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ACUTE RESPIRATORY INFECTIONS

Exercises on Planning, Implementation and Evaluation of Control
Programmes within Primary Health Care

Acute Respiratory Infections Programme
World Health Organization
Geneva, October 1986

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Introduction

This document contains a set of exercises on Planning, Implementation and Evaluation of ARI Control Programmes within Primary Health Care, and relates to the Manual published under the same title as document WHO/RSD/86.29. The Manual and the exercises are addressed to national (or intermediate level) ARI programme managers to assist them in the implementation of a comprehensive Acute Respiratory Infections Control Programme focussed on the population under 5 years of age.

The five exercises that follow cover the major steps described in the Manual that should enable the Programme Manager to acquire the necessary managerial skills. They should be done in a step-wise fashion after careful reading of the relevant chapters in the Manual, either as a group or an individual exercise. They were designed for use at special workshops for programme managers. After comparing the results with the respective Answer Sheets, from Part 2 of this document, there should be a general discussion.

Exercises A and B provide examples of managerial skills necessary at the planning stage of the programme. They should be completed after reading and discussing the content of the first six chapters of the Manual. Exercise C refers to chapter 10, and Exercise D to chapter 12. To all these exercises answer sheets are provided to facilitate discussion on the importance of a specific activity, i.e., initial planning, supervision and evaluation of the programme.

The last exercise, Exercise E, is devoted to the preparation of an outline of a Plan of Operation for the programme. It refers to chapter 13 and is meant as a final step in the manager's training. No answer sheet is provided for this exercise since its main objective is a general discussion on the whole content of the Manual, on the issue of setting targets for the programme, and on any specific issues considered of importance by programme managers.

Exercise A: National ARI programme implementation - Prepare a schedule of activities for yourself as a national programme manager for a six-month period prior to programme implementation. (This may be a group or an individual exercise.)

Your government has decided to initiate ARI programme activities and you were nominated as a national programme manager. You are requested to formulate an outline of the national programme and submit it for your Minister's approval in six month's time.

Describe what you will do in this six-month period. Try to provide a detailed description of all activities required in initiating the programme within six month's time, provided that you already have all the material developed by WHO as well as your government commitment to provide resources for a phased implementation of the programme. Try to list the activities in a chronological sequence and provide justification for their selection and for their order on your list.

Use the situation of your own country as it is at present for this exercise.

Exercise B: Calculating drug needs

Introduction

Among major planning activities to be carried out at the national and intermediate levels of health care system there is one dealing with the development of a logistical support system necessary for a given programme. Logistics means procurement, maintenance and distribution of equipment and supplies needed for the programme.

In a national ARI control programme, as in all the other programmes, it is an essential management function to ensure that the necessary supplies are provided when and where they are required to carry out the programme activities. National managers, in general, are familiar with the logistics of established programmes, such as, for example, EPI or CDD. In ARI, providing antimicrobial treatment to all children with moderate and severe ARI represents an important point in achieving the programme's objective, i.e. to reduce mortality. The national ARI programme manager will need to ensure that the following supplies are available to the appropriate health care providers:

- (i) first line antimicrobial drugs for use at the primary health care/first level health facility. In most cases it will be procaine penicillin for injections and cotrimoxazole (or ampicillin or amoxicillin) for oral use for areas/facilities where injections are not possible;
- (ii) second line antimicrobial drugs for use at the first referral level facilities. In most cases these will be benzyl penicillin, chloramphenicol, cloxacillin and gentamicin, in more or less equal proportions;
- (iii) instructions on the use of first-line antimicrobial drugs for primary health care workers, as well as appropriate educational material for mothers;
- (iv) forms for recording information on ARI cases seen as well as information on treatment with an antimicrobial drug;
- (v) other supplies such as syringes, sterilisers, antipyretic drugs, etc.:

This exercise will be limited to the logistics of antimicrobial drugs necessary for the implementation of case management/rational therapy strategy of the ARI programme, and particularly to calculating the amount of first-line antimicrobial drugs needed in the entire country for the first five years of ARI programme implementation.

