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**An audit of post partum MMR immunisation in rubella susceptible antenatal women in the Cwm  
Taf Health Board (South) in 2010**

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## Abstract

Rubella, an insignificant viral disease of childhood, can have devastating effects for the foetus if infection is acquired during pregnancy. An immunisation programme was established in the UK in the 1970's, with monitoring of pregnant women for rubella susceptibility and post partum immunisation for those found to be susceptible. This study examined records of 115 rubella susceptible pregnant women (defined as rubella IgG titre < 10IU/ml) identified in a South Wales Health Board area in 2010. Of these, 88% were offered post partum immunisation and 67% accepted the offer. In total, almost a quarter (23.3%), left maternity services care without receiving post-partum immunisation.

Key phrases (4-6 full sentences that summarise the major themes)

1. Post partum MMR uptake did not reach the current Wales target of 100%; this is due to a combination of individuals not being offered immunisation, and women declining the offer of MMR
2. There are missed opportunities to immunise.
3. Over 60% of the rubella susceptible women whose records were examined, had received two doses of rubella containing immunisations in childhood.
4. There are no National and local protocols for post partum MMR immunisation in place that include monitoring uptake.
5. Proposed changes may not address issues surrounding uptake of post partum immunisation.

## Introduction

Rubella infection in the first trimester is associated with a cluster of congenital defects including cataract, heart defects, microcephaly, dental defects, deafness and mental retardation (Banatvala and Best 1998), known as Congenital Rubella Syndrome (CRS). Because of these devastating defects, vaccines were developed and rubella immunisation was introduced in the UK in the 1970's. Initially immunisation was aimed at those felt to be at the greatest risk - pre-pubertal females, female nurses and female teachers (Tookey and Peckham 1999; Tookey 2004). Shortly after the introduction of immunisation it was recommended that pregnant women should be screened for rubella immunity and, if susceptible, be offered immunisation post partum (Tookey and Peckham 1999; Tookey 2004). The immunisation programme resulted in a drop in case of CRS from 48 births and 742 terminations between 1971 and 1975 to 4 births and 9 terminations in a similar period 20 years later (1991 – 1995) (Tookey 2004). In 1986, the single rubella vaccine was replaced by a combined measles, mumps and rubella vaccine (MMR) which was given at 12-15 months to both boys and girls. Screening in pregnancy and post partum immunisation continues, but a number of studies have highlighted deficiencies in the system for ensuring uptake (Gyorkos et al 1998, Bloom et al 2006, Yung et al 2008)

Screening for rubella immunity is carried out at approximately thirteen weeks of pregnancy. Women are informed of their results within 15 working days. If rubella susceptible (rubella IgG antibody titre < 10 IU/ml), women are given a leaflet, explaining what rubella susceptibility means, action to be taken if in contact with a rash and information relating to the offer of MMR immunisation post partum. This

leaflet is readily available in English and Welsh with copies of the leaflet in other languages being available from Antenatal Screening Wales. Where understanding of English is poor and there is no family member able to translate, the services of an interpreter are used, a rare occurrence in this Health Board.

In Wales, there is currently a national system for reviewing uptake and performance of maternity services against key screening targets including anomaly scans, Down's syndrome screening, sickle cell and thalassaemia screening, as well as infectious diseases screening, and postpartum MMR immunisation (Antenatal Screening Wales 2010). This results in the production of a "Balanced Scorecard Report", published twice a year. This system is based upon self-reported audits, carried out over a period of weeks, by each Health Board against key criteria. As information systems in Wales are not able to provide all the details required, data are collected using information technology systems and manual audits.

Prior to 2010, the guidance from Antenatal Screening Wales recommended that rubella susceptible mothers (defined as rubella IgG <10IU/ml) should receive a single dose of MMR post partum. However, as the Department of Health recommend a two dose regime for all those over 10 years of age with inadequate antibody level (Department of Health 2006), this guidance has recently been revised and Antenatal Screening Wales now recommends that a second post partum MMR dose be given at least 4 weeks after the first (Antenatal Screening Wales, 2010). Midwives now advise women receiving post partum MMR that they should attend their GP practice for a second dose. After negotiation, the Welsh Assembly Government agreed a payment to GPs for providing a second MMR dose ensuring its availability as of 1<sup>st</sup> February 2011 (Fishwick, 2011). However, antenatal screening for rubella and post partum immunisation are now under review (Antenatal subgroup 2011).

