

Research Article

Increasing Rubella Susceptibility in the UK: Results from patients in South West London

Stephen Mortlock

Global Infectious Diseases and Microbiology Liaison, Q² Solutions, Cranford Lane, Heston, Middlesex TW5 9QA

***Corresponding author**

Dr. Stephen Mortlock

Email: stephen.mortlock@q2labsolutions.com

Abstract: Mass vaccination has helped to effectively eliminate rubella infection in most developed countries. Unfortunately, declining uptake rates due to concerns about the vaccine, moral objections and increasing numbers of cases in some European countries where rubella surveillance and pre-conceptional vaccination are inadequate has started to show in the number of rubella susceptible patients being diagnosed. A retrospective review of all of the patients attending the West Middlesex University Hospital in Isleworth (UK) was undertaken to see if the number of patients susceptible to rubella was increasing. Over a six year period the number of rubella susceptible patients increased from 4.3% to 6.6% of the 30756 specimens tested. Although, this increase was not significant the distribution of susceptible patients was higher in the area with the highest ethnic minorities.

Keywords: Rubella, antibody, vaccination, migration

INTRODUCTION

For many people rubella (German measles) is usually a mild, rash-producing, febrile illness in children and young adults characterized by a rash that starts on the face and neck then spreads to the trunk and limbs (Fig-1). Although, this rash usually disappears after three days, rubella was the first virus to be shown as a teratogen and infection in pregnancy, especially during the first trimester, can result in stillbirths, foetal death or congenital defects known as congenital rubella syndrome (CRS)[1]. For the last decade the elimination of rubella infection in Europe has been a high priority for the WHO European Regional Office[2,3]. Due to the various measures introduced, maternal rubella infection is now rare in many developed countries, but in some developing countries or in countries with inadequate rubella surveillance and pre-conceptional vaccination, rubella infection in pregnancy can still result in miscarriages, stillbirths, or newborns with CRS[4,5].

In the United Kingdom (UK) the rubella vaccine was offered to schoolgirls from 1970- 1996 and the mass vaccination of children aged 12-15 months with the measles, mumps and rubella (MMR) vaccine was introduced in 1988. The schoolgirl vaccination programme has been discontinued and replaced by a second dose of MMR for pre-school children; and postpartum vaccination of susceptible women identified

through antenatal testing[6,7]. Because of these measures maternal rubella infection is uncommon in many developed countries. Recently, however, the number of rubella cases in some European countries has been on the increase again; this coupled with poor vaccine uptake rates could start to jeopardize the progress of rubella immunization[8,10]. Certainly, a number of studies have confirmed that the prevalence of rubella susceptible patients is on the increase in the UK[11-14].



Fig-1: Rubella Rash

From January 2007 to December 2012, Q² Solutions (formerly Quest Diagnostics) provided the antenatal screening for the West Middlesex University Hospital (WMUH) in Isleworth. The catchment area for the WMUH is made up of approximately 450,000 residents living in two quite diverse boroughs

(Hounslow and Richmond) with a mobile and transient population. A report in 2009 found that these two boroughs were almost at the opposite ends of the poverty scale with Hounslow being the 19th most deprived (with the 18th highest rate of child poverty) while Richmond was one of the least deprived among the London boroughs[15]. As a consequence this was reflected in the premature death rate (death before 65 years of age [per 100,000]) with Hounslow being in the top quarter (175.1/100,000) while Richmond was in the bottom quarter (121.4/100,000). Also, the level of ethnic groups in Hounslow was 50% but only 11% in Richmond (Table 1)[16].

This study was to see if the number of patients susceptible to rubella was increasing and to see if there was any difference in the geographic distribution of the results.

METHODS

The descriptive analysis of epidemiological situation of rubella susceptibility was based on data retrieved from the routine laboratory computer system. A patient’s location was determined using the GP surgery address and their address, this was then correlated using a map showing the postcodes of the two boroughs to see where the patients were residing at the time of testing (TW1- TW20). The patient ethnicity was correlated from the hospital records where applicable. All other patient identifiers were removed to maintain patient confidentiality.

Statistical Analysis

A Fisher two tailed analysis was used to determine the significance in susceptibility over the time period under investigation and the assessment of bivariate correlations between variables was examined using Pearson’s correlation coefficient (χ^2) for normally distributed data. All P-values where applicable were two-sided and the level of statistical significance was established at 0.05.

