BASIC PRINCIPLES FOR CONTROL OF ACUTE RESPIRATORY INFECTIONS IN CHILDREN IN DEVELOPING COUNTRIES

A Joint WHO/UNICEF Statement

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PREFACE

In most developing countries, over 50% of all deaths occur among children under 5 years of age, even though this group generally makes up only 15% of the population. The main causes of childhood mortality are acute respiratory infections and diarrhoeal diseases. Control of these infections, therefore, has important implications not only for child survival but also for the success of primary health care, family health, and socioeconomic development.

The WHO Programme on Acute Respiratory Infections was initiated in response to the concern expressed by developing countries about the high mortality from these diseases in infants and young children. In 1983, the newly appointed Technical Advisory Group on Acute Respiratory Infections formulated guiding principles for control of these diseases. The "Basic Principles" outlined in this booklet are based on the Group's recommendations, and were first discussed at the UNICEF/WHO Joint Committee on Health Policy at its 25th session in 1985.

1. INTRODUCTION

Acute respiratory infections (ARI), diarrhoeal diseases and malnutrition are the principal causes of illness and death in children in developing countries. Until recently the acute respiratory infections have received relatively little attention, but many developing countries are now recognizing the problem and have expressed their concern about how to deal with it. Reduction of child mortality is a priority goal of both WHO and UNICEF and a strategy for dealing with ARI is emerging as a critical programme component for both agencies.

In the past few years there has been significant progress in our understanding of the problem of acute respiratory infections and their susceptibility to intervention in developing countries. In particular, the importance of bacteria as a cause of severe lower respiratory tract infections and death is widely accepted; effective supportive and antimicrobial treatment is available, and therefore many deaths can be averted. Existing clinical experience has been consolidated into simple case management plans that could be handled by trained community health workers; the progress expected in the development of primary health care will provide the infrastructure required to put these plans into effect.

2. THE MAGNITUDE OF THE PROBLEM

Acute respiratory infections constitute a complex and heterogeneous group of diseases caused by a great number of etiological agents and affecting any site of the respiratory tract.

While in many places children suffering from severe acute respiratory infections do not have the benefit of essential antimicrobial treatment, in other places indiscriminate and inappropriate

use of antibiotics is very common. A control programme for acute respiratory infections will rationalize the use of antimicrobials, help to preserve their effectiveness and, in many instances, reduce the expenses.

Of the respiratory diseases, lung infection (pneumonia) is the most frequent cause of death among children under five years old. Bronchiolitis, acute laryngitis (croup) and epiglottitis also often have a fatal outcome.

Data on registered deaths from these causes show striking differences between developing and developed countries. Mortality from such infections in developing countries is 30-70 times higher than in developed countries. It has been estimated that about 20% of infants born in developing countries fail to survive their fifth birthday, and that one-fourth to one-third of the child mortality is attributable to acute respiratory infection as an underlying or a contributing cause.

Accurate data on the incidence of acute respiratory infections are limited, but community-based longitudinal studies indicate that it is very high everywhere. On the average, a child in an urban area has from five to eight attacks annually, with a mean duration of 7-9 days. Most of these are the less serious upper respiratory tract infections. In rural areas the incidence seems to be lower. The incidence of severe lower respiratory tract infections, which account for most of the mortality from acute respiratory disease, is of particular importance in developing countries; low birth weight and malnutrition are associated with a very high risk of dying from these diseases.

The magnitude of the problem is also well represented by health services' statistics. Acute

respiratory infections are the leading reason for the use of health services; they constitute 30 to 50% of paediatric outpatient attendances, and 10 to 30% of child admissions to hospitals.

3. ETIOLOGICAL AGENTS

Evidence is now accumulating that in developing countries bacterial pathogens play a far greater role as a primary or secondary cause of severe lower respiratory tract disease than in developed countries. In investigations conducted among hospitalized children with pneumonia who had not received previous antimicrobial treatment, around 60% of lung aspirates yielded bacterial growth (Brazil, Chile, Gambia, India, Nigeria, Papua New Guinea and Philippines). This does not diminish the fact that respiratory viruses are widely prevalent and are probably the etiological agents in the first phase of most acute respiratory infections. The subsequent bacterial infection might be favoured by impairment of immunity in malnourished children, poor environmental conditions, and the lack of appropriate health care.

