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Rubella - prc.
Diphtheria
Tetanus
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PROBLEMS OF RUBELLA PREVENTION STRATEGY IN EUROPE AND ELIMINATION FROM THE EUROPEAN REGION OF CONGENITAL RUBELLA, DIPHTHERIA, NEONATAL TETANUS AND POLIOMYELITIS

Report on a WHO Meeting

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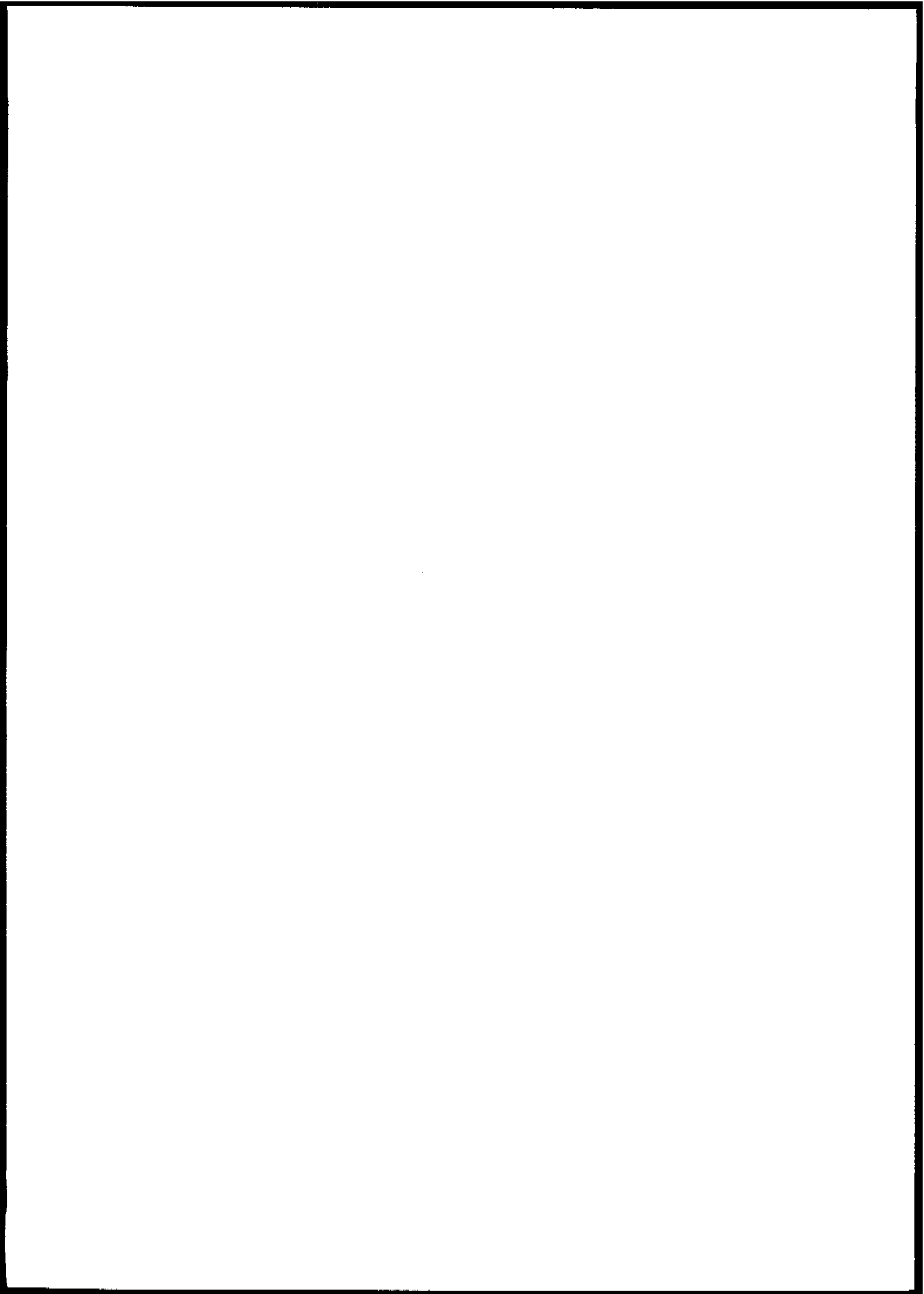
CONTENTS

	Page
Introduction	1
Congenital rubella	1
Poliomyelitis	3
Diphtheria	3
Neonatal tetanus	3
Summary and conclusions	3
Annex 1 List of participants	4



Introduction

An informal ad hoc consultation on the feasibility of elimination from the European Region of congenital rubella, diphtheria, neonatal tetanus and poliomyelitis was held in Copenhagen on 27 and 28 June 1983. A list of participants is attached as Annex 1. Before discussing the individual conditions, a few general statements about immunizations are in order.

