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## Testing of infants born to hepatitis B infected mothers: a three-year review of the national DBS testing service

In March 2011 Public Health England (PHE) Colindale launched a pilot scheme to explore provision of a free dried blood spot (DBS) testing service to increase uptake of testing in infants born to hepatitis B (HBV) infected mothers. These infants are at high risk of perinatal transmission of hepatitis B and are recommended to receive four doses of hepatitis B vaccine – at birth, four weeks, eight weeks and one year old – with testing for evidence of infection at the same time as the fourth dose is given (ie at their first birthday).

After a successful pilot in nine areas, the hepatitis B DBS testing service was launched nationally in September 2013. This service is intended for use mainly in primary care settings to allow more convenient and less-invasive blood sampling (by heel-prick) of infants at the same time as they receive their fourth dose of vaccine, to avoid the need for referral to secondary care for phlebotomy services and subsequent non-attendance. With the national availability of the DBS testing service, areas that have joined the service have adopted various models of delivering DBS testing but all have a named local coordinator responsible for distribution of the DBS test kits.

Data collected on the DBS test request form are presented in this review for the period of 1 September 2013 to 31 December 2016.

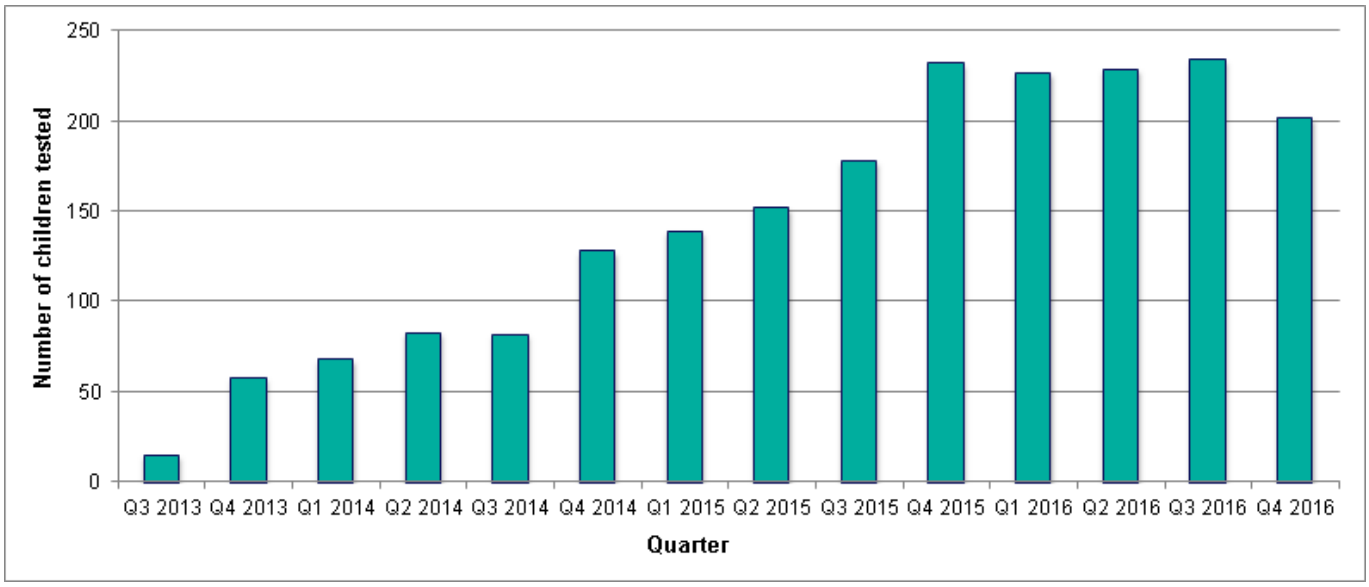
Geographical coverage of the service varies; in some PHE regions entire PHE Centre areas or NHS England Areas are covered, whilst in others, it follows acute trusts' catchment areas.

The total number of samples tested by this service since the pilot began was 2686 including 188 which were tested as part of incidents (see additional use of DBS). Since the national roll out on 1 September 2013 a total of 2027 samples have been tested (excluding incidents). The number of samples tested each quarter has increased from around 50 in Q4/2013 to over 200 samples tested in Q4/2015 (figure 2), with numbers sustained at this level throughout 2016.

