



## EVALUATING CONTROL MECHANISMS FOR ACUTE RESPIRATORY INFECTIONS

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### I. INTRODUCTION

**T**he success of a well-implemented health program requires close attention to the performance of administrative and operational personnel as well as to the participation from the community. It is also necessary to know what resources are used for different activities, such as promotion and support for central and local health authorities and program implementation, particularly in the case of ARI control.

For the sake of both the health team and the target population, the indicators used to assess intermediate or final results should be made consistent. An evaluation provides valuable information for current activities and future programming (1-3). The use and dissemination of evaluations will give health services and the ARI control program a solid foundation.

Evaluation is important due to the need to know how far one has advanced towards the set goal and which factors should be adjusted, or to verify that the set objectives have been met and therefore new ones need to be set. On a broader level, and to summarize the direction to be followed in the evaluation of a control program, principal objectives among others could be the following:

- Determine how far one has come, i.e., what has been achieved in comparison to what had been expected.
- Establish which problems were overcome to achieve the proposed goals.
- Redefine the direction in view of the problems encountered.

- Show that the activities carried out benefit the community despite the problems which may arise.
- Provide feedback to the participants, sharing the achievements, analyzing the problems encountered, and underlining the importance of working in depth with the program.
- Justify the need for the activities and the inherent cost, to both the authorities and the community (4).

## II. CONTROL MEASURES AND EVALUATION STRUCTURE

Evaluation is a process by which results obtained from the implementation of a program are evaluated and compared to the objectives set out for a given period—normally a year—in a specific geographic area, and whose purpose is to critically analyze all the information which is useful and available, to support, reinforce, and re-elaborate the activities and strategies previously established (1-3, 5-7).

Control or monitoring is also a structured process, of greater periodicity and constancy, whose aim is to systematically verify that the stages contributing to achievement of the objectives have been fulfilled. The sum of the various objectives achieved would allow for a specific goal to be reached.

Control or monitoring is carried out through the administration by gathering precise information on selected indicators, resources, the activities of personnel and health workers, the health centers, the local municipalities and community, and through direct observation on field trips to the area (6, 7).

To meet the goals through fulfillment of specific objectives, activities should be planned and implemented with priority criteria throughout the run of the ARI control program, and the parameters or indicators to be controlled and evaluated should be established beforehand. Selected information should be gathered, analyzed, and distributed throughout the different program levels with a periodicity that has been established previously. The use of forms is helpful in the transcription of data, permitting criteria to be put together to consolidate the local information from health establishments or units from a same area, municipality, district, region, or country.

The main goal of the ARI control program is to reduce the annual pneumonia mortality rate in children under 5 years of age (8). However, in many areas where there is regular information on pneumonia deaths, it may not be necessary to wait a year or even more to learn the results of a given effort. The possibility of analyzing the trend of this indicator in shorter time periods, for example a month, according to geographic distribution or the number of deaths at home, allows efforts to be concentrated on those social groups or places with a higher mortality, thus being able to adjust the annual goal with action directed at the problems detected by the control process. When evaluating any control program, it is important to have its organizational chart in mind, which basically means answering two questions:

**What will be evaluated?**

This first question can be answered by viewing the grouping of the elements that make up the evaluation according to the classic criteria (9, 10). In this way the evaluation can be charted as it is made:

- a) Evaluation of the process, which means evaluation of the “process” of implementation, i.e., the activities carried out and their effect on the population’s request for attention. This is done by comparing the results with the proposed objectives.
- b) Evaluation of the impact, i.e., the result of the activities carried out on the effect of ARI on the population; this is observed directly by measuring the reduction in “harm” in the community. The reduction of this “harm” is what is intended when planning the activities, and the evaluation consists in comparing the damage at the time of evaluation with the situation set by the goals. In the majority of ARI control programs, the main “harm” to be reduced is mortality.