(1) An agency for planning, implementation, coordination, and evaluation of immunization activities should be designated in each country.

(2) All vaccines used should be safe and effective and meet WHO standards.

(3) Surveillance systems are essential to monitor disease occurrence, vaccination coverage, and adverse reactions to vaccines. Where they do not exist, they should be established; where they do exist, consideration should be given to strengthening them. Investigation of individual cases is particularly important for diseases as they become less common and disappear.

(4) Each vaccine recipient should receive a record of the date and type of each dose of vaccine administered.

Congenital rubella

Although rubella is usually a mild disease with few complications, infection during early pregnancy can have a devastating effect on the foetus, causing foetal death or severe malformations in a high proportion of those infected. The incidence of prenatal rubella infection becomes progressively greater as the natural transmission rate grows less, with the result that a higher proportion of pregnant women are susceptible to the disease. Congenital rubella syndrome imposes a severe and continuing load upon the family, upon social services and upon educational services, as well as incurring tremendous life-long financial costs. Prenatal rubella infection poses a real or potential threat throughout the Region although its exact impact has not yet been demonstrated in all countries. Improvement of surveillance of rubella and prenatal rubella infections (including abortions undertaken because of rubella) should be a priority.

Live attenuated rubella vaccines were first licensed in 1969 and have been shown to be highly effective, inducing sero conversion in well over 90% of those vaccinated. Three types of vaccine are or have been available in Europe: HPV 77 derived, Cendehill and RA 27/3. Observations now extending up to 16 years indicate that vaccine-induced immunity is long-lasting. Further studies will be needed to demonstrate whether immunity is life-long; this is an important issue since the vaccine is typically given several years before the individual is at risk of having a rubella-damaged pregnancy.

Rubella vaccines are safe. Although up to 35-40% of susceptible adult female vaccinees may exhibit transient arthralgia, temporary disability or frank arthritis are quite rare. The major concern about use of rubella vaccines has related to their possible teratogenicity. The largest body of information on this subject comes from the United States, where data are now available on 174 susceptible women who received rubella vaccine within three months of conception and who carried their pregnancies to term (94 received HPV 77 or Cendehill vaccines, 80 received RA 27/3). None gave birth to infants with congenital rubella syndrome although a few infants had serological evidence of intrauterine infection. These data indicate that rubella vaccines have a low potential for teratogenicity and that vaccination during pregnancy should not be considered an automatic indication for termination of the pregnancy. Nonetheless, data are not yet sufficient to state that vaccination during pregnancy poses no risk to the foetus and vaccination of women known to be pregnant should be avoided.

Problems have arisen in the interpretation of serologic tests for susceptibility to rubella with older tests such as hemagglutination inhibition often being less sensitive and less specific than newer tests. Continuing work is necessary to ensure the proper standardization and evaluation of all serological tests.

Serologic testing prior to vaccination is unnecessary for children. Although not essential before vaccinating adults, serologic screening may be useful and cost-effective in many circumstances, depending on the relative costs of testing and vaccine and on the certainty that identified susceptibles will be successfully followed up and vaccinated.

Administration of immune globulin after exposure to rubella can modify the clinical expression of disease but cannot be relied upon to prevent congenital infection. Consequently, use of immune globulin should be confined to situations in which a susceptible pregnant woman has just been exposed to rubella and will not consider termination of pregnancy.

The effectiveness of rubella vaccination programmes in practice depends on the vaccine acceptance rate and upon the choice of strategy. There are two main options for this choice. The minimal acceptance requirements differ according to the choice of strategy and, conversely, the choice of strategy must depend upon the likelihood of these minimal acceptance requirements being met. The two main strategic options are:

(a) a programme of protecting women from the effects of exposure, without (necessarily) influencing the transmission rate of rubella itself; a reduction in the transmission rate can be counterproductive among the women who are not vaccinated; this strategy is attained through vaccinating schoolgirls and women of child-bearing age;

(b) a programme of protecting pregnant women from being exposed in the first place by very considerably reducing the transmission rate to levels far below those observed in nature; this strategy is attained through vaccinating young children of both sexes.