RESULTS

From 2007 to 2012, Q² Solutions tested 37,673 samples from patients and staff who attended the WMUH. There were 451 (1.2%) samples from the paediatrics department, 2099 (5.5%) samples from healthcare workers, 2509 (6.6%) samples that had no postcode, and 1858 (4.9%) with an incorrect postcode. The remaining 30,756 samples were split into 5668 samples with a Richmond postcode and 25,088 with a Hounslow postcode (Graph 1). Of these 1840 (5.1%) samples were reported as rubella susceptible or low-level immunity; the rest showed good immunity to rubella (“immune”). In 2007 the number of susceptible and low level patients accounted for 4.3% of the samples received, by 2011 this had increased to a maximum of 7.7% (average 6.0% over the time period), but was not considered significant with a p-value of >0.999 (Table 2). However, rubella susceptibility was nearly ten times as common in Hounslow borough as in Richmond (Table 3) with a p-value of <0 which is a significant difference. No definitive change was seen in the distribution of ethnicities among all patients (Graph 2).

Table 1: Comparison between Hounslow and Richmond Boroughs

	Hounslow	Richmond
Unemployment	5.5%	4.5%
Employed at Heathrow	10%	2.5%
Ethnic Minorities	50%	10%
Low Income Families	45%	21%
Premature Death (per 100,000)	175.1	121.4

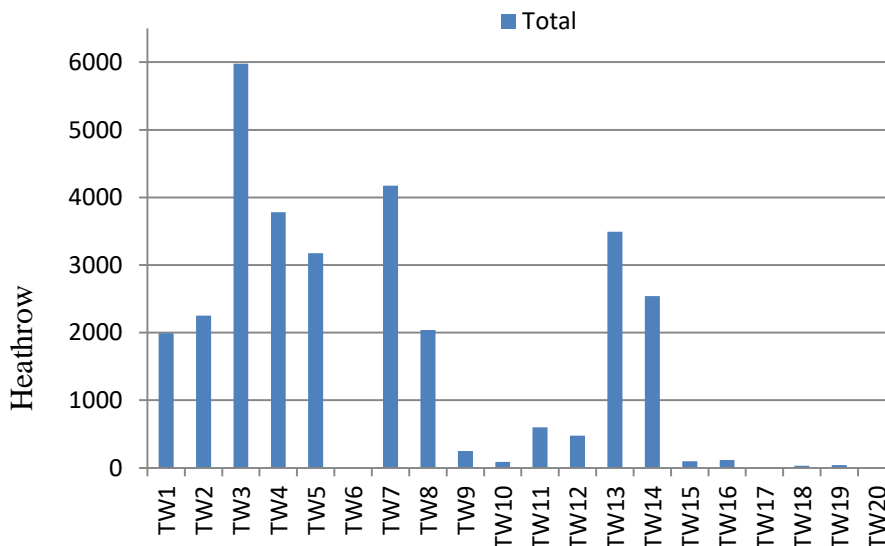
Table 2: Rubella Numbers from WMUH by Year

	2007	2008	2009	2010	2011	2012	Total
Susceptible	52	231	210	292	373	390	1548
Low level	9	21	17	80	70	95	292
Immune	1374	5346	4781	5169	5331	6915	28916
	1435	5598	5008	5541	5774	7400	30756
% of Total	3.6	4.1	4.2	5.3	6.5	5.3	5.0
NI & LL %	4.3	4.5	4.5	6.7	7.7	6.6	6.0
Fisher Two Tailed		>0.9999		Not Significant			

