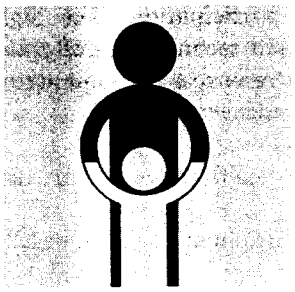


EPI Newsletter

Expanded Program on Immunization in the Americas

Volume IV, Number 5 — IMMUNIZE AND PROTECT YOUR CHILD — October 1982

EPI Evaluation in the Dominican Republic

From 1 to 12 March 1982 the Dominican Republic's State Secretariat for Public Health and Social Welfare (SESPAS), together with the Pan American Health Organization, conducted a multidisciplinary evaluation of the Expanded Program on Immunization. Ten SESPAS officials and four PAHO staff members participated in this work.

The evaluation included visits to 57 health establishments in four of the Dominican Republic's six health regions. Standard forms were used to collect data at the administrative and operational levels.

In addition, data were collected and interviews held with personnel of several SESPAS units at the central level.

The group concluded that complete vaccination coverage of children under 1 year of age and pregnant women is low, as can be seen in Table 1.

TABLE 1. **Vaccination coverage in children under 1 year and pregnant women. Dominican Republic, 1978–1981.**

Vaccine	Age group	Coverage (%) 1978	1979	1980	1981
Poliomyelitis	Under 1 year	28	34	45	42
DPT	Under 1 year	12	20	35	27
Measles	Under 1 year	19	...	29	17
BCG	Under 1 year	18	27	28	33
TT	Pregnant women	...	19	29	25

... Information not available
Source: Statistics Division, SESPAS

The principal achievements of the Dominican Republic's program, as well as the problems identified and recommendations for solving them, are outlined below.

Achievements

Programming: A programming form has been developed in accordance with EPI recommendations and is incorporated into the programming norms of all Secretariat divisions concerned with immunizations.

The multidisciplinary teams at health region headquarters (maternal and child health, epidemiology, statistics, and rural health) are familiar with this form.

Coordination: Intrainstitutional coordination has been effected and functions adequately in such areas as standardization, training and health education.

Community promotion and participation: Immunization programs are being supported by health education activities, for which mobile units and audiovisual materials are available.

In general, the community does not reject immunization programs; community members participate actively in rural areas through the 5,400 rural promoters and the health committee, and in urban areas through volunteer workers from different institutions.

Training: Multidisciplinary teams from each regional headquarters were trained in the EPI workshop held in June 1981.

Information pertaining to the EPI is being added to the programs for continuing education in primary care.

Some EPI subject matter is included in all training activities of the various Health Secretariat divisions.

Supervision: Chronograms have been developed and supervisory visits are conducted periodically at all levels.

Cold chain: There are cold rooms at the central level, in all regions, and in the priority areas, making a total of 16 throughout the country.

Refrigerators are available in more than 85% of the health establishments.

There are 3,900 thermoses suitable for the transport of vaccines in the field.

A system for the distribution of biologicals has been established which ensures their preservation.

Supplies of vaccines and related materials: In general, supplies of needed vaccines were available at the central level at all times during 1981.

Contents

Vaccination cards, daily reporting forms and monthly vaccination reporting sheets were available during 1981.

Strategies: The program's priority groups have been clearly identified.

In rural areas of scattered population, health promoters are employed on a permanent basis to conduct immunization activities.

Epidemiological reporting and surveillance system: Most establishments are reporting vaccination and morbidity data more regularly and promptly.

A person responsible for epidemiological surveillance has been designated at the central level.

There are standard forms in all areas of the country for the monthly collection of vaccination data and the weekly collection of morbidity data.

A system for monitoring the dispatch of reports has been set up to improve the quantity and quality of reporting on a regional level.

Revised and standardized forms have been designed for the yearly consolidation of monthly immunization data.

There is feedback from the central to the regional level concerning immunization coverage data and paralytic poliomyelitis surveillance.

Human resources: At the central level the program has designated personnel responsible for technical-administrative activities who work in close collaboration with other divisional personnel.

In all regions and most areas there is an epidemiologist who is responsible for the program.