**What will be the means used for the evaluation, i.e.,  
Which are the parameters that more truly reflect  
the present state of the situation evaluated?**

This second question entails selecting the best indicators to be used to characterize the situation and that most clearly reflect the advances made (4, 11, 12). In this sense the most convenient indicators are not always of the same kind and depend on what is being evaluated and the level at which the evaluation is being made, as well as the information available for putting them together.

The following criteria should be taken into account in the selection of each indicator:

- usefulness, in terms of contributing to reaching the goal;
- availability or feasibility of obtaining it systematically;
- reliability, and
- priority.

The priority requirement refers to the need to define the basic indicators which the health units or establishments should provide (3).

Within the defined framework for determining the instruments that allow or facilitate evaluation, it is important to take into account the difficulties in obtaining the information and how to overcome them. The lack of reliable, timely information with a wide scope, mainly for evaluating the effect reached, is one of the problems which most limits the possibilities and scope of the evaluations, above all at the central levels. This difficulty is eased if the information sys-

tems are organized in such a manner that the personnel responsible for the activities being carried out have a clear idea as to which is the necessary information.

Great importance should be given to the gathering and consolidation of information, as well as establishing the hierarchy of those in charge of this task. In some countries, the motivation and thus the collaboration of personnel in charge of gathering information has been achieved through developing ARI epidemiology and control supervision courses, thus facilitating evaluation (see more following that refers to training).

The majority of countries have one or several kinds of registers on the services which their health establishments provide, the vital data verified in a determined zone (civil registers, cemeteries in the case of deaths, and others) and other aspects which are useful when carrying out the evaluation. These sources of information should be taken into account even if they are of doubtful quality, when putting together the evaluation indicators. On the other hand, it should be considered that the best way of solving registration system problems, and thus to improve them, is by using them, thus learning their weaknesses and limitations.

One of the specific objectives (3, 5), training, is of extreme importance. From it indicators are chosen for the control of ARI. Training is important in helping achieve the goal of reducing pneumonia deaths, because trained and motivated personnel will take the proper measures for prevention, diagnosis, and treatment of cases, and thus reduce ARI deaths. In view of this, the completion of the scheduled courses and determining the number of trained officers and the categories to which they belong should be checked. Control of the activities and difficulties in carrying it out allows for timely recognition of the types of problems encountered to find ways of solving them and providing support.

Elements to be controlled could include activities, resources, and the program's administrative elements, such as regularly providing antibiotics, supervising education, and community participation. The following section details the indicators and parameters presently used in evaluating ARI control activities.

### **III. EVALUATION SYSTEMS**

Evaluations may be quantitative and qualitative, given that in some cases the necessary quality is expressed numerically (2). On the other hand, operational and sociological research can also be quantified and be qualitative (2, 3, 5, 6, 8, 13, 14). The following proposal for classifying evaluations according to their nature and the elements taken into account is especially pragmatic:

#### **a) Periodic and systematized evaluation**

##### **a.1) Epidemiological evaluation**

For the program's main goal, which is to reduce the pneumonia and ARI-related deaths in children less than 5 years of age, the quantitative epidemiological evaluation

indicates in numeric form how many children of specific ages (less than 1 year and 1 to 4 years) have died due to these pathologies in a specific period and comparing these figures to the total dead of the same age due to other causes, which allows their relative importance to be established. In comparing these figures with the specific population, the rates for a specific period and geographic area can be obtained.

Obtaining an area's or country's periodic rates allows for comparison in a specific period, between themselves and those of other regions or countries, to establish the evolution, magnitude, and location of this severe child health problem. At least one previous year is needed as a reference to compare that mortality information and to verify whether the indicator shows an increase or decrease in deaths. To have a larger picture, one would have to have the data from six or more years, which allow one to study a trend, including years of epidemics—for example, respiratory viruses—and reduce the influence of randomness and interepidemic periods or other phenomena. This six-year period allows an annual five-year average in the reduction of the problem to be calculated.