We have previously reported a study of rubella susceptibility in pregnant women in the Cwm Taf Health Board Area (south) between 2005 and 2010. (Matthews et al, 2010). In this study, susceptible women were identified from laboratory blood samples, and were then followed up by mailing of questionnaires during pregnancy to determine attitudes to, and history of immunisation. Examination of patients' notes and a brief questionnaire sent out two months after delivery were used to collect data to establish if post partum immunisation had been offered and received. As the majority of women in the study were born, and had remained in the Health Board area it was possible to examine their Child Health Records to confirm childhood immunisations received.

This study aimed to examine uptake of post partum MMR in one Health Board in Wales using these sources, and to report the findings.

## Method

During 2010, 2536 pregnant women in a Health Board in Wales (Cwm Taf south) were screened for rubella immunity. Data on the number of susceptible samples (<10 IU per ml) from pregnant women in 2010 was obtained from the laboratory serving the hospital. Rubella susceptible women are identified during two three month periods each year as required for the return to the Welsh Assembly. Data relating to these women was provided by the Antenatal Screening Co-ordinator. No information on ethnicity or gravida was provided. Case notes of these rubella susceptible women who had delivered in 2010 were reviewed by the Antenatal Screening Co-ordinator to ascertain whether it was recorded that post partum immunisation had been offered and whether the immunisation had been given. These data were used for the return for the Balanced Scorecard.

From the list of all susceptible women in 2010, a subset was identified who had also taken part in the questionnaire study and for whom information about past rubella immunisations in childhood was available from Child Health Records. The questionnaire collected self reported information on parity, ethnicity, past immunisations and intentions to have post partum immunisation. Data from questionnaire respondents was linked to original audit of the notes to determine if there was evidence of post partum immunisation.

## *Results*

### Case note review

Examination of screening test results identified 163/2536 (6.4%) women who had delivered babies in 2010 and were susceptible to rubella. A list of 115/163 (70.6%) rubella susceptible women identified in 2010 over two three month periods for the return to Welsh Assembly Government was provided by the Antenatal Screening Co-ordinator, and the medical records reviewed. Of these gravida information was available for 101; 65/101 (64.4%) were first pregnancies and 36/101 (35.6%) were second or subsequent pregnancy. Examination of medical records found that 101/115 (87.8%) had documentation to show that an offer of post partum MMR had been made, and that in 77/101 (76.2%) MMR immunisation had been accepted and given prior to discharge. Immunisation was prescribed but not offered to 10/101 (9.9%) rubella susceptible women; in the case of 3/115 (2.6%) women there was nothing documented in the notes to say whether immunisation was offered or given so it seems reasonable to assume that it was not.; in one case, although susceptible, the case notes recorded wrongly that the rubella antibody result was immune.

MMR immunisation on the ward prior to discharge was declined by 22/101(21.8%), all of whom indicated that they would make an appointment to have immunisation at GP surgery. Immunisation was declined by 2/101 (2%) women with no reason documented. Therefore 38/115 (33%) rubella susceptible women had not received immunisation prior to discharge (Figure 1).