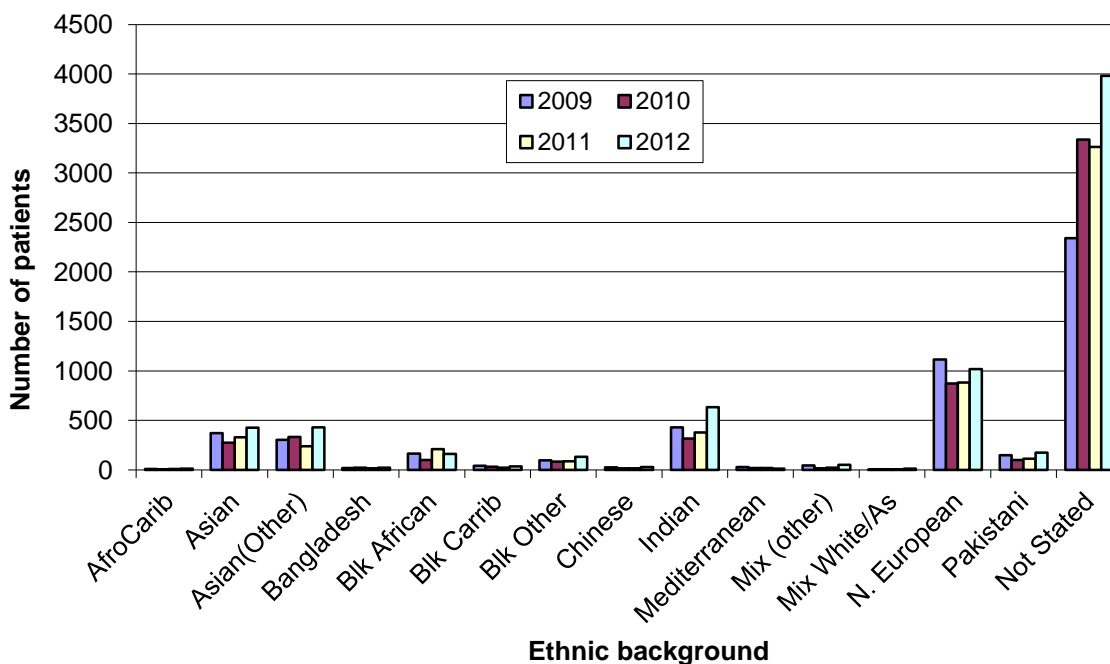
Table 3: Distribution of susceptible and immune patients

	Susceptible	Immune	Total
Richmond	184	5484	5668
Hounslow	1656	23432	25088
Total	1840	28916	30756

The Chi-square statistic is 92.4949. The P value is 0. This result is significant at $p < 0.05$.



Graph 1: Rubella Samples from WMUH catchment post codes



Graph 2: Ethnic Origin.

DISCUSSION

Sporadic cases of rubella infection do occur in the United Kingdom, although congenital rubella is comparatively, most of the reported cases are often associated with travel abroad.¹⁷ Elimination of rubella

infection in Europe has progressed over the past ten years, and the goal is to have complete elimination of the virus by 2015. There has been a re-emergence in recent years, with potential serious implications for susceptible pregnant women. Of particular concern are

communities with relatively high rubella susceptibility rates due to religious or moral objections to vaccination or significant numbers of recent immigrants from countries lacking routine rubella vaccination programmes[18,19]. The uptake rates of the combined measles, mumps, and rubella (MMR) vaccine did decline briefly due to poor publicity and evidence seems to suggest that non-immunisers were more concerned about unknown, long-term side effects of vaccines than the diseases themselves[20,24].

Over the six year study period Q² Solutions tested nearly thirty-eight thousand samples for rubella antibodies and although there appeared to be an increasing number of samples that were either non-immune (<10 IU/mL) or had low-level immunity (10-15 IU/mL), in 2007 the figure was 4.3% but by 2012 this had increased to 6.6% with an average of 6.0%, it was not a significant increase. This study did show, however, that there was marked difference in the geographic location of the susceptible or immune patients, with the susceptible patients more likely to come from Hounslow than Richmond[25]. This could be due to the high ethnic or immigrant population, as shown by the government sponsored reports. But trying to decipher the ethnic backgrounds for the susceptible patients, however was difficult as electronic capture of ethnic origin had only started in 2009 and as always a large proportion did not record their background, an average of 55% were classed as 'ethnic background not stated'. But, using the available records showed there was no definitive trend in any of the 14 ethnic groups. So it was difficult to make any deductions from these results. The health needs of newly arriving immigrants and refugees will often differ from those of the indigent population, patients may present with conditions and concerns that are unfamiliar to clinicians[26,27]. The prevalence of diseases differs with exposure to disease, migration trajectories, living conditions and genetic predispositions. Rubella is now emerging as an imported infection in many countries including the United Kingdom where immigration occurs from areas without mass vaccination programmes[28-30].

CONCLUSIONS

Any increase in the number of susceptible patients should serve as a reminder that non-immune individuals who were not vaccinated within the framework of national immunization programmes remain at risk of rubella infection and could open the door to a re-emergence of rubella infection in the United Kingdom. If such a re-emergence were to occur, women who had emigrated to Britain in later childhood or in adulthood would be at higher risk of acquiring infection during pregnancy than would the indigenous women. All such women should be offered rubella vaccination at the earliest opportunity.

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