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PNEUMONIA IN CHILDREN IN EUROPE

Report on a WHO Meeting

Zagreb
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ABSTRACT

Certain European countries have areas with high infant mortality rates (over 40 per 1000 live births). National control programmes have been shown to reduce infant and child mortality from acute respiratory infections, which are the leading cause of death among this age group. A WHO meeting was called to review the incidence of and mortality from such infections, particularly pneumonia, in Europe, and the methods of surveillance and reporting in use. The participants drew up a nine-point framework for a national control programme, which five countries with areas of high infant mortality agreed they would (or already had begun to) formulate. Other countries were invited to review their management and surveillance of acute respiratory infections and inform the WHO Regional Office for Europe of the results. Ways of lowering their infant mortality from such infections still further were suggested.

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Introduction

Mortality from acute respiratory infections (ARI) has been observed to fall in children in some developing countries after the introduction of national control programmes. A meeting on pneumonia in children in Europe was therefore held by the WHO Regional Office for Europe in the School of Public Health, Zagreb, Yugoslavia, from 26 to 28 September 1990.

The aims of the Meeting were to:

- review the epidemiology of ARI and pneumonia in children in the European Region;

- discuss the feasibility of national control programmes to prevent premature death from pneumonia in areas with high infant mortality rates (IMR).

Representatives from Albania, Romania, Turkey, USSR and Yugoslavia were invited to present data for their respective countries on the magnitude of this problem and current practices for the control of ARI. These countries are known to have areas with a high IMR (i.e. in infants from birth to 1 year of age). Additional data were presented by representatives from France, Sweden and the United Kingdom on pneumonia caused by *Chlamydia* spp. and on the surveillance of ARI in France and the United Kingdom.

The meeting was chaired by Dr A. Georgescu. Dr V. John was elected as a Vice-Chairperson and Dr S. Walters was Rapporteur. The WHO secretariat was represented by Dr B. Bytchenko, the Regional Office, and Dr A. Pio, headquarters. The participants are listed in Annex 1.

Reports from specific countries

Albania

The IMR for 1989 was 30.8 per 1000 live births while child mortality (1-5 years of age) was 3.8%. Regional variations in the IMR were identified. In 13 of the country's 26 districts the IMR was over 30 per 1000 live births.

Diseases of the respiratory tract are the largest cause of death in both these age groups, accounting for 39.6% and 37.8% of deaths respectively. Most of these deaths are probably due to pneumonia. One study of post mortems on children dying from ARI in hospitals showed that 52% of deaths were thought to be due to viral pneumonia and 39% due to bacterial pneumonia.

Malnutrition, low birth weight and bottle feeding of infants were identified as risk factors that increased morbidity and mortality.

When pneumonia is diagnosed at the primary health care level, beta-lactam antibiotics are usually prescribed. Incorrect traditional beliefs and attitudes to disease persist in the community and emphasis is placed on health education in this setting. Treatment in hospitals permits the use of more effective and more expensive combinations of antibiotics.

Romania

The available data are based mainly on 1988 statistics. The IMR for 1988 was 25.3 per 1000 and in 1989 was 26.9 per 1000. In 1988, the main cause of death in infants was respiratory tract disease at 8.6 per 1000. Likewise, one third of all deaths in the 1-4 year age group was also due to respiratory tract disease.

Regional variations in the IMR were identified and in 5 of 40 districts it was over 30 per 1000 (48.4 per 1000 in one district in 1989).

Data from these five districts showed that in the 0-2 year age group, 37% of all deaths were due to ARI, and that each child had an average of 3.44 respiratory illnesses per year. The cause of these ARI was considered to be viruses in 57% of cases, bacteria in 33.6%, a mixture of both in 7.85% and other causes in 1.6%. Low birth weight was identified as a significant contributor to mortality.

Turkey

In 1983, the IMR was 95 per 1000 and in 1988, it was 78 per 1000. Large regional variations exist, with an IMR of 103 per 1000 in the eastern part of the country and 47.5 per 1000 in the west. In one survey, ARI accounted for 13.1% of deaths in the first year of life, and 22.2% of those in the 1-4 year age group.

An ARI programme began in 1988 and is now being implemented in 20 provinces in the eastern and south-eastern parts of Turkey.

