



Image 2: A child receives a rubella vaccination.
Source: Wellcome Images.

CASE STUDY 7: Preventing Congenital Rubella Syndrome: Health disaster risk reduction through Rubella vaccination

The problem

When a woman contracts the disease rubella (or German measles) in early pregnancy, her unborn baby also becomes infected. While the woman may experience only a mild illness, the unborn baby will suffer major birth defects such as deafness, blindness, heart defects, and blood disorders. Severe learning disabilities can also occur; these may worsen throughout life and may also be associated with deformities of the skull (such as a small head size, as seen in Image 1). In some cases the unborn baby will die from the infection^{1,2}.

Rubella is an infectious disease caused by a virus. It spreads from person to person through sneezing and coughing. Outbreaks of rubella are public health disasters: in the 1960s a rubella epidemic swept through the world. In the United States alone, approximately

11,000 babies died and 20,000 babies were born with birth defects^{3,4}.

The science

In the first half of the twentieth century, the link between rubella and birth defects was not known. At that time, the fact that intrauterine infections could cause fetal damage, birth defects and fetal loss was largely unrecognised. Rubella was a fairly common infectious disease, mostly occurring in children but also in adults, including pregnant women.

In 1941, an Australian eye doctor called Norman Gregg was treating babies born with eye problems. He noticed that there were many more such infants that year than in the preceding years. One day he overheard two mothers talking about how they had both suffered from rubella when pregnant⁵. This led him to review the medical records of many mothers and babies. He connected the increased numbers of such damaged infants he had observed to a large epidemic of rubella which had recently occurred⁶.

Gregg went on to show that rubella in early pregnancy could be linked to many serious birth defects in children⁷.

This was a new discovery and, at first, even the possibility that such an apparently trivial illness could be so destructive was dismissed by some influential medical voices. It took some time - and further proof from scientists in other parts of the world - before doctors and policy-makers were convinced Gregg's findings were correct. The birth defects seen in babies infected with rubella while in the womb were later named Congenital Rubella Syndrome (CRS).

The application to policy and practice

A vaccination to prevent rubella first became available in 1969. The world now had a way of preventing the harm caused by rubella infection.

Since that time, increasing numbers of countries around the world have introduced the vaccine into their national immunisation policies. This is mostly done by vaccinating all the children in a population when they are still young (Image 2).

1 US Centers for Disease Control and Prevention (CDC). Rubella: Make Sure Your Child Gets Vaccinated. <http://www.cdc.gov/features/rubella/> [accessed 9 April 2013].

2 DC. Progress Toward Control of Rubella and Prevention of Congenital Rubella Syndrome – Worldwide, 2009. Morbidity and Mortality Weekly Report. 2010; 59(40): 1307-1310.

3 US Centers for Disease Control and Prevention (CDC). Rubella: Make Sure Your Child Gets Vaccinated. <http://www.cdc.gov/features/rubella/> [accessed 9 April 2013].

4 Witte JJ, Karchmer AW. Epidemiology of rubella. American Journal of Diseases of Children. 1969; 118:107-12.

5 De Quadros CA. Vaccines: Preventing Disease and Protecting Health. Geneva: World Health Organization, 2004, pp.53.

6 Gregg NM. Congenital Cataract following German Measles in the Mother. Transactions of the Ophthalmological Society of Australia. 1941; 3:35-46.

7 Gregg NM. Further observations on congenital defects in infants following maternal rubella. Transactions of the Ophthalmological Society of Australia. 1944; 4: 119-131.

