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ANTENATAL SCREENING AND PREVALENCE OF INFECTION: SURVEILLANCE IN LONDON, 2000-2007

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In the United Kingdom (UK), it is recommended to universally offer antenatal infection screening for human immunodeficiency virus (HIV), hepatitis B and syphilis infections, and susceptibility to rubella for the benefit of the mother and to reduce vertical transmission of infection. This paper describes the surveillance of antenatal infection including uptake of screening, and the results of testing in pregnant women in London between 2000 and 2007. Antenatal screening coordinators in liaison with midwifery heads and microbiologists at all thirty London National Health Service (NHS) Trust maternity units supplied quarterly data on the number of pregnant women booked for antenatal care, tests done, and tests results. The overall estimated uptake of screening increased since 2000 and reached 95.6% for HIV, 96.5% for syphilis, 96.2% for hepatitis B and 97% for rubella susceptibility by the second half of 2007. There is considerable variation in the performance between NHS Trusts. The overall estimated prevalence of HIV infection was 3.4/1,000 women (ranging from <1/1,000 to 10/1,000 across Trusts), of hepatitis B (HBsAg-positive) was 11.3/1,000 (2.6/1,000- 23.9/1,000), of syphilis was 4.4/1,000 (<1/1,000-16.3/1,000) and of rubella susceptibility was 39.3/1,000 (19-103/1,000). Antenatal infection screening has improved and there has been some success in implementation of national policy. However, screening uptake and prevalence of infection vary considerably across London NHS Trusts and some women are evidently disadvantaged. Improvements in information systems should help local partners to focus their interventions in those Trusts where work is still needed to increase testing as well as the capacity to monitor the uptake of screening.

Introduction

Universal antenatal infection screening aims to identify infection early so that mothers can be offered advice and interventions in pregnancy and afterwards for their own health benefit as well as to reduce the chance of vertical transmission. In 1998 in the United Kingdom (UK), the Department of Health recommended that all pregnant women should be offered antenatal screening for hepatitis B infection [1]. In 1999, UK national policy stated that all pregnant women should be offered and recommended testing for human immunodeficiency virus (HIV) infection, along with other antenatal screening tests, as an integral part of their antenatal care, and that this offer as well as the patient's decision to undergo the testing should be recorded [2]. National guidelines also require robust systems to monitor the uptake of testing. In 2003, the

Department of Health reinforced the policy by publishing a set of antenatal screening standards including those for syphilis infection and susceptibility to rubella virus infection [3].

In 2007, there were an estimated 77,400 people living with HIV in the UK, of whom over a quarter (28%) were unaware of their infection. Almost half (48%) of those individuals who had been diagnosed were resident in London [4]. Antenatal Infection Screening Surveillance (AISS) was implemented in London in 2000 in collaboration with the National Health Service (NHS) in London, by the then Regional Epidemiology Services of the Public Health Laboratory Service now the Health Protection Agency (HPA) [5]. It monitors the implementation of the national screening policy in London NHS Trusts (i.e. public hospitals), as well as the antenatal prevalence of HIV, hepatitis B and syphilis infections, and susceptibility to rubella. The results are reported quarterly to NHS Trusts and health authorities, to assist them in understanding the infection burden among pregnant women and to facilitate targeting of interventions where needed in London.

This article describes the AISS system as well as the gradual increase in antenatal infection screening during 2000 to 2007 and prevalence of infection in pregnant women reported at NHS Trusts across London.

Methods

The surveillance system was developed throughout London in collaboration with 30 maternity units in 28 NHS Trusts (two of the Trusts comprising of two maternity units). In each Trust, the head midwife of the maternity unit and the antenatal screening coordinator liaise with the microbiologists to obtain the information and provide it to the HPA. Currently 96% of births take place in obstetric units in hospital, and these Trusts are estimated to cover the large majority of the birth cohort (around 115,000 births per year in London) [6]. Staff at each Trust return a six-monthly (since 2005 quarterly) form to the HPA London regional office. Forms include source of information, aggregated data for the total number of pregnant women registered for antenatal care (hereafter called "booked" for antenatal care), tests carried out for HIV, hepatitis B, syphilis and rubella antibody, and the total number of positive tests. Positive tests are defined as HIV antibody positive, hepatitis B surface antigen (HBsAg) positive, syphilis positive with enzyme immunoassay test and rubella antibody <10 iu/ml.

The uptake of screening for each infection was estimated by calculating the proportion of tests done per total number of women booking for antenatal care. Prevalence of infection was calculated as the total number of positive tests per 1,000 tests done.

Results

By the end of June 2008, all 30 maternity units at the 28 London NHS Trusts had returned completed forms for the years 2000 to 2007. In 2006 and 2007, reports were received for all four quarters from all Trusts. There were some gaps in information provided by individual units, but all Trusts participated in the scheme.