Another quantitative indicator is the number of children who have died at home by age group, which is shown in Table 1 as a control and evaluation proposal. The possibility of evaluating the number of pneumonia and other severe ARI releases from hospital, hospital pneumonia lethality expressed in percentages, and the number of children who received standard treatment, among others, could also be considered.

#### **a.2) Administrative evaluation**

By means of the administrative evaluation, the achievements and problems encountered in the activities and the logistic support to the program will be determined. An administrative analysis should, for example, indicate the degree to which the proposed time frame was met for handing in information and comments. Other indicators are knowledge of the number of courses and trained persons; the number of establishments they originate from and the category to which they belong; the number of trained community workers; the number of educational sessions held among the population in general or among the mothers, among others. Likewise it may be necessary to have data on the availability of transportation and travel allowances; acquisition and distribution of supplies for the program, such as antibiotics, forms, educational and audiovisual material, among others.

### **b) Sporadic evaluation**

#### **b.1) Operational studies**

These studies are extremely useful in consolidating the program, as they provide practical information on how activities are carried out, showing the weaknesses and strengths of a wide range of aspects of interest to the persons developing the process

(3, 6, 13). The technical, therapeutic, administrative, epidemiological, and other studies provide valuable elements to a variety of specialists, such as bacteriologists, clinicians, students, health workers and administrators, various health professionals and technicians, and to community volunteers.

At present, the study of biomedical and social risk groups, as is the case with some of the factors contributing to ARI: low birth weight, malnutrition, congenital irregularities, immunodepression, and other diverse pathologies, is considered very important. For example, a geographic area where malnutrition is prevalent would probably have a higher incidence of severe cases or deaths from ARI. Knowledge of this fact should be used in considering prevention and control measures for this problem which go beyond those considered in the ARI program.

Various risk factors could be investigated in these operational studies, such as the causes of morbidity and mortality and the relative importance of some diseases accompanying ARIs. Studies could be conducted on intrahospital outbreaks of respiratory diseases, their prevalence or incidence by clinical service; the kinds of manipulations or the equipment used in treating infections.

It might be important for the administrators of some specific regions to have knowledge of the coverage and access to health services, rejection of visits, analysis of referrals and their replies, self-medication, prescription and administration of medication by pharmacists or other workers, standard treatment of cases, and the study of autopsies in determining the causes. This evaluation of the intermediate steps in the evolution of a child's pathology tend to explain the causes for success or failure in the term of his illness, and consequently the program's degree of effectiveness.

Due to the fact that these studies require human resources, time, and special records, it is not always possible to carry them out in a constant fashion, and thus they should be scheduled and carried out sporadically and often based on a team's motivation or with the participation of outside groups.

As well as a broader knowledge of how the program is running, operational studies try to provide precise information and to motivate personnel and the community to find solutions to problems as they are detected. Receiving and disseminating these reports, which have been processed and analyzed according to selected variables, has the purpose of improving technical and administrative aspects over time. Some may ask for more extended periods for solving the problem, especially if more complex resources are required, as would be broadening the coverage.

- **Clinical studies**

Clinical field research is especially aimed at establishing the effectiveness of the activities included in the program. The results of the quality evaluation and the diagnostic criteria according to the levels of ARI treatment and the therapy used in each one provide substantial elements for training personnel. The quali-

ty of the diagnosis could be compared to the exams provided by the clinical support services, such as lab, X-rays, and the pathological anatomy. Likewise, the criteria presently used to diagnose the gravity of a case, or the inference charts, could be evaluated and eventually modified in light of the new information obtained thanks to these studies.

- **Therapeutic studies**

Various investigations have provided a working basis standardized by level for therapeutic aspects ranging from the choice of antibiotics according to their effectiveness, their availability and cost, and in order of priority indicated by their dose, secondary effects, and bacterial resistance. These investigations also indicate the use and recommendations for inhaled bronchodilators, antipyretics, and analgesics in specific doses and concentrations.