Trained technical staff have been employed at the regional and area levels.

Staff for vaccination activities has been increased at all levels.

Financial and other resources: Despite difficulties in some areas, the minimum resources needed to maintain the program were usually available.

Funds were appropriated to provide travel expenses for vaccinators in some priority areas.

Problems

Programming: The programming forms are not used at the various administrative and operational levels.

Area and local health establishments do not know the populations to be covered in their areas of influence and, since they take no part in programming, the number of vaccine doses actually needed is much greater than was estimated.

Coordination: Coordination is still poor in the areas of promotion, supervision and information because of the failure to establish systematic intrainstitutional coordination.

There is no extrainstitutional coordination in EPI matters.

There is no effective coordination among the different levels.

Community promotion and participation: The high dropout rate between the first and second doses of polio and DPT vaccines indicates that resources for community participation are not being used sufficiently.

Spontaneous public demand is low.

Existing physical resources for health education are not properly utilized.

Training: There was no multiplication of the EPI workshops in any health region.

Some important areas of the EPI, such as programming, are not covered in continuing education programs.

EPI workshops are not offered in nursing schools or in the last year of premedical instruction.

Supervision: There are no methodological guidelines for EPI supervision, therefore supervision is not being used as an in-service continuing education activity.

The supervision chronograms are often not followed for lack of readily available vehicles, fuel or travel money.

Cold chain: Most refrigerators have no thermometers or temperature recording forms.

At the central level, in some regions and in local establishments that do have thermometers, daily temperatures are not recorded.

There is no system for preventive maintenance and equipment repairs have to be requested.

Difficulties are encountered in supplying gas for the refrigerators in rural clinics.

Refrigerators, cold boxes and thermoses are lacking in some establishments.

It has been found that the refrigerators in some establishments are being used to store food and beverages.

Supplies of vaccines and related materials: At some operational levels vaccines are found to be out of stock for as long as two months at a time.

At most establishments no regular inventory is kept of deliveries to or withdrawals from the stocks of biologicals, occasioning unnecessary vaccine losses.

In 1981 the program was disrupted for five months by delays in deliveries of syringes and needles.

In general, supplies of alcohol and cotton fell short of needs during 1981.

The vaccine requirements for 1982 are still not assured because the budget has not yet been defined.

Strategies: Although the program's priority groups are clearly identified, vaccines continue to be administered to nonpriority groups.

The strategy of responding to spontaneous demand and the three-day national vaccination campaigns held every three months are not yielding the hoped-for results, and this is reflected in decreased coverage in 1981.

Consequently, the use of this strategy is creating difficulties in training, supervision and information collection.

The programming strategies used, together with underreporting, are resulting in considerable losses of biologicals.

This strategy may be one reason for the high dropout rate among children between the first and third doses of DPT and polio vaccines; in 1981 this rate was about 50%

due to the lack of a follow-up system to keep track of unvaccinated children.

Promoters are not administering BCG vaccine in rural areas.

The strategy used stresses vaccination against polio, to the neglect of the other vaccines.

Epidemiological reporting and surveillance system: While reporting has improved, information is not yet sent as promptly as necessary.

At the operational level, no cumulative records are kept of vaccinations performed or of morbidity and mortality. In some places, no copies are kept of information forwarded to higher levels, consequently, the information fails to be used.

The information generated by the levels and by health promoters in many health establishments is not consolidated at the local or area level, or even at the regional level; this results in two information channels which impedes the calculation of immunization coverages at the different levels. The epidemiological bulletin is not issued regularly which means there is no feedback in the system.

A manual of norms for epidemiological surveillance is needed.

There is no control system to ensure the quality of statistical information.

There is no effective coordination between Epidemiology and Statistics.

Human resources: Administrative support (secretaries) is needed at the central, regional and area levels.

In the area of Santiago de los Caballeros there is no post for an area epidemiologist.

There are vacant posts for area epidemiologists in some health regions.

Not all area epidemiologists have the required training for their posts.

In some areas the epidemiologist devotes his time to individual health care, to the detriment of his primary responsibilities.

There is no staff specifically responsible for controlling the transport of biologicals.