Uptake of screening

Estimated uptake of antenatal screening in 2007 was 96.4% for hepatitis B, 96.6% for syphilis and 96.8% for rubella susceptibility. HIV screening uptake, which had been less than 70% in 2000, rose to an estimate of 95.1% in 2007 (Figure 1). Nevertheless, in 2007, valid quarterly reports where information on booking for antenatal care and test was given (108/112 reports) indicated that for at least 6,744 out of 138,618 booked women no HIV testing was reported. Based on average prevalence of antenatal

HIV infection in London as obtained through the AISS in 2007 (3.6/1,000), we estimated that around 24 babies were potentially at risk of vertical transmission of HIV and remained unrecognised. Three Trusts reported that in at least one quarter in 2007 less than 4/5 women had been screened for HIV.

Prevalence of infection

In 2007, the estimated overall prevalence of HIV infection, slightly decreasing, was 3.6/1,000 varying across Trusts (<1/1,000 to 10/1,000), of hepatitis B (HBsAg-positive) was 11.7/1,000 (3/1,000 to 24/1,000) and of syphilis was 4.7/1,000 (<1/1,000 to 16/1,000) (Figure 2). Prevalence of rubella susceptibility was 41/1000 (16/1,000 to 78/1,000) in 2007, compared to previous estimates of 37/1000 in 2001 and 34/1000 in 2004.

The prevalence of antenatal infection varies considerably across London's NHS Trusts (Table) and sectors ("pre 2006 NHS reorganization" London Strategic Health Authorities). HIV prevalence in 2007, ranged from 1.6/1,000 pregnant women in the North West London sector to 4.9/1,000 in the South East London sector, and was 50-fold higher at the NHS Trust with the highest prevalence compared to the one with the lowest prevalence (range from 0.2/1,000 to 10.1/1,000). For hepatitis B, the disparity was 11-fold (2.6/1,000 compared to 23.9/1,000), and for syphilis prevalence was 81-fold higher at the Trust most affected (range 0.2/1,000 to 16.3/1,000).

Data source, participation and data provided

In 2007, the source of information was missing from only two reports. Sources of data were derived from maternity and laboratory records such as manual records, delivery figures (birth register), electronic patient records, range of laboratory and maternity computer systems including Euroking K2, Winpath and Telepath. Only one Trust was unable to provide information about the number of bookings made. All Trusts were able to supply information on the number of screening tests performed apart from one Trust that did not provide syphilis data. All Trusts provided their positive results apart one that did not provide syphilis data and one unable to provide rubella data for two quarters.

Discussion

Overall in London, antenatal infection screening has improved and the implementation of the national policy can be regarded as a success to some degree. However, screening uptake and prevalence of infection does vary considerably across London NHS Trusts, and it is likely that in some pregnant women HIV infection remains undiagnosed thus putting unborn babies at risk of vertical transmission. Many NHS Trusts in London serve a population with high levels of HIV infections. This reflects the demography of the capital, with areas where a high proportion of women come from high prevalence countries. In 2006, overall 53% of women who gave birth in London had been born outside of the UK. In the same year, the prevalence of HIV among women born in sub-Saharan Africa who gave birth in the UK was 25/1,000 [4]. Though certain groups are at higher risk, it is essential that all women in London can benefit from early diagnosis and interventions to prevent their infants from becoming infected.

There were some problems with data completeness in some Trusts and thus there are limitations to the system. However, we believe that its overall results and conclusions are sound.

FIGURE 1

Uptake of antenatal screening for HIV, hepatitis B and syphilis; Health Protection Agency Antenatal Infection Screening Surveillance, London, half-years 2000-2007

FIGURE 2

Prevalence of HIV, hepatitis B and syphilis; Health Protection Agency Antenatal Infection Screening Surveillance, London, half years 2000-2007

It is possible that some women reportedly not tested in the current pregnancy may have been tested prior to pregnancy [7]. Irrespective of this, they should be screened in the current pregnancy. An underestimation of screening uptake could also result if women booked for testing had pregnancy loss before being tested. However, screening uptake could also be overestimated, with tests repeated during pregnancy, or reported for women who had miscarried or women who were not booked, typically because they presented very late in the pregnancy. Detailed local audit would be necessary to accurately assess to what extent low uptake reported in some Trusts may reflect limitations in the reporting system. Exploration of this and further review at Trusts level is recommended along with an assessment of characteristics of women who were not screened. Those who decline screening may constitute a particular risk group and may have higher prevalence of HIV or other infections [8]. Variability in the monitoring systems in place may make comparisons across Trusts less meaningful but observations and trends within single Trusts should be fairly reliable.

The findings mirror the trend in HIV prevalence found in the HPA HIV Unlinked Anonymous Survey of Pregnant Women through Dried Blood Spot Surveys, showing stability since 2004 (29/10,000 cards tested positive in 2000, 40/10,000 in 2002 and 42/10,000 in 2006) [4, 10]. There are evident inequalities in the prevalence of HIV across London, consistent with findings from the confidential reports of HIV-positive pregnancies to the Royal College of Obstetricians and Gynecologists in the National Study of HIV in Pregnancy and Childhood; data for 2003-2004 indicated that prevalence of maternal HIV infection was the highest in North Central London (5.8/1,000) [11].