Background data

Total population	10,000,000
Under 5 population	1,750,000
Birth rate (live births)	38/1000
Crude death rate	18/1000
Infant mortality rate	100/1000 live births
Under 5 mortality rate	30/1000 population under 5

To facilitate calculations, there are 5 provinces of roughly the same population, i.e. 2 million each, and of roughly the same proportion (50%) of the population living within 5 km of a health facility in each province. For the sake of simplification, this proportion of the population is also considered as covered by existing health facilities, i.e. has access and utilizes these services. About 80% of the present coverage is represented by first level health facilities staffed with at least some trained auxiliary personnel (a nurse, a medical assistant) or even a doctor, and 20% by community health workers. It is expected that in 5 years time the coverage and utilization will increase to 80% of the total population through development of primary health care, i.e. 40% of the total population will have access to a health facility staffed with trained health personnel, and another 40% will be served by community health workers (for ease of calculation you may assume that this target will be achieved each year by one province).

All the first level health facilities as well as all the first referral level facilities (district hospitals) that exist will be strengthened to cope with the growing demand for their services. There are 10 district hospitals in each province, each one serving approximately 200,000 of the population.

All health facilities, irrespective of their present staffing patterns, will be using injectable procaine penicillin as a first line antimicrobial drug for moderate and severe ARI, and all community health workers will be using cotrimoxazole only.

You are requested to calculate the amount of procaine penicillin and cotrimoxazole needed for the ARI programme for the coming 5 years. There will be several steps in this exercise, each one followed by discussion.

NOTE: In normal situations, one would need to take into account the changes in population growth. For the sake of simplification, it can be assumed that no increases or decreases in population have occurred during this period.

Step 1. Since there are approximately 350,000 children under 5 years of age in each province, calculate the number of children that will be covered by health services in the next 5 years in the whole country, assuming that one province a year will reach the targeted coverage of 80% of the population.

Number of children under 5 covered by health services will be:

in year 1	.....
in " 2	.....
in " 3	.....
in " 4	.....
in " 5	.....

Step 2: Knowing the number of children covered by health services (step 1) what proportions would be expected to be brought to the clinic for ARI-related health problems? If you have any data or estimates from your own country, please indicate; if not, refer to chapter 5 of the Manual.

Answer:

The proportion would be

Now, using the above answer you may calculate the expected total number of ARI visits each year. This will be:

in year 1	.....
in " 2	.....
in " 3	.....
in " 4	.....
in " 5	.....

Step 3. Out of the total number of ARI visits, one can assume that 75% will have mild ARI; 20% moderate ARI, and 5% severe ARI, as indicated in chapter 5 of the Manual. Based on this distribution, calculate the numbers of mild, moderate and severe ARI that you may expect each year for the entire country:

	Mild ARI	Moderate ARI	Severe ARI
in year 1			
" " 2			
" " 3			
" " 4			
" " 5			

Step 4: Using all the previous data you may now calculate the number of ARI cases that need to be treated with procaine penicillin, cotrimoxazole, and second line antimicrobials. These will be:

	Procaine penicillin No.	Cotrimoxazol No.	Other antimicrobials No.
in year 1			
" " 2			
" " 3			
" " 4			
" " 5			

Step 5. Translate the number of ARI cases that need to be treated with antimicrobial drugs into the number of vials of penicillin, the number of tablets of cotrimoxazole as well as other relevant antimicrobials, taking into account the necessary dosage requirements and duration of treatment.

As an example, you may just calculate the amount of procaine penicillin and cotrimoxazole that you would need to order for the coming years: This would be:

	Procaine penicillin	Cotrimoxazole
in year 1		
" " 2		
" " 3		
" " 4		
" " 5		

Step 6: When ordering antimicrobial drugs needed for the ARI programme, would you consider it necessary to take into account factors other than the number of ARI cases as calculated above? What factors justify a higher order? What factors justify a lower order? What would be your final decision in ordering the drugs?

Exercise C - Design a checklist for supervisory visit. (a group exercise)

As a national ARI programme manager's team of experts, design a checklist for the team's supervisory visit to a province where ARI programme activities have just been initiated. Your advisory team includes a paediatrician, an epidemiologist, a public health administrator and a nurse. This will be the first visit of the team to that province. Describe in detail all the items to be reviewed and questioned. Try to include both general aspects of the programme and specific ARI activities. Indicate also the time you would consider necessary for such a visit.