Despite an increase in manpower, some areas still lack support personnel for program activities.

Financial and other resources: A specific budget for the Expanded Program on Immunization is needed at all levels.

The program manager does not yet know what the 1982 budget will be.

Per diem payments for supervisors and vaccinators are in arrears.

A vehicle is needed for the Epidemiology Division.

Vehicles are not regularly available at the different levels for program implementation and supervision.

Communications are hampered by the lack of a direct-line telephone in the Epidemiology Division.

At the local level there are difficulties in communications with higher levels.

Recommendations

Programming: The programming forms should be used at all levels.

Data from the 1981 population census should be made available to all health establishments, including data for their respective areas of influence and outlines of the geographic areas involved.

The participation of area and operational levels in programming activities should be promoted through the use of information regarding the population in their areas of influence.

Coordination. Systematize coordination among all levels of care in the areas of programming, supervision and information.

Extrainstitutional coordination and coordination among the various administrative levels should be systematized.

Community promotion and participation: Use voluntary organizations to follow-up children who need to start or complete their immunization schedule.

Gear education activities in health establishments so as to increase spontaneous demand.

Ensure that material resources for health education are properly used.

Training: Multiply EPI workshops in all areas of the country.

Include information on EPI programming in all continuing education programs.

Include EPI workshops in nursing schools, and in the last year of premedical training for future interns.

Supervision: Prepare methodological guidelines for supervision.

Prepare the chronogram of supervision jointly with the various program officials and assign vehicles in accordance with established needs.

Assure the provision of vehicles, fuel and travel funds in areas where they are unavailable.

Cold chain: Supply thermometers and temperature recording materials to all establishments.

Designate a person who is responsible for recording temperatures in all establishments that have thermometers.

Draw up a maintenance manual for personnel in charge of equipment and ensure they receive appropriate training.

Assure the timely provision of fuel supplies.

Provide cold chain equipment to establishments where it is still lacking.

Ensure that refrigerators are used only for storing biological products.

Supplies of vaccines and related materials: Ensure prompt delivery at all levels of biologicals, syringes, needles, immunization booklets, alcohol, cotton, etc., in accordance with the programming needs established.

Implement an inventory system in those health establishments which have not yet done so.

Secure a budget for the timely procurement of the biologicals and materials programmed for 1982.

Strategies: Ensure that vaccines are administered to the priority groups defined by program norms.

Promote spontaneous attendance at health establishments.

Make a detailed three-day study of house-to-house vaccination strategies to identify the reasons for the low coverage and for dropouts between the first and third doses.

Train rural personnel to assure the administration of BCG vaccine.

Ensure that equal importance is given to the administration of all vaccines.

Epidemiological reporting and surveillance systems: Ensure that information is reported promptly.

Ensure that all levels maintain a monthly cumulative record of vaccinations and of reported cases and deaths from EPI diseases in order to monitor program progress.

Where necessary, ensure that the local level includes, and consolidates into its reports, work done by rural health care staff in areas of dispersed population.

Evaluate the contents of the Epidemiological Bulletin in order to bring them into line with the objectives of the Epidemiology Division; resume the publication and distribution of the Bulletin on a regular monthly basis.

Establish, publish and disseminate norms for the epidemiological surveillance of EPI diseases; ensure that personnel are trained to apply these norms.

Create and implement a control system to ensure the quality of statistical information.

Set up machinery for coordination between Epidemiology and Statistics in order to expedite the exchange of information.

Human resources: Assign support personnel (secretaries) in areas where they are lacking.

Create posts for area epidemiologists on a rational basis.

Fill existing vacancies with qualified persons.

Complete the training of area epidemiologists who require additional skills.

Ensure that the duties described for area and sub-area epidemiologists are performed.

Designate a specific individual in charge of controlling vaccine transport.

Evaluate the support personnel needed for program operations and assign them to specific areas as needed.

Financial and other resources: Allocate a specific budget for the EPI at all levels.

Make known the amount that will be available to the program for 1982.

Provide for the prompt payment of travel allowances for supervisors and vaccinators.

Provide a vehicle for the use of the Epidemiology Division for its operations.