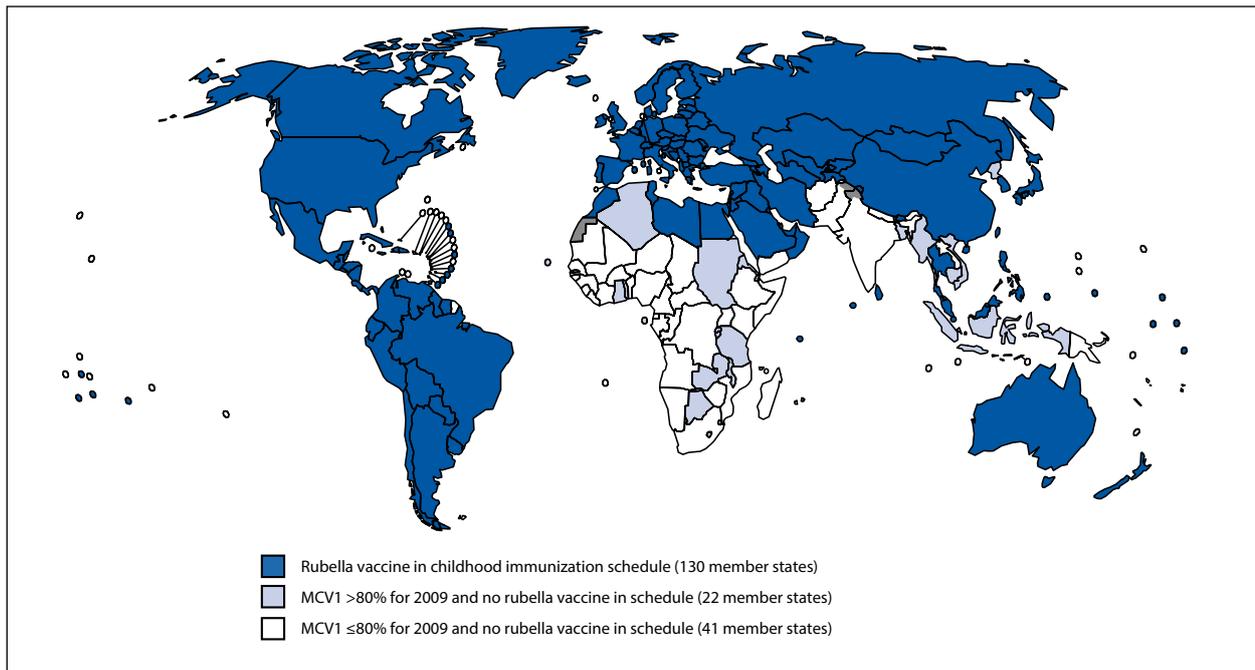


Figure 1: Countries using rubella vaccine and countries meeting WHO criteria for rubella vaccine introduction, 2009. *Source: CDC, 2010⁸.*

Following good progress in rubella immunisation in the 1990s, the Pan-American Health Organization (PAHO) resolved in 2003 to eliminate rubella and CRS from the region by 2010⁸.

Did it make a difference?

The number of World Health Organization (WHO) Member States using rubella-containing vaccine in their national immunisation programmes is continuing to grow, increasing from 83 of the 190 Member States (44%) in 1996 to 130 of 194 (67%) in 2009¹⁰ (Figure 1).

Rubella has been eliminated in the WHO Region of the Americas¹¹; this means less than 1 case of CRS per 100,000 births. Their experiences have been turned into guidance to support elimination in other regions of the world. Lessons identified include: high-level commitment and partnerships are essential; link political commitment with technical strategies; use proven surveillance tools; recognise outstanding performance by individual countries; provide on-going training for surveillance staff¹².

The WHO Regional Office for Europe has now set a target for elimination of CRS in its Member States^{13,14}.

Gregg's scientific work has saved countless lives and prevented much disability, family tragedy and economic loss around the world. However, CRS still affects an estimated 110,000 infants in developing countries each year^{15,16}, meaning the full benefits of his work are yet to be realised.



Image 1: A newborn baby with 'microcephaly' or small head size. *Source: mastersinhealthcare.net.*

⁸ Periago MR. Elimination of Rubella and Congenital Rubella Syndrome: We Did It Together! *The Journal of Infectious Diseases*. 2011; 204 (Suppl 2): i.
⁹ CDC. Progress Toward Control of Rubella and Prevention of Congenital Rubella Syndrome – Worldwide, 2009. *Morbidity and Mortality Weekly Report*. 2010; 59(40): 1307-1310.
¹⁰ Strebel PM, Gacic-Dobo M, Reef S, Cochi SL. Global Use of Rubella Vaccines, 1980-2009. *The Journal of Infectious Diseases*. 2011; 204:S579-S584.
¹¹ Periago MR. Elimination of Rubella and Congenital Rubella Syndrome: We Did It Together! *The Journal of Infectious Diseases*. 2011; 204 (Suppl 2): i.
¹² Irons B, Morris-Glasgow V, Andrus JK, Castillo-Solorzano C, Dobbins JG and the Caribbean Surveillance Group. Lessons Learned From Integrated Surveillance of Measles and Rubella in the Caribbean. *The Journal of Infectious Diseases*. 2011; 204:S622-S626.

¹³ CDC. Progress Toward Control of Rubella and Prevention of Congenital Rubella Syndrome – Worldwide, 2009. *Morbidity and Mortality Weekly Report*. 2010; 59(40): 1307-1310.

¹⁴ British Paediatric Surveillance Unit. 23rd Annual Report 2008-2009. London: Royal College of Paediatrics and Child Health, 2009.

¹⁵ CDC. Progress Toward Control of Rubella and Prevention of Congenital Rubella Syndrome – Worldwide, 2009. *Morbidity and Mortality Weekly Report*. 2010; 59(40): 1307-1310.

¹⁶ Cutts FT, Vynnycky E. Modelling the incidence of congenital rubella syndrome in developing countries. *International Journal of Epidemiology*. 1999; 28:1176-84.