The choice of strategies or combinations of strategies is necessarily influenced by considerations of feasibility, especially those concerning the current accessibility of the respective populations and the possibility of attaching a rubella vaccination programme to an existing programme. When possible, use of combined antigen vaccines (measles-rubella, measles-mumps-rubella) should be considered to increase the cost-effectiveness of the programme. Since cost of the vaccine is an appreciable factor, consideration should be given to the means of obtaining vaccines at the lowest price, including the possibility of large-scale national or international (e.g. through WHO) contracts. Consideration should also be given to the means of obtaining the lowest costs of administration of vaccine. However, the main basis of choice of strategy should be determined through calculating the likely results of a programme in the circumstances in which it has to be managed; no choice should be made without such calculations having been performed. Whatever strategy of vaccination is chosen, immunity to rubella should be ensured for those who are in close contact with pregnant women, particularly health care personnel of both sexes.

In general, strategies based on schoolgirl vaccination produce their results slowly and take about 20 years to produce their full effectiveness. The response in terms of prenatal rubella infection prevented is roughly linear with the acceptance/efficacy rate of the vaccine. That is, if 60% of the target population accepts the vaccine, then 60% of the cases will be prevented. Programmes based on vaccination of preschool children of both sexes have the advantage of a more rapid response, and can be expected to produce their full response within about 10 years of initiation. However, the response is not linear with input. In particular, vaccine uptakes less than about 70% may produce long-term results significantly worse than the schoolgirl vaccination system, whereas uptakes greater than 70% should produce better results. Moreover, uptake rates less than 70% could produce oscillations such that intermediate term results were worse than if no vaccination programme had been started at all.

It therefore follows that a choice for the preschool child vaccination strategy must be preceded by firm reassurance that high levels of compliance (voluntary or imposed) can be achieved. In addition, the possibility of decay of vaccine-induced immunity seriously influences the choice. For the schoolgirl vaccination system, the effect of decay is simply to reduce effectiveness in a linear manner. For the preschool vaccination-type system, by contrast, the potential effect is to delay the age at infection from childhood to adult life and to set the stage for a severe "rebound" phenomenon which, in the worst projected calculations, could be disastrous.

While the passage of time has so far failed to demonstrate decay rates on a scale which would give serious concern, it may yet be a few years before countries which have already adopted a schoolgirl programme, and which are only just beginning to reap its benefits, might find it appropriate to adopt a strategy of vaccinating preschool children of both sexes or a combination of vaccination approaches.

In the mean time, it is essential that, within individual countries, and possibly within Europe itself, a compatibility of policy should be sought, such that one district or country does not find itself in the position of trying to reduce transmission rates, while another neighbouring district or country is trying to maintain them. Countries or districts which opt for interrupting transmission will face the subsequent task of protecting their populace from reintroduction of

rubella and of maintaining high uptake rates for the indefinite future in the absence of the local stimulus of the continued presence of the diseases. For many countries, it is doubtful whether this can be achieved without the introduction of compulsory vaccination, e.g. for school entry.

Whichever approach, or combination of approaches, is taken, prenatal rubella infection can and should be eliminated from Europe before the end of this century. Achievement of this objective will require attainment of immunization levels in excess of 90% in designated target populations.

Poliomyelitis

Although once a cause of periodic severe epidemics causing thousands of cases of paralysis each year, a remarkable degree of control over poliomyelitis has been achieved in most countries in the Region. Overall there has been a 97% decline in annual reported incidence comparing the period 1958-60 with 1976-80 and several countries have apparently eliminated indigenous disease. Both live and inactivated vaccines have been used successfully. Nonetheless, several hundred cases were reported from the Region each year during the period 1976-80, primarily from a limited number of countries. Paralytic disease due to indigenous transmission of wild poliovirus can and should be eliminated from the countries of the European Region by 1990. In the few areas where transmission persists, services should be strengthened to interrupt it. In other areas, current immunization levels must be maintained to ensure that the progress made is not lost.

Diphtheria

Diphtheria was once a cause of major epidemics in the European Region with thousands of cases reported each year. Through widespread vaccination, the incidence of diphtheria has been dramatically reduced and in many countries, indigenous cases no longer occur. Elimination of indigenous respiratory diphtheria can and should be accomplished in the Region by 1990 through maintenance and strengthening of immunization services.

Neonatal tetanus

Neonatal tetanus is now a rarity in most of the European Region and can be eliminated entirely from the few remaining areas through feasible improvements in immunization services. This should be accomplished by 1990.

Summary and conclusions

Within the next several years and certainly before the end of this century, certain vaccine-preventable diseases can and should be eliminated from the European Region: prenatal rubella infection, indigenously acquired paralysis due to wild poliovirus, respiratory diphtheria and neonatal tetanus. Elimination of prenatal rubella infection will require selection and implementation of appropriate strategies; elimination of the other conditions can be accomplished by maintenance and improvements in existing approaches. It would be advantageous to convene a Regional meeting to discuss these issues before the end of 1984.

Annex 1

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