Estimating the effect of the 2005 change in BCG policy in England: A retrospective cohort study

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**ABSTRACT**

**Background**

In 2005 in England, universal Bacillus Calmette–Guérin (BCG) vaccination of school-age children was replaced by targeted BCG vaccination of high-risk neonates.

**Aim**

Estimate the impact of the 2005 change in BCG policy on tuberculosis incidence rates in England.

**Methods**

We conducted an observational study by combining notifications from the Enhanced Tuberculosis Surveillance system, with demographic data from the Labour Force Survey to construct retrospective cohorts relevant to both the universal, and targeted vaccination between Jan 1, 2000 and Dec 31, 2010. We then estimated incidence rates over a 5 year follow-up period and used regression modelling to estimate the impact of the change in policy on TB.

**Results**

In the non-UK born, we found evidence for an association between a reduction in incidence rates and the change in BCG policy (school-age incidence rate ratio (IRR): 0.74 (95% credible interval (CrI) 0.61,0.88), neonatal IRR: 0.62 (95%CrI 0.44,0.88)). We found some evidence that the change in policy was associated with an increase in incidence rates in the UK born school-age population (IRR: 1.08 (95%CrI 0.97,1.19)) and weaker evidence of an association with a reduction in incidence rates in UK born neonates (IRR: 0.96 (95%CrI 0.82,1.14)). Overall, we found that the change in policy was associated with directly preventing 385 (95%CrI -105,881) cases.

**Conclusions**

Withdrawing universal vaccination at school-age and targeting vaccination towards high-risk neonates was associated with reduced incidence of TB. This was largely driven by reductions in the non-UK born with cases increasing in the UK born.

**Keywords:**

BCG, surveillance, vaccination policy, neonatal, school-age

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**Conflicts of interest**

HC reports receiving honoraria from Sanofi Pasteur, and consultancy fees from AstraZeneca, GSK and IMS Health, all paid to her employer.

**Accessibility of data and programming code**

The code used to clean the data used in this paper can be found at: <DOI:10.5281/zenodo.2551555>

The code for this analysis, interim results, and final results can be found at: <DOI:10.5281/zenodo.2583056>

**Key Messages**

* There is little existing literature on the impact of withdrawing universal school-age BCG vaccination and introducing high-risk neonatal BCG vaccination on TB incidence rates in the populations directly affected by the vaccination programmes.
* There was strong evidence that the change in policy was associated with a decrease in TB incidence rates in non-UK born neonates and school-age children. In the UK born individuals, there was some evidence that the change in policy was associated with an increase in TB incidence rates in those relevant to the universal school-age scheme, with little evidence of a decrease in incidence rates in those relevant to the high-risk neonatal vaccination scheme.
* Overall the change in vaccination policy was associated with preventing TB cases, mainly in the non-UK born.
* These results provide an important evaluation of the direct effects of both withdrawing and implementing a BCG vaccination programme in a low incidence, high income, country and are relevant to several other countries that have made similar changes to their vaccination programmes.