Ensure that vehicles are available at all levels for program implementation and supervision.

Install a direct-line telephone in the Epidemiology Division.

Expedite implementation of the system for radio communication from local to higher levels.

Follow-up: The national evaluation group should meet quarterly to verify implementation of the recommendations and identify the problems impeding operations. A report on this monitoring operation should be transmitted to the health authorities.

Another multidisciplinary evaluation should be made in April 1983.

Source: Secretariat of State for Public Health and Social Welfare (SESPAS), Dominican Republic.

Choosing a Cold Box or Vaccine Carrier

A few simple guidelines will help the user select a suitable cold box or vaccine carrier. Figure 1 outlines the basic steps to follow in determining the type of container most appropriate for a particular application.

Storage Capacity

The quantity of vaccine to be transported to an area should be calculated to determine the vaccine storage capacity required. The user must then determine the minimum length of time the vaccine will be stored in the container and the local ambient temperature in order to calculate the necessary cold life.

Cold Life

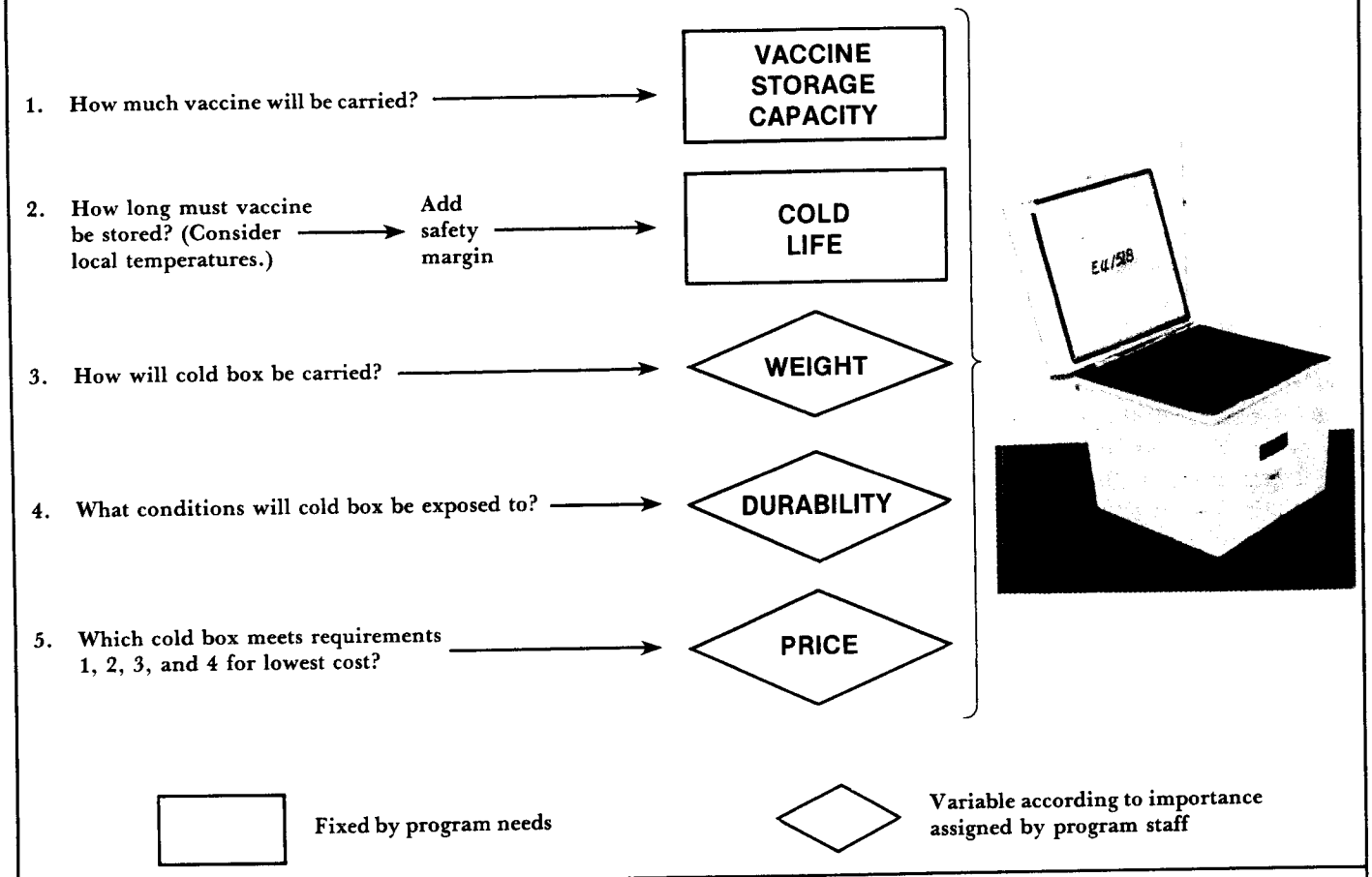
A container's cold life is the length of time it can keep the vaccines stored inside at a temperature between +4 and +8°C. The cold-life requirement should be doubled if the container will be opened and closed many times during use. Consideration of these two factors will narrow cold box selection to a small range of products.

