Screening Brief

Congenital rubella syndrome: antenatal screening to identify women for postpartum vaccination

The disorder

- Congenital rubella syndrome is caused by maternal rubella infection during pregnancy
- Infection during the first trimester of pregnancy can lead to congenital heart disease, cataract, sensorineural hearing loss, microphthalmos, microcephaly, cerebral palsy, and/or mental retardation
- Hearing loss is usually the only disability that follows infection beyond the first trimester of pregnancy.

Prevalence

- Risk of congenital rubella syndrome decreases with increasing gestation of pregnancy at onset of infection. Defects occur in offspring in 80% of mothers infected in the first trimester, 10–20% infected in the fourth month, and very few infected later in pregnancy.[1–3] About 30% of offspring of all women infected during pregnancy must therefore be affected.

Table 1 Estimated frequency of maternal susceptibility (lack of immunity) to rubella, maternal infection, and congenital rubella syndrome in England and Wales

	Rates per 1000	
	First pregnancies	*Later pregnancies*
Prevalence of maternal susceptibility[4] (a)	20	12
Rubella infection rate in non-immune pregnant women[4] (b)	3	1
Birth prevalence of congenital rubella if no pregnancies terminated (30% of a × b)	0.018	0.0036

- The above figures must be read in the context of established rubella vaccination programmes (of school age girls since 1970, and (combined with measles and mumps vaccination) of all children since 1988)
- From the table, the estimated prevalence of congenital rubella syndrome is 18 per million firstborn and 3.6 per million later-born—that is, about eight cases per year in Britain if no pregnancies were terminated because of maternal infection. Reported cases are fewer, averaging one or two affected infants and five terminations on account of possible fetal rubella syndrome per year (P Tookey, personal communication)
- Immigrants from countries where vaccination is not routine are more likely to be susceptible.[4] It would be sensible for such immigrants to be vaccinated, so that they are no more susceptible than the rest of the population.

Aim of antenatal screening

- To protect offspring of *future* pregnancies by identifying susceptible (non-immune) pregnant women so that they can be vaccinated against rubella after delivery. Such screening is unusual in that it does *not* aim to identify affected pregnancies.

Screening procedure

- Test pregnant woman's serum for rubella antibodies by a reliable and validated screening assay such as an enzyme linked immunosorbent assay, radial haemolysis, or latex agglutination. Sera giving <10 IU/ml should be retested by an alternative assay. If second assay is negative, classify as susceptible.[5]

Impact of screening programme

- Can only prevent rubella in subsequent pregnancies. Without the programme, the incidence of fetal rubella syndrome in these pregnancies would not be expected to exceed six ($1/3 \times 18$) per million in the UK, given the above evidence that infection is only one third as likely to occur in the second or later pregnancies of susceptible women as in their first, and that the incidence of congenital rubella in first pregnancies is 18 per million. Even if vaccination after maternal screening prevented all cases in second and later pregnancies it would reduce overall incidence by no more than three (that is, 6/2) per million in the UK, where about half of all infants are firstborn, and childhood vaccination has been routine for many years.

Overall assessment

- Although the prevalence of susceptibility and the infection rate among susceptible mothers will vary between countries, screening is not justified in countries such as Britain where vaccination in childhood has been routine for many years and coverage is high
- In all countries the main method of prevention should be general childhood vaccination rather than testing in pregnancy
- The overall prevalence of susceptibility in pregnant women should be monitored in small, randomly selected proportion (perhaps regular samples of 1000).

1 Miller E. Rubella in the United Kingdom. *Epidemiol Infect* 1991;**101**:31–42.
2 Miller E, Craddock-Watson JE, Pollock TM. Consequences of confirmed maternal rubella at successive stages of pregnancy. *Lancet* 1982;**ii**:781–4.
3 Grilner L, Forsgren M, Barr B, *et al*. Outcome of rubella during pregnancy with special references to the 17–24th weeks of gestation. *Scand J Infect Dis* 1983;**15**:321–5.
4 Miller E, Waight P, Gay N, *et al*. The epidemiology of rubella in England and Wales before and after the 1994 measles and rubella vaccination campaign: fourth joint report from the PHLS and the National Congenital Rubella Surveillance Programme. *Commun Dis Rep* 1997;**7**(review 2):R26–32.
5 Public Health Laboratory Service Working Group. Guidance on the management of and exposure to rash illness in pregnancy. http://www.phls.co.uk/advice/rashillness.htm.