The available evidence indicates that Streptococcus pneumoniae and Haemophilus influenzae are the most prevalent bacterial agents of community-acquired pneumonia in children in developing countries. Efficient case management of acute respiratory infections within primary health care should include the administration of appropriate antimicrobials as a component of the strategy to control mortality. In recent years infections with bacterial strains with decreased susceptibility to antibiotics belonging to the penicillin group have been increasingly encountered. Most reports, however, relate to developed countries, and in many cases the drug resistance is relative. Respiratory infections caused by pneumococci or H. influenzae in developing countries can be

considered therapeutically susceptible to adequate doses of injectable penicillin or oral ampicillin or co-trimoxazole. Thus the use of these antimicrobials is warranted in developing countries for community-level treatment of pneumonia in children. However, monitoring of the therapeutic efficacy and surveillance of microbial drug sensitivity are essential components of strategies anywhere in view of the threat of increasing drug resistance of these two microorganisms. There is a need to control the use of antimicrobial drugs to avoid indiscriminate use and inadequate dosages leading to development of resistant strains.

4. AVAILABLE CONTROL METHODS

The control methods that can be implemented now at the community and first referral health care levels of developing countries are preventive measures (including immunization), case management and health education.

4.1 Preventive Measures

(a) Immunization against diphtheria, pertussis, measles and childhood tuberculosis* is already part of the Expanded Programme on Immunization. Strengthening of this Programme should have very high priority for any country that starts addressing the problem of acute respiratory infections since these conditions contribute heavily to childhood mortality and morbidity.

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*In children pulmonary tuberculosis usually starts as an acute infection and may progress to become a chronic one.

(b) Non-specific preventive measures at the community level to be promoted through health education include prenatal care aimed at increasing the birth weight, breast-feeding, proper nutrition, protection against chills, and reduction of parental smoking and other indoor air pollution.

4.2 Case Management

The content of case management may present wide variations among countries according to local disease characteristics, awareness and motivation of the population, traditions in paediatric practice and resources. In any situation correct case management includes differentiation of clinical condition by degree of severity, supportive measures, antimicrobial therapy and appropriate referral.

(a) Identification of clinical conditions for management

A number of simple decision trees and flow charts based on selected, easily recognizable signs and symptoms of acute respiratory infections have been developed to facilitate the process of diagnosis and timely decision-making. The critical decisions are whether or not to give antimicrobials and whether or not to refer to a higher level of care.

The degree of clinical severity of a child with cough can be discriminated through the observation of a few cardinal signs, on which the management decision can be based. For example:

- Chest indrawing or inability to drink indicates severe infection, which requires antimicrobial treatment plus referral to the district hospital.

- Respiratory rate over 50 per minute (in the absence of the two previous signs) indicates moderate disease, which requires antimicrobial treatment but can be treated at home.

- In the absence of the three previous signs the case can be considered mild, and only supportive measures and close observation are indicated.

In areas where stridor and wheezing are frequent, complementary instructions for their management are needed. Most upper respiratory infections are mild and no antimicrobial treatment is required.

The most difficult part of the programme will be the development of a management system that can be used by semi-literate parents and community health workers. Yet it is the easy access to effective therapy that will be the major determinant for the reduction of mortality. This, in turn, means availability of appropriate antimicrobial treatment at the community level and a functioning referral system for more severe cases.

Detailed and clear instructions must be provided to the community health workers, both through manuals and training programmes. Their capacity to discriminate acute respiratory infections into different management categories is crucial to the success of the programme.

(b) Antimicrobial therapy

One problem in diagnosis is early identification of moderate and severe cases for which the use of appropriate antimicrobial drugs may be a life-saving measure. The main issues concerning antimicrobial drugs that deserve consideration are:

(i) decision to use an antimicrobial drug at the community level;

(ii) choice of drug;

(iii) dosage;

(iv) duration of therapy.