Data sources and availability

Not all London NHS Trusts appear to be able to provide all the required information. Implementation of simple and robust methods for monitoring uptake of screening in antenatal patients has been recommended [9]. There are still some limitations though, as the surveillance is not based on individual records, but on aggregated numbers. Denominators and numerators are often obtained from

TABLE

Prevalence of HIV, hepatitis B and syphilis infection and susceptibility to rubella per 1,000 pregnant women tested, by London Strategic Health Authority and National Health Service Trusts. Health Protection Agency Antenatal Infection Screening Surveillance, London, 2007)

Strategic Health Authority	National Health Service Trusts (i.e. public hospitals)	Prevalence per 1,000 tested			
		HIV	Hepatitis B	Syphilis	Rubella susceptibility
North Central London	Barnet & Chase Farm	1.9	7.9	3.2	47.9
	North Middlesex	10.1	20.9	16.3	55.4
	Royal Free	0.5	8.0	0.2	37.4
	University College	2.9	8.3	-	42.9
	Whittington	2.3	16.1	4.7	40.5
North East London	Barking, Havering and Redbridge	2.8	13.2	5.7	42.3
	Homerton	4.7	23.9	8.8	35.3
	Newham	6.3	14.9	6.7	56.3
	Royal London	0.8	13.4	5.4	64.7
	Whipps Cross	3.5	21.6	6.8	62.5
North West London	Central Middlesex	2.4	15.7	5.2	59.4
	Chelsea & Westminster	1.5	4.3	1.0	34.7
	Ealing	0.6	10.8	4.8	59.9
	Hillingdon	1.0	7.0	1.8	34.6
	Northwick Park	2.5	7.1	2.0	78.4
	Queen Charlotte's	0.6	5.9	1.6	17.4
	St. Mary's	2.6	9.3	6.4	31.5
	West Middlesex	2.6	5.8	2.0	31.2
	Farnborough	0.2	2.6	1.2	23.0
South East London	Guy's & St. Thomas'	6.7	17.5	5.9	45.8
	King's College	4.3	19.0	7.2	36.4
	Lewisham	7.9	16.1	5.9	59.6
	Queen Elizabeth	5.6	17.2	2.2	26.7
	Queen Mary's	2.2	4.8	0.9	41.2
South West London	Kingston	1.0	3.9	0.5	24.5
	Mayday	3.9	11.3	0.8	19.4
	St. George's	4.4	10.0	2.5	52.2
	Epsom & St. Helier	1.1	4.5	1.7	16.2

different sources (i.e. laboratory and maternity units and their various computer systems). Aggregated data cannot be cross-checked and do not allow us to explore co-infection or correlations in high rates of infections (e.g. in some Trusts, hepatitis B rates are very high but not correlated to high rates of HIV or syphilis infection). The HPA-coordinated AISS does not involve the private sector. However, almost all antenatal care in London is provided through the NHS [6].

The AISS is of particular public health interest for infections other than HIV, which are not monitored through alternative dedicated scheme. The estimated prevalence of syphilis (screen test positive) in pregnant women is around one in 200 but the increasing numbers of cases of syphilis among women in the UK [12,13] suggests that high rates of antenatal testing should be maintained to prevent future cases of congenital infection.

An assessment of vaccination coverage among babies at risk of vertical transmission of hepatitis B in 2006 showed that less than half of the babies born to HBsAg-positive mothers in London had received the four recommended hepatitis B vaccinations by the first year of age. There were important variations in performance across London [14]. This study enabled a limited validation of AISS data as it provided baseline information on the expected numbers of those at risk at each Trust in a particular timeframe. Aggregated data for pregnant women who decline antenatal tests recently have been added to the AISS questionnaire, to help better understand why uptake is not complete in all maternity units. A better understanding of the characteristics of individual infected women is needed as well. For this purpose a pilot of an individual based enhanced surveillance of HBsAg-positive mothers also began in London in 2008.

In the UK, as in many other European countries [15-21] there are different policies for universal antenatal infection screening. From a health-economics point of view, there is recent evidence in Europe that universal antenatal HIV screening is justified [22]. In the UK, cost benefit analysis has concluded that syphilis antenatal screening is worth continuing [23]. A recent study in France showed that surveillance of congenital syphilis cases, as well as assessment of syphilis screening practices during pregnancy, should be performed to prevent the occurrence of congenital syphilis cases [24]. An Italian study found prevalence of positive syphilis serology among 0.49% of pregnant women and authors concluded that antenatal syphilis screening is important, facilitates treatment during pregnancy and prevents vertical transmission [25]. Syphilis screening tests need to be followed by further diagnostic tests to confirm infection and assess its stage as well as any potential infectivity and risk to the unborn child.

We believe that the Antenatal Infection Screening Surveillance system described here is an effective method of monitoring policy implementation through provision of simple, relatively cheap and timely information. This provides the local health care providers with comparative data and indicators of their relative success. Maternity unit practices have been described as the most important predictor for determining uptake of HIV testing [26]. Local studies of possible reasons for not achieving universal testing are needed. This would help to ensure that practices are appropriately monitored at local level and results of this monitoring are used to improve antenatal screening, provision of treatment for infected mothers and interventions to prevent infection in the unborn child and among contacts of the mother.

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