USSR

The IMR in 1976 was 31.4 per 1000 and has slowly decreased since then. It was 24.6 in 1988 and the projected rate for 1990 was 21.1. Regional differences were identified enabling the USSR to be divided into three areas:

- republics with a low IMR (Byelorussia, Estonia, Lithuania, Latvia and Ukraine);

- republics with a medium IMR (Armenia, Georgia, Moldavia and Russian Federation);

- republics with a high IMR (Azerbaijan, Kazakhstan and the Republics of Central Asia).

In areas of high IMR, infectious diseases were identified as the main cause of death. In the Republics of Central Asia, they accounted for 63% of deaths and 71% of these were due to infections of the respiratory tract.

Yugoslavia

Regional differences in the IMR were identified with a rate of 10-15 per 1000 in the more developed republics, and 40-52 per 1000 in the less developed republics.

A large proportion of these deaths are probably due to ARI. In one study of children aged 0-6 years attending outpatient clinics, 67% suffered from ARI of which 1.1% were diagnosed as having pneumonia. Of children aged 0-4 years in hospital, 13.1% had ARI and 8.8% had pneumonia. ARI is therefore a major cause of morbidity and mortality in children in Yugoslavia.

The incidence of ARI seems to be almost the same in different areas, but the outcome is different. This is partly due to variation in the quality of health services. An ARI programme is clearly needed, especially for the areas with the highest IMR such as Kosovo and Macedonia. To this end, the management technology developed by WHO for ARI is being adopted in and adapted to local conditions. The maternal and child health centre in Zagreb has initiated such a programme, placing emphasis on the training of health workers and the involvement and participation of the community. Investigations are being made into the lack of knowledge and faulty practices of health workers and parents, to focus training and health education on appropriate targets. This information can then be used to help formulate appropriate ARI programmes in other areas of the country.

Additional reports

Pneumonia in children caused by *Chlamydia*

It has recently been recognized that *Chlamydia* spp. can cause pneumonia not only in neonates but also in children. Three species have been identified: *C. trachomatis*, *C. psittaci* and *C. pneumoniae*. Diagnosis can be made by tissue cell culture techniques, host antibody response to infection (although this can take several weeks), antigen detection by enzyme immunoassay or immunofluorescence and, more recently, DNA hybridization by polymerase chain reaction (PCR). With time, antigen detection techniques may become cheap, simple and reliable diagnostic tools.

C. trachomatis infections are widespread in most populations. In the newborn, the infection may be subclinical, may cause conjunctivitis or may cause pneumonia with or without conjunctivitis. The pneumonia may predispose to obstructive lung disease in later life.

C. pneumoniae infections commonly cause upper respiratory tract disease as well as pneumonia. The prevalence in a population of antibodies to this organism depends on age and is higher in children in developing countries than in western industrialized countries. *C. pneumoniae* also seems to cause more cases of pneumonia in developing countries. In western countries, the epidemic occurrence of infections every three to six years has been described.

Erythromycin is the treatment of choice for all types of pneumonia caused by *Chlamydia* spp. in children, and this emphasizes the importance of establishing the diagnosis.

Surveillance of acute respiratory infections in children in France

Between 1925 and 1975, IMR fell dramatically from 100 to 13 in France owing largely to a decrease in deaths from infectious causes. It can be assumed that many of these deaths were due to infections of the respiratory tract. Despite this decrease, respiratory viral infections remain a major concern, particularly influenza and respiratory syncytial virus (RSV).

Each year, RSV causes significant illness and occasional deaths in infants and young children. This infection is particularly dangerous for children who are immunocompromised, or suffering from bronchopulmonary or cardiac disease or malnutrition. The pattern of seasonal epidemics during winter months is well established.

Epidemic episodes of influenza occur every year and the age distribution of cases usually shows a large predominance of children in the incidence but not necessarily in the mortality figures. Surveillance programmes enable such epidemics to be identified early and, with rapid feedback of information, help clinicians make the correct diagnosis. They also allow appropriate vaccination programmes to be initiated early in the course of an epidemic.

A successful surveillance system has been set up that relies on selected general practitioners regularly reporting newly diagnosed cases. The success of this system is due largely to the prompt feedback of information to these clinicians.

Surveillance of pneumonia in children in the United Kingdom

Surveillance data can be obtained from different sources, each of which has limitations in its ability to reflect the true pattern of pneumonia in the population.