## Figure 1. Geographical coverage of DBS testing

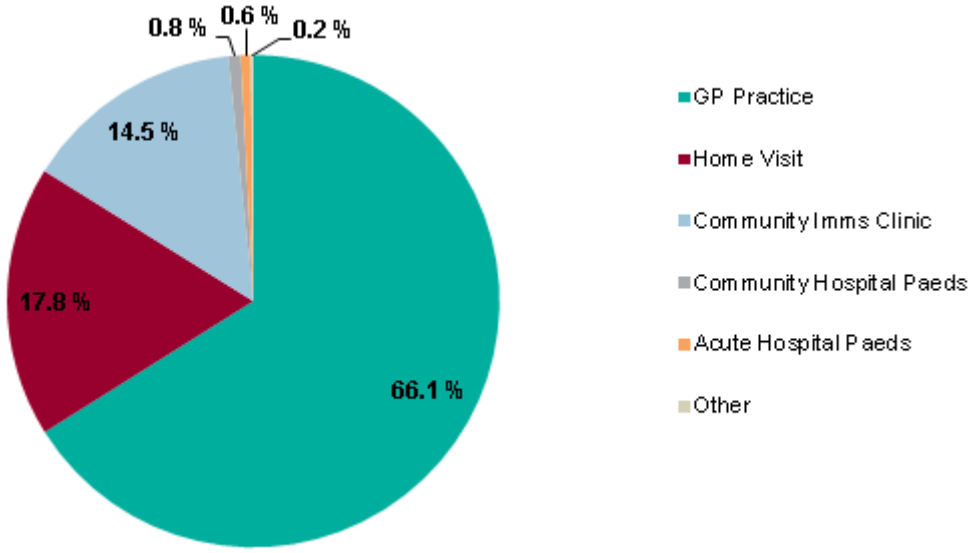

Last updated 16 June 2016 (PHE Centres as at pre-July 2015)

**Figure 2. Number of infants tested by quarter**




Most (66%) DBS sampling was carried out in GP practices, followed by home visits (18%), and community immunisation clinics (15%) (figure 3).

**Figure 3. Setting of DBS sampling**




Of the 2027 samples tested, vaccination status was available for 97% of children for doses 1 to 3; completeness for dose 4 at one year was 93%. Data provided on mother's HBV markers was less complete: 81% for hepatitis B surface antigen (HBsAg), 76% for hepatitis B 'e' antigen (HBeAg) and 75% for hepatitis B 'e' antibody (HBeAb). Of the infants with known vaccination status, uptake was over 99.7% for each vaccine dose.

Timeliness of vaccination was restricted to infants with evidence of a full vaccine course, and so any partially vaccinated infants or infants where vaccine dates were missing (n=255) were excluded, leaving 1772 (90%) for this provisional analysis.

**Timeliness of infant vaccination by vaccine dose**

| Dose | Median days (range) | Timeliness * |
|---|---|---|
| Dose 1 (at birth) | 0 (0-4377) | 93.7% |
| Dose 2 (4 weeks) | 33 (2-4406) | 74.3% |
| Dose 3 (8 weeks) | 66 (1-4439) | 73.4% |
| Dose 4 (12 months) | 376 (1-5103) | 68.7% |

*Timeliness = Dose 1 given within two days of birth, Dose 2 given within 42 days of birth, Dose 3 given within 84 days of birth, and Dose 4 given within 392 days of birth.