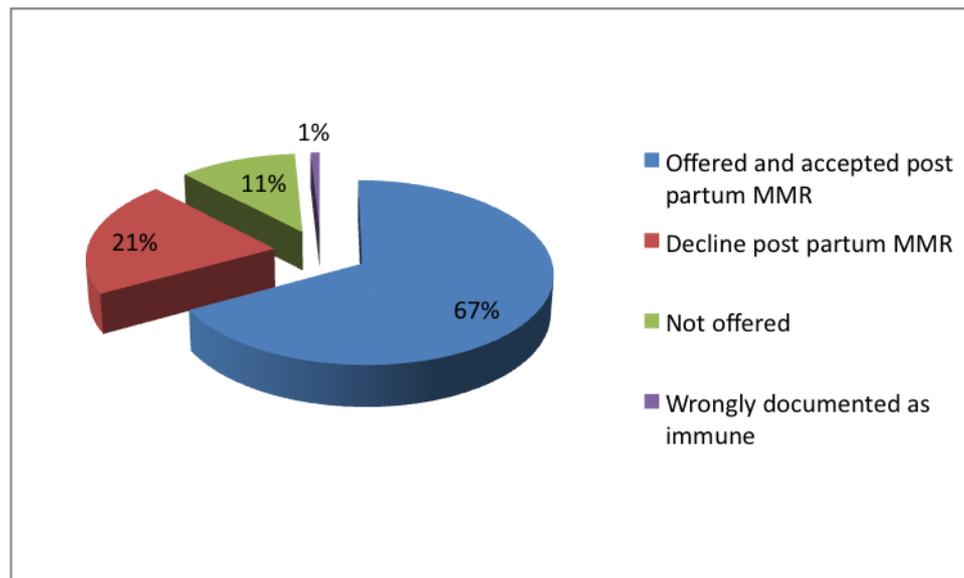


Figure 1. Results of review of case notes of rubella susceptible women (n=115) in Cwm Taf in 2010: summary of documented offer and uptake of immunisation.

### Questionnaire survey

The rubella susceptibility questionnaire was completed by 61/115 (53%) of those identified as susceptible. The age range of respondents was 15 to 40 years (Figure 2). The majority were born in 1983 or later and would have been offered MMR immunisation; only four (6.6%) were born in 1993 or later when decisions about immunisation may have been affected by adverse publicity.

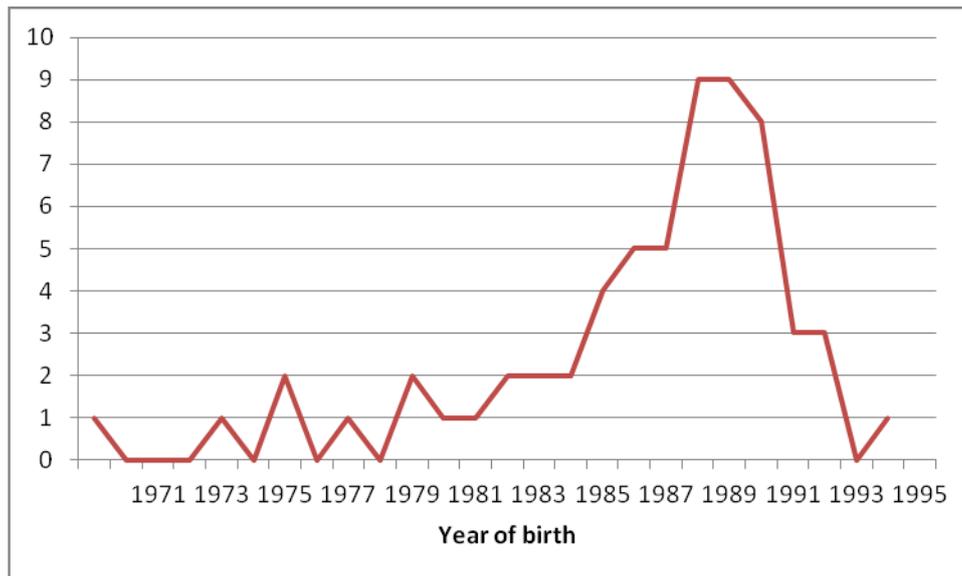


Figure 2. Number of rubella susceptible women by year of birth (n=61)

Of the 61 who were also part of the questionnaire study, 40 (65.6 %) were first pregnancy and 21 (34.4%) second or subsequent pregnancies. Of these only 7/21 (33%) stated that they had been offered MMR after a previous pregnancy. (It must be noted that this was self-reported as medical notes were not available to confirm this). Two women 2/61 (3.3%) were born outside the UK, one in Pakistan and one in the Philippines; neither had any childhood immunisation records available. The remaining 59 were born in the UK. No records were found for a further two women and the records for four other women had been destroyed as they were over 25 years old. Therefore Child Health Records were available for 53/61 (86.9%) women. Of those where records were available, 12/53 (22.6%) had received no rubella containing immunisations in childhood and 9/53 (17%) had received only one dose. Thus a total of 21(39.6%) of the women were inadequately protected against rubella. Four women were born in 1993 or later, at a time when adverse publicity about the MMR vaccine may have influenced parental decision to immunise. Of the four, three had received two doses of MMR and one had received one dose.

Of the 61 women who participated in the baseline questionnaire survey, follow up survey data on post-partum immunisation was completed by 54 (88.5%) women. All 54 women were linked to the audit of note findings. These results are shown below.