Exercise D - Evaluate the programme's impact on the reduction of ARI-related mortality.

In a particular country, as described in Exercise B, it was found that one third of all mortality in children under 5 years of age was due to pneumonia. When implementating ARI programme activities, the authorities have established an ARI mortality reduction target of 60% within 5 years, among children adequately treated, i.e. treated according to case management guidelines. The authorities realize, however, that not all children covered by health services may receive adequate treatment, unless an extensive training and supervision is implemented simultaneously.

You are requested to calculate the number of ARI related deaths that could be prevented if the proportion of children adequately treated among those covered by health services would be 50%, 75% or 100%.

Step 1. Calculate the number of annual pneumonia deaths assuming there is no impact of the programme activities

Step 2. Assuming that in the first year of ARI programme implementation, the coverage by health services of children under 5 is 50% and that ARI-related mortality is reduced to 4/1000 in only half of those children (since only half of those covered were receiving adequate treatment), calculate the number of pneumonia deaths in this first year of the programme's implementation.

Step 3. Taking into account the expected number of children covered by health services in 5 years' time (Exercise B step 1) and assuming that the mortality rate from pneumonia will be reduced to 4/1000 in adequately treated children, calculate the expected number of pneumonia deaths in the fifth year of the ARI programme implementation if the proportion of adequately treated children will remain 50% and if it would reach 75% and 100% among those covered by health services.

Step 4. Express your previous calculations in numbers of pneumonia deaths prevented which will represent the possible ARI programme's impact under different coverage and quality of treatment. You need not refer to total under 5 mortality in this exercise, although it might be interesting to also see the ARI programme's impact on overall childhood mortality reduction in a situation where ARI interventions are the only measures undertaken. This, of course, would be an artificial situation since other programmes such as, EPI and CDD, also produce an impact in terms of mortality reduction.

Exercise E. Prepare an outline of a Plan of Operation for a national ARI programme in your country (this may be an individual or group exercise for participants from the same country).

Having gone through the whole operational manual, you are now requested to formulate an outline of the Plan of Operation for your national ARI control programme. You may consult chapter 13 of the manual where you will find a checklist for preparing an ARI plan of operation. You need not follow strictly this checklist, but if you do, try to provide a concise description to the different points listed, and a more detailed one to points 6 through to 9.

Be prepared to discuss, after completion of this exercise, the issue of setting targets for your national programme. If time permits, other issues considered important by you will also be discussed.

In the discussion on setting targets be prepared to explain your understanding of the following terms:

- epidemiological target
- operational target
- medium term target
- long term target

What are the necessary basic data for setting populations-based targets?

Since the main objective of this exercise is a general discussion on the conduct of Plan of Operation, with particular attention on setting targets, no answer sheet is provided.



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PART II

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ACUTE RESPIRATORY INFECTIONS

Exercises on Planning, Implementation and Evaluation of Control
Programmes within Primary Health Care

ANSWER SHEETS

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Exercise A: National ARI programme implementation.

Major items which should be included in your list are as below. Please mark on the margin (v) the items which you have missed to include in your description.

- () 1. Collection and analysis of available demographic, social, epidemiological and health services data.
- () 2. Nomination of programme manager's team and preparation of relevant job descriptions.
- () 3. Nomination of an advisory committee and list of issues and tasks for their consideration.
- () 4. Establishment of programme objectives, targets and subtargets.
- () 5. Description of programme strategies and approaches to their implementation.
- () 6. Establishment of recording, reporting and monitoring system.
- () 7. Planning for training of personnel, including PHC workers.
- () 8. Planning for health education and promotion activities.
- () 9. Planning for logistical support to the programme.
- ()10. Establishment of supervision and evaluation procedures.
- ()11. Budgeting
- ()12. Coordinatin with other programmes
- ()13. Formulation of Plan of Operations
- ()14. Nomination of intermediate level programme managers and their training.
- ()15. Programme implementation.

Exercise B: Calculating drug needs.