The indications for the use of antimicrobial therapy in the clinical management of acute respiratory infections may vary from country to country depending on the following factors:

(i) the prevailing bacterial pathogens;

(ii) pattern of bacterial sensitivity to drugs;

(iii) policies regarding the use of antimicrobials and administration of intramuscular injection by the community health workers;

(iv) acceptability of the form in which medication is given to the local people, e.g. injections, tablets, mixtures;

(v) cost of treatment;

(vi) structure of the health system.

Parenteral penicillin is generally the drug of choice for the initial treatment because of its high effectiveness and its low cost. The selection of the best initial drug treatment is more difficult when the health worker is unable or is not allowed to give injections. In such a case oral ampicillin (or amoxycillin) or co-trimoxazole can be considered as a possible first choice.

Provisions should be made for at least a second-line standard antimicrobial drug to be used at the first referral level. The important thing is to define the standard clinical management strategy appropriate for the different levels of health care in the country, including choice of drug and treatment schedule, and to ensure that the supplies are available and that training and supervision are standardized accordingly.

The drug cost of treating a child with injectable penicillin, oral ampicillin, amoxycillin or co-trimoxazole is very low.* It has been estimated that in developing countries, in any year, 5-10% of children less than 5 years old will require such treatment.

(c) Supportive treatment at primary health care level

Supportive treatment has an important role in the management of acute respiratory infections. Most sick children can well be managed at home provided that the community health workers and the family are able to give them appropriate supportive treatment.

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* The drug cost (1985 UNICEF List) for treating a child for five days is:

procaine benzylpenicillin (50 mg/kg once a day)	$0.20
ampicillin (25 mg/kg every 6 hours)	$0.42
amoxycillin (15 mg/kg every 8 hours)	$0.46
co-trimoxazole (4 mg of trimethoprim per kg and 20 mg of sulfamethoxazole per kg every 12 hours)	$0.08

Children with such an infection may suffer anorexia, and breast-feeding infants might have difficulties in sucking because of blocked airways and troublesome breathing. In many regions hydration maintenance and feeding during and following recovery from the illness is inadequate. If the child suffers from repeated attacks of respiratory disease, severe malnutrition may ensue and increase the risk of a fatal outcome. During the infection, breast-feeding must be continued and the intake of liquids increased.

(d) Referral support

There are some cases of severe respiratory infection that must be referred immediately because they cannot be adequately managed at the community level. Others require referral because they fail to respond to first-line treatment. Such children should be referred within hours rather than days. Referral facilities should have available second-line antibiotics and, whenever possible, equipment for oxygen therapy.

The provision of appropriate support will increase the effectiveness of the community health worker and his or her acceptability in the community, particularly if the linkages between the worker and the referral facility are good.

4.3 Effectiveness of Case Management

Effectiveness of case management depends on getting the community informed and involved through health education, aimed at:

(a) increasing the capability of families to differentiate moderate and serious respiratory illness from mild disease and to decide when to seek help;

(b) educating the community regarding simple supportive therapy;

(c) promoting timely immunization against measles, pertussis, diphtheria and childhood tuberculosis;

(d) promoting breast-feeding;

(e) reducing parental smoking and other domestic air pollution.

The education efforts must be based on an understanding of local health behaviour and on what medical care can offer and how to make the best use of available services.

5. PHASED IMPLEMENTATION OF THE ARI PROGRAMME

The ARI control programme based on health education and well-defined case management should be introduced in a phased manner, and be supported by health systems research, to maximize the effectiveness of the approach and to monitor closely its impact on mortality from acute respiratory infections. In view of the complexity of the problem, epidemiological, etiological and clinical research will have to be pursued to strengthen further the country programmes. This does not mean that such research is necessary in each country or that countries should wait for results of research before implementing improved case management of respiratory infections in their primary health care network.

It is proposed, however, that health systems research on acute respiratory infections be given high priority in a phased implementation of the ARI programme. Among the many strategies that could be tested, those dealing with the ability of families and community health workers to recognize