Intention to have post partum MMR	Yes (n=44)	No (n=7)	Unsure (n=3)
MMR offered	34 (77.3%)	4 (57.1%)	2 (66.7%)
MMR not offered	8 (18.2%)	3 (42.9%)	1 (33.3%)
Nothing documented in notes	2 (4.5%)	0	0
Total	44 (100%)	7 (100%)	3 (100%)

Table 1. Questionnaire results for rubella susceptible women (n=54): intention to have post partum MMR triangulated with offer of immunisation in medical records.

Table 1 shows that 8/44 (18.2%) of women who stated their intention during pregnancy to have post partum MMR were prescribed MMR immunisation, but there was no documentation in their notes to show it had been offered, and in a further two (4.5%) cases the women had not been prescribed MMR vaccine.

Table 2 shows that 16/44 (36.4%) of women who stated during pregnancy that they would have post partum MMR immunisation declined after delivery although 3/10 (30%) who intended to decline or were unsure received immunisation.

Intention to have post partum MMR	Yes (n=44)	No (n=7)	Unsure (n=3)
MMR accepted	26 (59.1%)	1 (14.3%)	2 (66.7%)
MMR declined	16 (36.4%)	6 (85.7%)	1 (33.3%)
Nothing documented in notes	2 (4.5%)	0	0
Total	44 (100%)	7 (100%)	3 (100%)

Table 2 Questionnaire results for rubella susceptible women (n=54): showing intention to have MMR post partum triangulated with evidence that immunisation given in medical records.

A comparison of the post partum questionnaire and the medical notes show some discrepancies. Six women who stated that they had received immunisation did not have this documented in the notes. Three of them however had received anti-D injections, and although there are no contraindications for giving both anti-D and MMR (Department of Health 2006) this may have been a factor in MMR not being offered or accepted.

### *Discussion*

In our previous study (Matthews et al 2010) we highlighted the increasing percentage of pregnant women susceptible to rubella. In this study we have examined the uptake of post partum MMR and found in an audit of notes that despite identification of susceptible women during pregnancy, less than 90% had an offer of post-partum immunisation recorded in their notes and almost quarter were discharged without immunisation having been given. The questionnaire survey of a small subset found that almost 20% did not wish, or were unsure whether they wanted to be immunised, and even those who had stated an intention to be immunised almost a quarter had no documented offer in their medical notes. Three women who stated that they had not received immunisation had documented evidence in the notes that vaccine was given, confirming the fact that personal recall of such matters is poor (McKinney, et al, 1991).

In this study 6.4% of all pregnancies were considered rubella susceptible. It is known that rubella susceptibility is higher in those not born in the UK (Tookey 2004), but only 2/61 (3%) of those who completed the questionnaire were in this category, in keeping with the census figures for this area which show the figure for those born outside the UK to be 2% (ONS 2008). Of the small sample of women whose

immunisation records were examined, almost 40% had not had two doses of rubella containing vaccine. Adverse publicity about the MMR vaccine (Wakefield et al, 1998) may have had an effect on immunisation decisions made by parents, but as the first MMR is given at 12-15 months and the second before 5 years of age, this would only affect those born 1993 or later, a relatively small number in this study.

This study has identified deficiencies in the completeness of uptake of post partum rubella immunisations in South Wales, such that almost a third had not received immunisation prior to discharge from hospital. Although the majority of these indicated that they would make an appointment to be immunised at their GP, it is unclear if they did so. Similar issues have been described elsewhere in the UK; an audit at two centres (East of England and West Midlands) found post partum MMR immunisation rates to be 29% and 60% respectively (Yung et al 2008). Studies in other areas have also found disappointing levels of uptake; for example, a Canadian study carried out in 1998 in 16 hospitals found that uptake of postpartum MMR was 27% for those offered vaccination before discharge and only 2% were vaccinated in the following three months (Gyorkos et al 1998). In 2001, a study was carried out in Florida in four large hospitals, where the majority of pregnant women were foreign born (61%). Uptake of post partum MMR immunisation of rubella susceptible women was 21% (Bloom et al 2006). Bloom's study also reported transcription errors, with rubella susceptible women recorded as rubella immune in the notes in 11% of cases. It was noted by Bloom (2006) that in the USA, until his publication, only two studies of post partum uptake had been published. Whilst both of those studies found uptake of rubella screening to be high (97% and 99%) post partum immunisation rates were considered unacceptable at 66% and 76% (Bloom et al 2006). Data from this study in South Wales has confirmed that although better than