Step 1 Number of children under 5 years of age covered by health services will be:

year 1	-	980 000
year 2	-	1085 000
year 3	-	1190 000
year 4	-	1295 000
year 5	-	1400 000

Step 2

The proportion would be in the range 40-60%

The expected number of ARI visits per year may be:
between:

year 1	392 000	-	588 000
year 2	434 000	-	651 000
year 3	476 000	-	714 000
year 4	518 000	-	777 000
year 5	560 000	-	840 000

If you have chosen 50% proportion, the correct answer is:

year 1	490 000
year 2	542 500
year 3	595 000
year 4	647 500
year 5	700 000

Exercise B: Calculating drug needs

Step 3

The correct answer will vary depending on what proportions you have used in your calculations in step 2.

With 40% utilization the correct answers will be:

	<u>Mild ARI</u>	<u>Moderate ARI</u>	<u>Severe ARI</u>
year 1	294 000	78 400	19 600
year 2	325 500	86 800	21 700
year 3	357 000	95 200	23 800
year 4	388 500	103 600	25 900
year 5	420 000	112 000	28 000

With 50%

year 1	367 500	98 000	24 500
year 2	406 875	108 500	27 125
year 3	446 250	119 000	29 750
year 4	485 625	129 500	32 375
year 5	525 000	140 000	35 000

With 60%

year 1	441 000	117 600	29 400
year 2	488 250	130 200	32 550
year 3	535 500	142 800	35 700
year 4	582 750	155 400	38 850
year 5	630 000	168 000	42 000

Exercise B: Calculating drug needs
Step 4

From the background data of this exercise you will have noticed that in year 1 up to 80% of coverage (and utilization) will be represented by first level health facilities, in which procaine penicillin will be used as a first line antimicrobial drug and all the increase in coverage will be through development of PHC, where CHW's will use cotrimoxazol only.

According to ARI case management guidelines all moderate ARI cases will be eligible to receive first line antimicrobial drugs, and all severe ARI cases will be eligible to receive other antimicrobials (plus one day supply of a first line drug before referral).

Assuming that in Step 3 your calculations were based on 50% utilization, the correct answers in this step would be around the figures:

Number of ARI cases treated with:

	<u>Procaine Penicillin</u>	<u>Cotrimoxazol</u>	<u>Other antimicrobials</u>
year 1	78 400 (+ 3920)	19 600 (+ 980)	24 500
year 2	78 400 (+ 4300)	30 100 (+ 1500)	27 125
year 3	78 400 (+ 4000)	40 600 (+ 2000)	29 750
year 4	78 400 (+ 4000)	51 100 (+ 2500)	32 375
year 5	78 400 (+ 4000)	62 000 (+ 3000)	35 000
or	70 000 (+ 10 000)	70 000 (+10 000)	35 000

These figures may of course vary depending on your previous calculations in Step 3 and on the method of calculating the increase in coverage (utilization) of services.

The main point is to see the range of changes that may take place in time with different assumptions in regard to coverage and utilization of services, and consequently their possible impact on both achievement of programme objectives and targets and on budgetary requirements.

Exercise B: Calculating drug needs

Step 5

The case management guidelines indicate that a child treated with procaine penicillin should receive once a day for 5 days a dose of 50 000 U/kg. Procaine penicillin is usually available in vials of 4 000 000 units to be diluted with 5 ml sterile water. Although the weight of children eligible to this treatment will vary, on the average, however, one can assume that 1 ml of a 4 000 000 unit vial diluted in 5 ml of sterile water will be given daily i.e. 1 vial of procaine penicillin of 4 000 000 units will on an average be needed per child.

In regard to cotrimoxazol the guidelines indicate that a child should receive a dose of 4 mg/kg of trimethoprim twice a day and available tablets contain 80 mg trimethoprim. Again on average one can assume that a child should receive half a tablet of cotrimoxazol twice daily, i.e. 1 tablet a day for 5 days.

The correct answers in this step would then be (i) for procaine penicillin the same number of vials of 4 000 000 units as the number of children calculated in the previous step as eligible for this treatment, and (ii) for cotrimoxazol 5 times the number of children eligible for this treatment, since each child on average, will need 5 tablets.