Logistical and Mechanical Considerations

The final choice of a container can be made when the user has determined how the container will be transported (vehicle, hand-carried, by horse, etc.) and has studied its thermo-mechanical properties. Containers supplied with icepacks especially designed for a cold box or vaccine carrier have an advantage over those that are not so equipped. Containers with icepacks that fit snugly around the bottom, sides and top will provide a longer cold life than those which leave gaps between the icepacks. These gaps, or thermal bridges, can create hot spots or allow the vaccine to touch the walls of the container.

A container's durability, in terms of its lid fastening and ability to withstand accidental droppings or bouncing in the back of a vehicle, may be more important than its weight. However weight will be a more important factor if a container is to be handcarried.

FIGURE 1. Choosing a cold box or vaccine carrier



Price

The user will select the cold box or vaccine carrier that costs the least, yet still fulfills program requirements. Each of the five factors described—vaccine capacity, cold life, weight, durability and price—must be assigned relative importance according to the characteristics of the program and the country or region where the equipment will be used. Other factors may also come into play, but these five factors should be the minimum number considered.

Source: WHO document EPI/CCIS/81.3.

Editorial note: Users who desire assistance in identifying available vaccine storage equipment should consult the WHO/UNICEF Product Information Sheets (available from each country's EPI program manager) and/or WHO document EPI/CCIS/81.3, "Summary of Vaccine Hand Carrier and Cold Box Testing, December 1980, Consumers' Association, United Kingdom" (available on request to the *EPI Newsletter* editor).

WHO Collaborating Center for Pertussis Research

The Director-General of the World Health Organization, in consultation with the U.S. Government, has designated the Pertussis Branch, Division of Bacterial Products, National Center for Drugs and Biologics (formerly Bureau of Biologics), U.S. Food and Drug Administration, as the WHO Collaborating Center for Research on Pertussis Vaccines.

The center will perform research on antigens for a new generation of pertussis vaccine without bacterial cells. It will also investigate the reliability of a simple test to assay pertussis antibodies and disseminate the test through WHO/PAHO to control laboratories in developing countries.

Dr. Charles R. Manclark, well known in Latin America for his dynamic support to PAHO programs on pertussis vaccine standardization and control, is the Director of the WHO collaborating center.

The center will continue to supply control laboratories in the Americas with U.S. standards and reference preparations, train researchers and controllers, and provide consultation services. It will be able to accept a limited number of requests to retest the protective potency of pertussis vaccines produced by national laboratories. Such requests should be channeled through PAHO which will be responsible for scheduling the tests so as to avoid overburdening the testing laboratory. The directors of national control laboratories are requested to help PAHO comply with this policy.

Identification of the Origin of Poliovirus Isolates

Introduction

The ability to identify genetic relations between poliovirus isolates by means of stable markers is most important in the epidemiological surveillance of poliomyelitis. In studies of the safety and efficacy of live attenuated poliovirus vaccines it is particularly important to establish whether field isolates are of vaccine origin.