some of the reported studies, uptake remains well below the current target of 100% in Wales in 2010. Of those with gravida information available 35.6% of the rubella susceptible women were not primigravida showing the failure of current post partum schedules and providing additional evidence of the need to improve. This study suggests that although offer rates may be high, actual uptake is much lower. Historically, for women in the Cwm Taf Health Board area who delivered their baby in hospital, immunisation has been administered immediately prior to leaving hospital.. This may reduce uptake rates; more flexibility in the timing of immunisation during the hospital stay might improve uptake rates. Early discharge policies make administration of vaccine difficult, and a number of those who declined 22/101 (21.8%) said they would make an appointment to have immunisation at their GP surgery. However, there are no systems in place to check whether this occurred, as there was no way of monitoring uptake in 2010. A further issues is that midwives now advise women receiving post partum MMR that they should attend their GP practice for a second dose, (now funded by the Welsh Assembly Government from 1<sup>st</sup> February 2011 (Fishwick, 2011), but the mechanisms for monitoring this are not clear.

A Training Needs Analysis in relation to screening programmes was carried out by Antenatal Screening Wales in 2009 for midwives and sonographers (Antenatal Screening Wales, 2009). Only 51% of midwives participated, with 15% of those believing that antenatal communicable disease screening was compulsory in the UK (Antenatal Screening Wales, 2009). The document states that “some of the responses have given concern”, suggesting that there may be training needs in this area. This may need to extend to checking that immunisation has been received once discharged to the community.

### *Limitations of the study*

The study was carried out in a small Health Board area with only 163 rubella susceptible women delivering babies during the year of the study (2010). Data was drawn retrospectively from other studies with only 61/163 women being part of the questionnaire study.

### *Implications of the study*

This study, whilst only examining a small number of women, has highlighted major problems with the administration of post partum immunisation. It demonstrates that whilst screening in pregnancy identifies rubella susceptible women, many of these remain susceptible into their next pregnancy, having missed the opportunity for immunisation. The implication for the women is that they may not be adequately protected against rubella and, in the future, should there be circulating rubella virus; this may result in cases of CRS. Identifying rubella susceptible women during their first pregnancy would not address the problem of CRS should rubella virus circulate in the future.

### *Conclusions*

Post partum immunisation was introduced to protect a small percentage of women (<2%) who were susceptible on first pregnancy. This situation has changed with a statistically significant increase in first pregnancy susceptibility rising from 6.6% to 9.4% between 2005 and 2009 in the study area ( $p=0.02$ ) (Matthews et al 2010) In this study 65/101, over 64%, of the susceptible women were primigravida. Over 60% of rubella susceptible women in this study had received the required two dose immunisations in childhood suggesting that immunity is waning, possibly due to the

lack of circulating rubella which would have provided a natural boost. Robust protocols for post partum rubella immunisation of susceptible pregnant women have not been developed and whilst numerous published works on rubella susceptibility in pregnant women mention the need for development or the improvement of post partum MMR immunisation, there is very little published work on post partum immunisation alone. Although data on length of hospital stay and home deliveries were not collected, home deliveries and very short term hospital admissions were given anecdotally by the Antenatal Screening Co-ordinator as possible reasons for low uptake. Both the increase in first pregnancy susceptibility and the poor uptake of post partum immunisation are of concern. It is clear that the issue of immunity needs to be addressed before first pregnancy. A booster immunisation dose in adolescence may resolve this problem although a report from the Joint Committee on Vaccination and Immunisation (JCVI) sub-committee on adolescent vaccinations stated that “evidence did not support a third dose of MMR” (JCVI 2012)

. Cases of CRS in the UK are currently <1/100,000 population; below the WHO guidelines for screening. The Department of Health National Screening Committee Antenatal subgroup had recommended that the issue of rubella screening in pregnancy should be revisited and issued a consultation document in October 2011 (REF). The Health Protection Agency (HPA) responded by suggesting three possible alternatives to the current screening programme which were discussed by the JCVI (JCVI 2012). The committee accepted the following recommendation as “an appropriate and effective option and should replace the current system”:

**“replacement of rubella susceptibility screening with vaccination history screening with the offer of MMR vaccination to those with no history of rubella vaccinations or that are partially immunised”.(JCVI 2012).**

However, at this stage, it is not known how immunisation history would be determined, identifying those who need post partum immunisation would not ensure that immunisation was received and would not address the increases of susceptibility rates in first pregnancy.

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An application for ethical approval was made for the rubella susceptibility study and was considered unnecessary as it was deemed an audit.

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