
Reviews/Analyses

Control of rubella and congenital rubella syndrome (CRS) in developing countries, part 1: burden of disease from CRS

F.T. Cutts,¹ S.E. Robertson,² J-L. Diaz-Ortega,³ & R. Samuel⁴

Congenital rubella syndrome (CRS) can lead to deafness, heart disease, and cataracts, and a variety of other permanent manifestations. In developing countries, the burden of CRS has been assessed as follows: by surveillance of CRS; by surveillance of acquired rubella: by age-stratified serosurveys; and by serosurveys documenting the rubella susceptibility of women of childbearing age. During rubella outbreaks, rates of CRS per 1000 live births were at least 1.7 in Israel, 1.7 in Jamaica, 0.7 in Oman, 2.2 in Panama, 1.5 in Singapore, 0.9 in Sri Lanka, and 0.6 in Trinidad and Tobago. These rates are similar to those reported from industrialized countries during the pre-vaccine era. Special studies of CRS have been reported from all WHO regions. Rubella surveillance data show that epidemics occur every 4–7 years, similar to the situation in Europe during the pre-vaccination era. In developing countries, the estimated average age at infection varies from 2–3 years to 8 years. For 45 developing countries we identified serosurveys of women of childbearing age that had enrolled ≥ 100 individuals. The proportion of women who remained susceptible to rubella (e.g. seronegative) was $< 10\%$ in 13 countries, 10–24% in 20 countries, and $\geq 25\%$ in 12 countries. Discussed are methods to improve the surveillance of rubella and CRS in developing countries.

Introduction

Rubella is a common cause of childhood rash and fever; its public health importance relates to the teratogenic effects of primary rubella infection in pregnant women (1). The worldwide pandemic of rubella in 1962–65 highlighted the importance of congenital rubella syndrome (CRS); and in the USA alone, more than 20 000 cases of CRS were estimated to have occurred (2).

Table 1 summarizes the clinical manifestations of congenital rubella. After infection in the first tri-

mester, there is an approximately 50% increase in risk of spontaneous abortion (3). CRS manifestations in surviving infants may be transient (e.g. purpura); permanent structural manifestations (e.g. deafness, congenital heart disease, cataract), or late-emerging conditions (e.g. diabetes mellitus). Sensorineural deafness may occur following maternal infection up to the 19th week of pregnancy, while cataract and heart disease only occur after infection prior to the ninth gestational week (4).

The absolute risk of CRS among children born to mothers infected during pregnancy varies widely in different studies; in part, this reflects the age at follow-up of children, as deafness is most easily detected after 2 years of age (5). Among a series of 269 infants born to mothers with rubella infection during pregnancy, Miller et al. (6) found that the risk of congenital infection was 81% and that of malformations was 69% after confirmed maternal rubella with rash in the first trimester. The risk of malformation detected by 2 years of age fell rapidly from 90% of nine infants infected prior to 11 weeks gestation to 33% of four infants infected at 11–12 weeks' gestation. No defects were detected among 63 infants born to mothers in-

¹ Senior Lecturer in Communicable Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, England.

² Medical Officer, Global Programme for Vaccines and Immunization, World Health Organization, 1211 Geneva 27, Switzerland. Requests for reprints should be sent to this author.

³ Director, Research, Training and Supervision, National Vaccination Council, Ministry of Health, Mexico City, Mexico.

⁴ Research Officer, Departments of Clinical Virology and Community Health, Christian Medical College and Hospital, Vellore, India, and DSc Fellow, Netherlands Institute for Health Sciences, Erasmus University Medical School, Rotterdam, Netherlands. Reprint No. 5754.