in vacuum-sealed ampoules have a better stability than vaccines in vacuum-sealed vials or in ampoules or vials sealed with nitrogen.	Very unstable. Precise data lacking.
Reconstituted BCG vaccine	Reconstituted BCG vaccine should not be used during more than one working session (5-6 hours). This recommendation has two bases: (1) concern over the risk of contamination, as BCG contains no bacteriostatic agents, and (2) concern over the loss of potency.			
Freeze-dried measles vaccine	Many vaccines retain satisfactory titre during 1 year storage. Improved vaccines retain satisfactory titres after storage for 2 years or longer.	Stability varies. Many vaccines stable for 7-30 days. Improved vaccines retain satisfactory potency after storage for 1-4 months.	Stability varies. Many vaccines retain required titre for only 2-6 days exposure. Improved vaccines retain satisfactory titre after storage for 1-4 weeks.	Stability varies. Many vaccines are inactivated within 1 day at 41-45°C. Improved vaccines retain satisfactory titre after storage 2-8 days.
Reconstituted measles vaccine	Unstable. Should be used in one working session. Improved vaccines may keep their potency for 1 day to 1 month.	Unstable. Titre may drop below acceptable level after 4-24 hours.	Very unstable. Titre may be below acceptable level after 2-7 hours.	Inactivation within 1 hour.
Oral poliomyelitis vaccine	Stable for 3 months to 1 year.	Unstable. Some vaccines may retain satisfactory titres for 1-2 weeks.	Very unstable. Loss of satisfactory titre after 1-3 days.	In one study titre became unsatisfactory after 2 hours at 50°C.
Inactivated poliomyelitis vaccine	Stable for 12-18 months.	Precise data lacking.	Stable for 4 weeks.	Precise data lacking.

2) Revaccination should be carried out of all children previously given:

   (a) live measles vaccine before 12 months of age;
   (b) killed measles vaccine at any age, whether given alone or followed by live measles vaccine within 2 years;
   (c) further-attenuated live measles vaccine and human immune globulin (IG), formerly called immune serum globulin (ISG), simultaneously;
   (d) live attenuated measles vaccine within six weeks after receiving IG.

3) Surveillance for individual cases and outbreaks of measles in persons of all ages, especially adolescents and young adults, should be intensified. All cases should be reported and confirmed whenever possible by laboratory tests.

4) Each recipient of measles vaccine should be provided with a certificate of measles vaccination which should be kept as a permanent record by the parent or guardian.

5) Documentary evidence of adequate measles vaccination or of natural infection should be a prerequisite for all children entering school.

6) Efforts should be undertaken to ensure that all school children in all grades are fully immunized against measles.

7) During measles outbreaks, all children lacking documentary evidence of either adequate measles vaccination or natural infection should be excluded from school. For greatest effectiveness, such exclusion should be continued until the child is immunized or until two weeks after the last case has occurred.

The degree of control achieved in the United States was not possible until regulations excluding unimmunized children from school were enacted and enforced in all 50 states. NACI believes that legislation requiring measles immunization at or prior to school entry is necessary to interrupt transmission and to eliminate indigenous measles in Canada.

Source: Canada Diseases Weekly Report 7(17):81-82, 25 April 1981.

Barbados contribution to capitalization of the EPI Revolving Fund

Barbados' contribution of US$1,000 to the EPI Revolving Fund makes it the first country to respond to the request for Revolving Fund support which was made in Resolution XXI of the XXVI Directing Council (1979).

PAHO is currently studying the alternatives for reaching the full capitalization of US$4 million which was originally estimated as necessary to permit the smooth operation of the EPI Revolving Fund. These alternatives will be discussed during the upcoming meeting of the 86th Executive Committee in June 1981 and presented to the XXVIII Directing Council at its meeting in September 1981.

Ecuador: Local EPI courses

In accordance with one of the main goals of the national course held in November 1979, Ecuador is carrying out an ambitious program of replicating the EPI course at the local level in order to train or retrain health unit personnel in the different provinces. In accordance with the program for the first two quarters of 1981, these courses are being held in the following provinces:

Province	Dates	Training	Retraining
Carchi	26-30 January		X
Imbabura	16-20 February		X
Guayas	16-20 March	X	
Azuay	23-27 March	X	
Pichincha	05-06 March	X	
Pichincha	30 March-03 April	X	
Guayas	20-24 April	X	
Guayas	04-08 May	X	
Guayas	11-15 May	X	
Guayas	18-22 May	X	
Guayas	25-29 May	X	
Guayas	01-05 June	X	
Tungurahua	27-30 April		X
Cotopaxi	25-29 May		X
Loja	22-26 June	X	

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