Several in-vitro genetic marker tests were used for this purpose in the past, including measurement of the reproductive capacity at supra-optimum temperature (rct marker) and antigenic characterization by partially specific sera (Wecker and McBride tests). Highly strain-specific sera were produced later, and biochemical methods are now being used for the characterization of polioviruses. The relative merits of the techniques available for the characterization of poliovirus strains are discussed here: the conclusions are derived from collaborative studies and informal meetings held under the auspices of the World Health Organization in 1979 and 1980 at the National Institute for Biological Standards and Control, London.

Characterization Techniques

Biological Tests

The most commonly used biological analysis is the rct-marker test in which the end-point infectivity titer of the virus in cell cultures at elevated temperatures (39.5°C or 39.9°C) is compared with that at 35°C, the permissive temperature. Strains are defined as rct + if the difference in virus titer at the two temperatures is less than 10^2-fold, and rct – if the difference in titer at the two temperatures is greater than 10^4-fold or 10^5-fold. The remainder are described as intermediate. Live-vaccine viruses (Sabin) are rct – , whereas virulent wild strains of poliovirus are generally rct + .

The results obtained by this test may vary between laboratories, partly because of the accurate temperature control required. Many strains isolated before the use of Sabin attenuated vaccine prove to be rct – . In addition, vaccine strains, particularly type 3, readily alter from rct – to rct + on passage in man. Since there are also many "intermediate" strains which cannot be assigned to either category, the rct-marker test appears to be of little or no value in determining the origin of a strain.

Antigenic Characterization

Because it is technically difficult to produce large antigenic masses of poliovirus strains under normal laboratory conditions, unabsorbed, partially strain-specific sera have been used to distinguish strains. In the McBride test the rate of neutralization of the test strain is compared with that of reference strains. Infectivity is assayed by plaque formation after a set time of incubation with serum. The incubation time chosen, ranging from five to fifteen minutes, depends on the laboratory. The Wecker test measures the reduction in plaque size and the modified Wecker test the reduction in plaque numbers when the virus is grown in the presence of an overlay containing limiting concentrations of serum. It is essential in all three methods to limit the antigen-antibody reaction to the desired degree either by selecting a suitable incubation time or a suitable serum concentration or concentrations: these tests are, therefore, technically demanding. Nevertheless, the results obtained can generally be reproduced in different laboratories when appropriately selected immune sera and reference strains are used. However, as with the rct-marker test, some intermediate strains cannot be confidently designated either vaccine-like or non-vaccine-like, and many type 3 strains isolated before the introduction of the Sabin live poliovaccine prove to be vaccine-like. Although in skilled hands these tests can provide evidence of the origin of a strain, the results are sometimes difficult to interpret.

In recent years highly specific sera have been prepared by absorbing partially specific sera with poliovirus strains produced on a semi-industrial scale. These highly specific sera have been used to distinguish vaccine-derived and non-vaccine-derived strains by a variety of techniques including double diffusion, micro-neutralization and enzyme-linked immunosorbent assay. The highly specific sera are not subject to the technical difficulties associated with partially specific sera, and there are fewer "intermediate" strains neutralized by both sera specific for Sabin-like (SL) strains and sera specific for non-Sabin-like (NSL) strains. The existence of NSL-specific sera suggests that all non-Sabin strains have some common antigen which is not present in the Sabin strains. The use of absorbed strain-specific sera is the best of the antigenic methods of strain identification.

Physico-chemical Methods

These chromatographic methods are based on the original work of Hodes and Thomssen and Mayer on aluminum hydroxide gel chromatography. The conditions required to elute different strains from aluminum hydroxide columns vary considerably, but there is evidence that slight differences in technique can have great effects on the results. Although the phenomenon is of interest, it is of little value in establishing the origin of a strain as SL or NSL.

Biochemical Methods

Cells infected with a poliovirus synthesize proteins characteristic of the infecting strain. The proteins can be labelled with a radioactive aminoacid and resolved by polyacrylamide gel electrophoresis. Two types of variation between strains may be observed. Either proteins may be completely absent from cells infected with some strains or,

Reported Cases of EPI Diseases

Number of reported cases of measles, poliomyelitis, tetanus, diphtheria and whooping cough, from 1 January 1982 to date of last report, and for same epidemiological period in 1981, by country.