Mortality statistics for England and Wales in 1987 and 1988, derived from an analysis of death certificates, show that deaths from respiratory disease in the 0-4 year age group are not a major public health problem. In the age group 28 days to 1 year, respiratory disease is the third most common cause of death (0.5 per 1000 population) and in the 1-4 year age group it is the fifth most common cause of death (less than 0.05 per 1000 population). Most of these deaths are due to pneumonia of unknown etiology, but some viruses (e.g. influenza) and bacteria (e.g. pneumococcus) have been identified.

In 64 geographically widespread areas throughout the United Kingdom, selected general practitioners report all diagnoses they make each week. This provides incidence data on a total patient population of 460 000 (about 25 000 children), from which an estimate is made of the weekly incidence of specific diseases. These data clearly show the seasonal variation in pneumonia and, in particular, the winter epidemics of influenza.

All positive microbiological identifications in hospital or public health laboratories in England and Wales are reported to the Communicable Disease Surveillance Centre, London. Analysis of these data shows the quarterly and annual identification of specific pathogens. In this way, influenza A and B and RSV are shown to predominate in the winter months, while parainfluenza is identified more frequently in the summer months. Adenovirus and mycoplasma show no seasonal variation. The annual identifications of influenza viruses reflect the size of annual epidemics. RSV identification appears to be increasing each year (fewer than 2000 isolates in 1983 and over 6000 in 1988). This, however, may result from improved diagnostic facilities and increased requests for specimen analysis.

Approach to programme formulation

The five represented countries - Albania, Turkey, Romania, USSR and Yugoslavia - all reported that ARI is a serious health problem and that pneumonia contributes significantly to child mortality in these countries. The representatives from each of these countries recognized the need for a national or regional programme to control ARI and reduce mortality from pneumonia. Yugoslavia has already started to formulate such a programme as part of its existing health services. The representatives from the other four countries also agreed to formulate a programme based on WHO guidelines to address this problem in their country.

Such a programme must be acceptable and beneficial to each country. It could be designed to address specific problems that had been identified by surveillance, and it could also include pilot studies. Discussion with medical staff is necessary to establish to what extent the standardization of case management is acceptable. The framework for such a programme is suggested here, comprising nine components that should be considered when a country formulates its own programme: management, assessment, feasible and effective strategies, objectives, policies, activities, a timetable of activities, resources, and research and development.

1. A manager should be designated by national authorities, at national or regional level, to be responsible for the programme.

2. Case definitions of pneumonia and other ARI should be standardized, to ensure that the quality of surveillance and reporting is sufficient to enable the optimal assessment of the problems.

The following should be assessed:

- infant and neonatal mortality rates;
- pneumonia incidence and mortality rate in children;
- ARI incidence and mortality rate in children;
- changes in trends and geopolitical distribution of the above-mentioned mortality rates and incidences;
- existing practices of case management and inappropriate drug use in ARI;
- knowledge, attitudes and practices within the community with regard to ARI.

3. Feasible and effective strategies should be developed in three main areas: case management, vaccination coverage and control of risk factors.

Case management should be optimized by two means: first, by increasing access to correct case management through the training and supervision of health workers and by addressing the logistics of providing appropriate drugs, equipment and facilities; and second, by increasing the use of correct case management by educating the community. In particular, this should involve the introduction of standardized case management, which should reduce mortality and the inappropriate use of drugs.

Vaccination coverage should be improved.

The prevention and correction of risk factors could decrease the incidence of pneumonia and therefore the mortality from it.

4. The main objective should be the reduction in mortality from pneumonia. Additional objectives that may differ slightly for each country could also be adopted, such as the reduction of the incidence of pneumonia, the prevention of complications of ARI or the reduction of the financial waste from inappropriate use of drugs. The targets could also vary for each country: for instance, not only the size of the reduction in mortality but also the time scale over which it is to be achieved.

5. Policies are needed to secure the acceptance and support of the suggested programme both politically and financially by the relevant national authority.

6. Activities that should be included can be divided into the following categories:

- training of personnel;
- supervision of personnel;
- logistics of the supply of drugs, vaccines and equipment;
- health education (through communication science);
- monitoring of the programme and feedback, for example through data collection, training, education, and assessment;
- surveillance through a reporting system, surveys (including use of drugs), a disease surveillance system, sentinel surveillance, and surveillance of etiological agents and antibiotic resistance;
- evaluation.