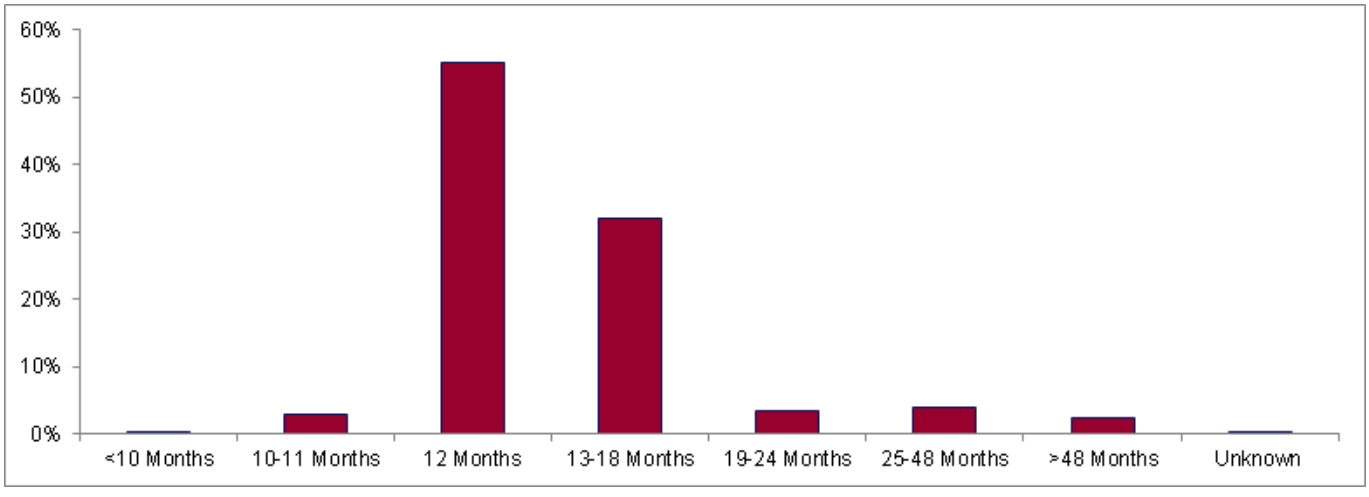
The vaccine uptake and timeliness data indicate that, although there is high coverage, doses are not always given on time. However, these data are provisional and should be interpreted with caution because of data quality / coding issues, noting the very wide range of days reported.

Samples are tested for HBsAg and hepatitis B anti-core antibody (anti-HBc). Of the 2027 samples, one sample was insufficient to carry out HBsAg testing.

Of 1707 infants tested (where risk status is known), 12% were in infants born to mothers with high infectivity risk, and therefore would have received hepatitis B immunoglobulin as well as vaccine at birth. Of the 2027 tested, six (0.3%) infants (all born to high infectivity mothers) were HBsAg positive, that is, had evidence of chronic infection.

The majority of DBS testing (55%) is being done at the recommended age of 12 months. This proportion increases to 87% if infants aged 12-18 months are included (figure 4).

**Figure 4. Age at time of DBS testing**




**Additional use of hepatitis DBS in incidents**

PHE Colindale has also provided DBS testing to support local lookback exercises and incidents in response to recognition of missed testing of at-risk infants. Two hundred additional DBS samples from these lookbacks were tested but these data have not been included in this review.

**Summary**

Since the national availability of the DBS service to improve 12 month testing of infants born to HBV infected mothers, PHE Colindale has received and tested over 2000 DBS samples (up until 31 December 2016). Almost 98% of tests have been done in primary care, community immunisation clinics or at home, as was the intended use of this service. Vaccination history has been well completed with over 99% vaccine uptake rates for each of the four doses which may reflect DBS testing being incorporated into a formally commissioned immunisation pathway for these infants. Only six infants (0.3%) had evidence of chronic infection; all of whom were born to highly infectious mothers, consistent with effective delivery of a neonatal selective immunisation programme. Data quality issues exist, particularly with vaccination dates, and so consideration is being given to minimise these issues. Only one sample was inadequate for testing indicating excellent user technique and ease of sampling by the DBS method.

Since September 2013, a total of 12 PHE Centres and/or NHSE Areas, and an additional 18 acute hospital trusts have joined the service leading to good coverage across the country, except in London. Continued advocacy is needed to increase the reach of this DBS testing service particularly to areas with high antenatal prevalence.

**Further information**

**National hepatitis B dried blood spot service webpage:**
https://www.gov.uk/guidance/hepatitis-b-dried-blood-spot-dbs-testing-for-infants

**The national dried blood spot (DBS) testing service for infants of hepatitis B positive mothers:**
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/343748/The_national_DBS_service_for_infants_of_hepatitis_B_positive_mothers.pdf

**PHE national dried blood spot (DBS) testing service for infants to hepatitis B positive mothers (three page factsheet):**
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/487016/PHE_Free_dried_blood_spot_testing_factsheet.pdf

PHE publications gateway number: 2016612. 