However, therapies are dynamic, and new medications and antibiotics are constantly being discovered; at the same time, an ever more powerful bacterial stock becomes resistant to current antibiotics (15). Thus the proposals of therapeutic charts are of value for the present but may become obsolete after a certain time.

Although these studies are more complex and costly, an evaluation of this kind can be made from the viewpoint of fulfilling the standards for the use of medications in this program, which indicates among its specific objectives a reduction in the use of antibiotics and cough suppressants. Their rational use would allow them to be available for those children truly needing them (13). Table 2 provides a proposal for evaluating their use.

- **Epidemiological studies**

There are various examples of this kind of study, such as the description and analysis of their incidence, according to the climate, environmental temperature, and the etiology, as well as the correlation with atmospheric pollutants and other causes, which would help health teams to more adequately face the variables in play.

As to mortality, as well as the classic indicators annual rates by age group, it is interesting to learn in detail the description of the variables, their correlations, and the study on causality in the geographic area under consideration. Bacteriology, histopathology, clinical and social sciences, and others could also greatly contribute to this epidemiological work. The sociocultural profile related to mortality indicates epidemiological risk groups which should be evaluated at length, given that public health attention modifies the risks, providing a certain dynamism to the problem.

- **Educational studies**

Training the personnel and educating the community is a relevant activity in the control of ARI (16, 17). Its purpose is to increase knowledge and appropriate action in these groups through different methodologies.

The resources of time, money, and personnel employed in these activities can be considerable, making it necessary to evaluate the methods and teaching-learning techniques used to achieve optimal results. An educational process should above all be a follow-up of the set objective. It should be confirmed whether the training efforts are resulting in effective action for the care of sick children; whether the mothers learned from and interacted with the health teams; or whether the community volunteers had learned to recognize the signs and symptoms of severe disease in their children.

Likewise the community's educational material, such as videos, brochures, posters, or others should be assessed to measure the degree of understanding and acceptance by those interviewed, as well as to consider their suggestions. At the end of any educational program, an evaluation of the mothers', or groups of the population interacted with, learning and behavior can be planned.

## **b.2) Sociological evaluation**

The programs and the resources mobilized are to have a positive impact on the population. However, there is little attention given to the factors of human behavior, culture, language or idiom, customs, religion, and beliefs (2, 6). There exist innumerable instances throughout the world of interventions that failed precisely because they did not consider these important elements of conduct.

Sociological studies take these aspects into account to incorporate them in the program. Many questions, determining the causes and evolution of ARIs, can be asked in this type of evaluative research: What and how much do mothers know about the signs and symptoms of severe disease in their children's pneumonia? Are they capable of identifying acute respiratory infections? What name do they know them by? What practices do they have with regard to them? What do they think of the health team? What do they know about prevention? What is the child's environment? Do they have the means of getting to a health center?

Any educational program in the control of ARI should take into account these sociological variables in the persons and communities, to manage the available resources effectively. For example, an element that should be taken into account is that related to the drawings and colors used in the posters and brochures, as well as the contents aimed at delivering information and education. For some indigenous cultures in America, red is a good and positive color, which is contrary to our cultural notions. Likewise, the messages and words normally used, and apparently clear to health technicians, may be interpreted differently by some communities.

Sociological studies may be complex or difficult to carry out, but the wealth of information they provide on the program's evolution, which with its messages tries to increase knowledge and bring about adequate changes in behavior, contributes in creating a profile of the population that should be adapting as the program develops. That is why it is necessary to repeat sociological measurements and evaluations which permit the correction of errors or reinforce lines of action. The preceding chapter "Results from Ethnographic Studies on the Control of Acute Respiratory Infections in Bolivia" provides a clear example of this kind of evaluation.

#### **IV. QUALITATIVE EVALUATION**

If the quantification of the activities and its results is useful and necessary, even though at times difficult to compile, there is always the question of how have said figures arisen, what are the deficiencies, how can they be overcome, and how do the principal actors (personnel, volunteers, and community members) perceive and relate to the development of the program.