7. A timetable of activities should be drawn up.

8. The resources required, both personnel and budget, should be identified.

9. Research and development needs should be explored.

Research priorities

Some data on health, social and economic factors must be available before anyone can decide what intervention is required, convince relevant authorities that the problem is severe and later evaluate the effect of the programme.

If the magnitude of the problem is known it is possible to set quantified objectives and targets. The size and nature of the problem in many countries of the Region is largely unknown and needs to be identified. This means in particular determining the child mortality from pneumonia both as a national mortality rate and in any regional variations. This should be stratified by age. Similarly, the incidence of pneumonia should be determined.

The inappropriate use of drugs should be identified, in particular the abuse of antibiotics and the use of unnecessary and harmful "cough and cold" remedies. In addition, incorrect case management of pneumonia should be identified and the knowledge, attitudes and practices of both health workers and the community should be assessed.

A knowledge of the endemic and epidemic etiological agents is needed. This could be obtained by taking case samples to identify known common respiratory pathogens (e.g. such bacteria as *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus* and *Chlamydia* spp., with determination of their sensitivity to antibiotics, or such viruses as influenza A and B,

RSV, parainfluenza and adenoviruses). Reference laboratories will need to be designated to assist these microbiological investigations, especially in establishing the etiology of epidemics of respiratory infection.

Conclusions and recommendations

1. Countries with infant mortality rates above 40 per 1000 live births in some geopolitical areas plan to develop national or subnational ARI control programmes, to be implemented through primary health care services.

2. The main objectives of these programmes, in the framework of target 4 of the regional strategy for health for all, will be:

- to reduce mortality from acute lower respiratory infections (ALRI), especially pneumonia in children, by at least 50%;
- to reduce the incidence of ALRI in children;
- to reduce the severity of and complications from ALRI in children;
- to reduce the inappropriate use of antibiotics;
- to reduce unnecessary visits by children with mild ARI to treatment centres.

3. The main control strategy to attain target 4 and its ARI objectives will be the correct case management of pneumonia and other severe forms of ARI.

4. A specific strategy for preventing ARI in children caused by diphtheria, measles, pertussis, *Haemophilus*

influenzae B and other bacterial and viral infections is immunization with effective vaccines already available or to be developed.

5. More general strategies for the control of ARI in children are the elimination of risk factors such as low birth weight, malnutrition, specific nutritional deficiencies (such as lack of vitamin A), being cold, indoor and outdoor air pollution (smoke from fuel and tobacco and other pollutants), and overcrowding, including in children's institutions.

6. All Member States are invited to review their case management of pneumonia and other severe complications due to ARI in children and report the results of their surveys to the Regional Office.

7. All Member States are invited to review their drug therapy in the management of ARI in children and report the results of their surveys to the Regional Office.

8. All Member States are invited to review their surveillance and reporting on incidence of and mortality from pneumonia and pneumonitis, bronchiolitis, laryngotracheobronchitis (croup) and epiglottitis in infants (0-12 months) and children 1-5 years of age, and report the results of studies to the Regional Office.

9. All Member States are invited to evaluate their surveillance and reporting on the incidence of the common cold, acute sinusitis, pharyngitis/tonsillitis and acute otitis media in children under the age of 5, and report the results of studies to the Regional Office.

10. To increase the effectiveness of ARI control activities in the Region, such programmes should have the support of a laboratory network for the rapid identification of cause agents in ARI outbreaks. Similar laboratory networks should be developed for the surveillance of resistance.

11. Countries with lower IMR may consider developing ARI control programmes according to the components 2-5 outlined in the section on programme formulation.

12. National and subnational programmes on ARI control should adapt technical guidelines and other materials provided by the ARI programme at WHO headquarters to their local conditions. The training of medical and health staff as well as health education for the public should be promoted.

13. Each national programme on ARI control will determine its own priority research components necessary for its successful implementation.

14. The progress of work on ARI control in the Region should be reviewed annually.

Annex 1

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PNEUMONIA IN CHILDREN IN EUROPE

WORLD HEALTH ORGANIZATION
Regional Office for Europe
COPENHAGEN

TARGET 4

REDUCING DISEASE AND DISABILITY

By the year 2000, the average number of years that people live free from major disease and disability should be increased by at least 10%.

Note