Country	Date of last report	Measles		Poliomyelitis		Tetanus				Diphtheria		Whooping Cough	
						Non-neonatorum		Neonatorum					
		1982	1981	1982	1981	1982	1981	1982	1981	1982	1981	1982	1981
NORTHERN AMERICA													
Canada	7 Aug.	750	1,825	—	—	7	1	...	...	3	3	1,088	1,288
United States	25 Sep.	1,277	2,649	3	3	61	43	...	...	2	3	1,057	905
CARIBBEAN													
Antigua and Barbuda	14 Aug.	—	247	—	—	—	—	—	—	—	—	—	—
Bahamas	2 Oct.	45	38	—	—	2	—	—	2	—	—	6	7
Barbados	21 Aug.	4	1	—	—	3	7	—	—	1	9	9	7
Belize	5 Oct.	4	185	...	...	3	3	1	...	4	...	...	59
Cuba	21 Aug.	22,050	6,039	—	—	11	14	—	—	—	—	711	152
Dominica	28 Aug.	1	5	—	—	—	—	—	—	—	—	4	3
Dominican Republic	30 Oct.	2,402	2,084	165[a]	63	62	75	5	9	86	108	166	156
Grenada	25 Sep.	601	9	—	—	3	2	—	—	—	—	—	—
Haiti	30 Jun.	245	493	3	—	76	13	10	4	8	1	431	57
Jamaica	26 Jun.	1,246[b]	3,418[b]	58	—	3[c]	3	—[c]	3	6	4	80[c]	10
Saint Lucia	15 May	77	33	—	—	1	—	...	...	—	—	3	228
St. Vincent and the Grenadines	21 Aug.	725	2	—	—	—	—	—	—	—	—	—	1
Trinidad and Tobago	24 Jul.	834	3,235	—	—	9	9	—	—	2	3	1	7
CONTINENTAL MIDDLE AMERICA													
Costa Rica	28 Aug.	102	126	—	—	11	6	1	—	—	—	30	147
El Salvador	14 Aug.	2,972	6,941	12	37	29	27	57	56	2	1	1,211	1,711
Guatemala	24 Jul.	3,117	1,923	39[d]	32	38	44	...	...	12	14	740	728
Honduras	4 Sep.	2,149	2,805	8	10	20	14	—	1	—	—	1,189	836
Mexico		...	...	...	...	...	...	...	...	...	...	...	...
Nicaragua		...	...	...	...	...	...	...	...	...	...	...	...
Panama	31 Jul.	3,345	1,492	—	—	3	12	11	9	—	—	29	78
TROPICAL SOUTH AMERICA													
Bolivia	30 Jan.	117	353	—	3	13	12	...	...	2	2	171	286
Brazil	19 Jun.	11,909	25,864	4	62	1,152	1,285	...	...	1,718	1,919	23,482	18,909
Colombia	18 May	4,393	6,507	27	82	273	192	...	...	40	54	2,483	1,832
Ecuador	3 Apr.	391	1,606	3	7	9	21	10	7	3	4	468	133
Guyana	5 Jun.	25	19	—	—	2[e]	5[e]	...	...	—	—	...	35
Paraguay	31 Jul.	232	332	50	7	35	45	66	52	9	4	298	315
Peru	11 Sep.	1,532	4,303	107	115	44	191	...	...	5	53	1,161	4,584
Suriname	18 Jul.	25	697	—	—	...	...	...	...	2	2	9	...
Venezuela	4 Sep.	9,345	19,656	—	12	...	...	...	...	2	6	2,071	2,661
TEMPERATE SOUTH AMERICA													
Argentina	19 Jun.	1,439	6,143	...	...	...	36	...	...	13	42	2,971	9,573
Chile	27 Feb.	1,153	595	...	...	6	1	...	...	24	36	123	868
Uruguay	29 May	58	660	—	—	10	4	1	1	—	—	315	148

[a] Suspected cases
[b] 29 May
[c] 1 May
[d] 20 August
[e] 31 March

— No cases
... Data not available

more commonly, there may be slight but highly reproducible differences in the migration rates of a protein or proteins. Both characteristics (i.e., lack or alteration of a protein) are inherited when the strains are passaged and may, therefore, be used as markers of strain origin. However, it is likely that they reflect only slight changes in the virus genome which may be easy to alter; these properties of the virus are not indefinitely stable. The value of this method in identifying strain origin is, therefore, limited.