Generally, qualitative studies are postponed or not carried out due to the diverse social, economic, psychological, cultural, political, and environmental factors, which interact to cause the facts there is an interest in analyzing (2).

As for the principal indicator and goal, which is the reduction of mortality due to pneumonia and ARI, it would not suffice to simply indicate a decrease or increase, though from the quantitative point of view this would be valid in some kinds of evaluative studies. It would also be extremely important to learn the quality and reliability of said information, as well as its causality. It is probable that many observers (doctors and other witnesses) participated in generating these figures, which is why it would be useful to validate the quality of the diagnosis and registers, even if it were in a sample of total deaths.

An infant death is irreversible and lamentable from the social point of view, but it also has to do with the end of the natural evolution of various stages of a disease, which could be interpreted as a failure of the program, as it had not been prevented and treated through primary, secondary, or tertiary prevention. Qualitative research may provide valuable retrospective information on this process and reveal to what degree it could have been avoided and what action needs to be taken in the future for similar situations.

Consequently it is important to learn and explain the reasons for death due to pneumonia in a group of children, for example, from a specific area; at the same time one should ask oneself if the mothers recognized the signs and symptoms of severe disease in their children in time, and if they made the decision to consult the services. Likewise, it would behoove one to determine whether the parents had difficulty in accessing the health services and to pose other questions pertinent to the program, such as, What was the quality of the diagnosis of the children? What indications, which specific treatment, and in which dosage was it provided? In which diagnosis were antibiotics used and what kind were they? Were cough suppressants or expectorants used? Was there an indication of hospitalization? Did the trained human and mate-

rial resources, which are indispensable for an adequate treatment, exist? To explain these problems in a manner similar to that provided by the quantitative methods, these questions are aimed at providing more precise information to make the correct decisions and thus improve the programs.

The evaluation studies and proposals presented in this chapter are not exclusive. On the contrary, each one of them provides valuable information for the ARI control program. The experience of the administrators and the rest of the personnel allow the models deemed necessary and viable to be proposed or modified through the length of the course. At the same time it is necessary that the national coordinators and those responsible at the local level establish their priorities and the resources which would be used to carry out any evaluative study.

## **V. DISSEMINATION AND FEEDBACK**

At the end of an evaluation period and whatever its results, it is important to complete the process as quickly as possible by means of feedback to the personnel involved and the health authorities of the area evaluated with regard to the program's scope, achievements, and weaknesses. The processed information delivered to the different levels of execution will demonstrate that the data provided are used and appreciated, which helps to improve the systems (1, 3, 14).

Some parameters which the feedback should include are the following:

- Meeting the deadlines for the delivery of local information
- Coherence of the information provided
- Comparison of the information from different geographic areas
- Results of specific goals and objectives, as well as their trends
- Information on the achievements, difficulties, and means of solving the problems
- Comprehensive analysis of the program in the period evaluated
- Proposals for new strategies and activities or for reinforcing the restricted ones and those not carried out.

A crucial aspect of the evaluation process feedback is to stimulate the personnel, congratulating them for the initiatives undertaken in the periodic evaluations and in the supervision visits.

There are various methods for disseminating the evaluations in brochures or information letters on a monthly, trimonthly, six-month, or annual basis. The seminars or national or regional evaluation meetings also contribute to the active participation of those involved. The chances for direct communication and exchange of experiences, educational material, and publications between local coordinators, national officers, and in some occasions international advisors personalizes the program and makes its activities dynamic, contributing positively to the formation of a human chain concerned with resolving these important problems.

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**Table 1.** Number of pneumonia deaths, by community

Control and evaluation Health Service \_\_\_\_\_  
Under 1 year

COMMUNITY	FIRST SEMESTER							SECOND SEMESTER							TOTAL YEAR H R
	January H R	February H R	March H R	April H R	May H R	June H R	Subtotal H R	July H R	August H R	September H R	October H R	November H R	December H R	Subtotal H R	
H = Hospital															
%															
R = Residence															
%															