Exercise B: Calculating drug needs

Step 6

Among factors that justify higher order, one can take into account:

- (i) Achievement of higher than estimated coverage and utilization of services in some areas
- (ii) Use of drugs not only for children under 5 years of age, but also for older population
- (iii) Epidemics of acute respiratory infections with higher than estimated proportion of moderate and severe ARI
- (iv) Loss through spoilage

Among factors that may justify lower order, one can take into account:

- (i) Lower than estimated coverage and utilization of services in some areas
- (ii) Lower than estimated proportion of moderate and severe ARI
- (iii) High proportion of patients going direct to referral hospitals and treated with second line antimicrobial drugs.

As regards the final decision it may be advisable to order more drugs than the amount calculated to meet the targets, for example, by one-third. This decision may be of particular importance at the beginning of the programme. Later on, information on actual drug consumptions can be used to adjust the needs.

Exercise C: Checklist for supervisory visit.

Among general aspects of the programme to be included, one can take into account:

- (i) a review of all the items listed in national manager's schedule of activities necessary to be undertaken prior to programme implementation, and relevant to intermediate level - see your answers to Exercise A
- (ii) particular attention should be paid to a review of network of health facilities and their involvement in the programme, and to the training of personnel

In regard to specific ARI activities, one can take into account:

- (i) review of available reports from health facilities
- (ii) Visit to two or more selected peripheral health facilities and direct assessment of activities related to ARI control, of logistical support available and of problems identified.

The duration of such a visit may vary depending on the area visited, but 2-3 days may always be necessary.

Exercise D: Programme's impact on the reduction of ARI-related mortality.

Step 1

The correct answer will be:

17 500 i.e., one-third of under 5 mortality rate of 30/1000 = 10/1000 population under 5

Step 2

The correct answer will be: 14 875

ARI-related mortality will be reduced to 4/1000 in only 25% of total under 5 populations

$$\text{i.e. } 437\ 000 \times 4/1000 = 1750$$

remaining under 5 population will still experience mortality of 10/1000 i.e. $1312\ 000 \times 10/1000 = 13\ 125$.

Step 3

According to calculations in Exercise B Step 1 in the fifth year of the ARI programme implementation there will be 1400 000 children under 5 years of age covered by health services.

With 50% adequately treated children, number of pneumonia deaths would be:

$$350\ 000 \times 10/1000 = 3\ 500$$

$$700\ 000 \times 10/1000 = 7\ 000$$

$$700\ 000 \times 4/1000 = \underline{2\ 800}$$

$$\underline{13\ 300}$$

With 75% $350\ 000 \times 10/1000$ 3 500

$$350\ 000 \times 10/1000$$
 3 500

$$1\ 050\ 000 \times 4/1000$$
 4 200

$$\underline{10\ 200}$$

With 100% $350\ 000 \times 10/1000$ 3 500

$$1\ 400\ 000 \times 4/1000$$
 5 600

$$\underline{9\ 100}$$

Exercise D: Programme's impact on the reduction of ARI-related mortality

Step 4

The number and percentage of pneumonia deaths prevented:

(i)	With 50% coverage and 50% adequate treatment	$17\ 500 - 14\ 815 = \underline{2\ 625}(15\%)$
(ii)	- " - and 75%	$17\ 500 - 13\ 562 = \underline{3\ 938}(22.5\%)$
(iii)	- " - and 100%	$17\ 500 - 12\ 250 = \underline{5\ 250}(30\%)$
(iv)	With 80% coverage and 50% adequate treatment	$17\ 500 - 13\ 300 = \underline{4\ 200}(24\%)$
(v)	- " - 75%	$17\ 500 - 10\ 200 = \underline{7\ 300}(41.7\%)$
(vi)	- " - 100%	$17\ 500 - 9\ 100 = \underline{8\ 400}(48\%)$

Impact of ARI programme on the reduction of total under 5 mortality would be:

(i)	5.0%	reduction
(ii)	7.5%	- " -
(iii)	10.0%	- " -
(iv)	8.0%	- " -
(v)	13.9%	- " -
(vi)	16.0%	- " -