In an alternative biochemical method the RNA genome of a poliovirus strain is characterized by oligonucleotide mapping. Radioactively labelled RNA extracted from the purified virus is digested with a nuclease which cleaves the molecule at specific bases. Usually T1 ribonuclease is used; this cleaves RNA at guanosine residues. The sizes of the fragments generated vary with the position of the bases in the RNA and, when the fragments are resolved by two-dimensional electrophoresis, the larger oligonucleotides yield a pattern characteristic of the RNA.

There is agreement between workers on several features of such oligonucleotide maps. Firstly, the overall pattern (i.e., the distribution of the larger oligonucleotides relative to each other and to marker dyes) is highly reproducible within a laboratory and between different laboratories. Secondly, poliovirus strains which are known to be epidemiologically unrelated give completely distinct patterns. This is also true of foot and mouth disease virus, vesicular stomatitis virus, and influenza virus. The differences in the patterns are usually obvious by simple inspection and can be confirmed by resolving mixtures of two digests, when the number of spots increases. Thirdly, each pattern consists of a large number of spots (50–60) so that it remains recognizable even when several are altered. It is possible to detect relations between strains even where the two genomes have undergone considerable mutational drift. It is estimated that more than half the spots on a map could be altered before it became unrecognizable but among maps from epidemiologically related strains so far studied a maximum of 25% of the spots are altered.

Oligonucleotide mapping is a sensitive method for unambiguously establishing relations between strains and is the best biochemical method to use. The results are consistent with those obtained by the use of absorbed sera.

Conclusions

Of the methods available for showing whether a poliovirus strain is vaccine-like or not, the rct marker and the various physico-chemical elution markers give unreliable and ambiguous results and are therefore not recommended. The antigenic methods which use partially specific sera are technically demanding and, although more reliable than the rct marker and the elution markers, can be recommended only in the absence of more reliable techniques based on highly absorbed antisera. The methods of choice, which give clear and reproducible assignments of strain origin, use absorbed sera or oligonucleotide maps of RNA from purified virus. Oligonucleotide mapping can detect both similarities and differences between related strains and is unambiguous, but it is technically more demanding than the use of absorbed sera.

Source: Minor PD and Schild GC. *The Lancet* 2: 968-970, 1981.

Editorial note: The differentiation between poliovirus strains derived from the field and those of vaccine origin is of great importance. Such differentiation is particularly necessary in countries where the occurrence of paralytic cases has been greatly reduced due to effective vaccination programs.

It is desirable that all poliovirus strains recovered from paralytic cases associated with the use of oral poliomyelitis vaccine be examined by means of reliable methods to determine if the isolate is vaccine-like or not. Arrangements can be made through PAHO in order to have these isolates identified in one of the laboratories which presently can perform the differentiation tests. Each strain submitted for this purpose should be accompanied by a form containing clinical and epidemiological information pertinent to the paralytic case. This form can be obtained from PAHO which will support the countries wishing to undertake such a study.

The *EPI Newsletter* is published bimonthly, in English and Spanish, by the Expanded Program on Immunization (EPI) of the Pan American Health Organization, Regional Office for the Americas of WHO. Its purpose 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 their possible solutions.

References to commercial products and the publication of signed articles in this newsletter do not constitute endorsement by PAHO/WHO, nor do they necessarily represent the policy of the Organization.

Editor: Dr. Ciro de Quadros
Assistant Editors: Mr. Peter Carrasco
Ms. Kathryn Fitch

Contributors to this issue:
Ms. Maureen Anderson, PAHO
Dr. Francisco Pinheiro, PAHO
Dr. Gaston Tawil, PAHO

Expanded Program on Immunization
Division of Disease Prevention and Control
Pan American Health Organization
525 Twenty-third Street, N.W.
Washington, D.C. 20037
U.S.A.

ISSN 0251-4710