IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

CENTRAL RABBINICAL CONGRESS OF THE USA & CANADA, *et al.*,	:	Case No.: 12-Civ.-7590
Plaintiffs,	:	Judge Naomi Reice Buchwald
vs.	:	
NEW YORK CITY DEPARTMENT OF HEALTH & MENTAL HYGIENE, *et al.*,	:	
Defendants.	:	

AFFIDAVIT OF DR. DANIEL S. BERMAN, M.D.

Qualifications and Overview

1. I am a medical doctor specializing in infectious disease. I graduated from New York University School of Medicine in 1982, completed a Residency in Internal Medicine in 1985 at the New York University Medical Center, and then completed a Fellowship in Infectious Diseases at the New York University Medical Center in 1987. I am Board-certified in Internal Medicine and Infectious Diseases. I have been in private practice since 1987. I have been the Chief of Infectious Diseases at the New York Westchester Square Hospital Medical Center since 1989. I am also on the attending staff as an Infectious-Diseases specialist at the Montefiore Medical Center. Among other things, I have cared for patients with Herpes simplex infection.

2. I have carefully reviewed the recent report, published on June 8, 2012, by the Centers for Disease Control and Prevention (CDC) in its Morbidity and Mortality Weekly Report (MMWR), which attempts to prove based on an investigation conducted by New York City's Department of Health and Mental Hygiene (DOHMH) that neonatal Herpes simplex infection (HSV-1) can be transmitted through orogenital suction, in Hebrew called *metzitzah b'peh* (MBP), performed as part of Jewish ritual circumcision. I have examined and studied, in light of my knowledge and experience in this area, the findings recorded by this report, as well as the conclusions drawn from them. I have also independently investigated some of the individual cases that form the basis for the report.

3. In my professional opinion, there are serious flaws in the CDC report's methodology and analysis, raising doubts about the validity of the data and the strength of the conclusions reached by the researchers. Based on my review, the data do not support the conclusion that MBP increases the risk of neonatal Herpes simplex infection. In short, I see *no evidence* for the transmission of HSV-1 through ritual circumcision.

The CDC Report and Its Findings

4. The CDC report focuses on a total of 11 cases of neonatal Herpes simplex infection that occurred in the past 11 years. This included a period from 2000 until April 2006, during which time reporting of neonatal Herpes simplex infection to the DOHMH was not required, and a second period, from April 2006 through December 2011, during which time reporting was mandatory.

5. During the period of mandatory reporting, there were a total of 84 cases of laboratory-confirmed neonatal Herpes simplex infection in New York City (within 60 days of birth). There are two types of Herpes simplex infection; HSV-1 is generally associated with oral herpes, commonly known as cold sores or fever blisters; whereas HSV-2 is associated with genital infection. Of the 84 cases during the mandatory reporting period, 45 were in males (HSV-1:22; HSV-2:15; and untyped HSV:8) and 39 in females (HSV-1:15; HSV-2:18; and untyped HSV:6). The report does not state how many total cases of neonatal Herpes simplex infection there were during the first period.

6. The report states that, during the first period, there were five cases of neonatal HSV-1 infection in those who either "probably" or were "confirmed" to have had MBP, and one case of untyped HSV neonatal infection. Of these six cases, in four of them the children were "confirmed" to have had MBP, and in two it was "probable." In the second period, there were four cases of HSV-1 neonatal infection and one untyped case in children either "probably" or "confirmed" to have had MBP. Only two of those five cases (including the untyped case) were "confirmed" to have involved MBP; the other three were only "probable." Together, these are the report's 11 cases.

7. The investigators estimated that the number of boys born in New York City who did not have MBP performed during the 5 1/2-year period of mandatory reporting of neonatal Herpes simplex infection was 352,411. As there were 25 reported cases of neonatal HSV-1 infection in this group, the rate of neonatal HSV-1 infection was 7.1 per 100,000. The investigators further estimated that the number of boys born during this time who were likely to have had MBP was 20,493. Accordingly, they inferred that the total number of HSV-1 cases arising from that subgroup should have been 1.46. The report claims that there were five cases in this group. As five is 3.4 times greater than 1.46, the investigators concluded that "infant males who underwent circumcision with confirmed or probable direct orogenital suction had an estimated risk 3.4 times greater than the risk for 1 or untyped HSV infection among males who were unlikely to have had direct orogenital suction." Another way of expressing this is that there should have been 1.46 cases among the ones who underwent MBP. Since we cannot have a fraction of a case, this means there should have been one or two cases. Over the 5 1/2 year period, there were three or four "extra" cases found among the estimated 20,000 who had MBP.

8. The investigators theorized that HSV-1 can be transmitted from the mouths of *mohelim* (circumcisers) to babies during MBP, even in the absence of any sores in the mouth of the mohel, through a process of asymptomatic "viral shedding."

Flaws in the CDC Report

9. I have great concerns about the validity of the findings included in the CDC report. Both the evaluation of the purported 11 cases, and the assumptions underlying the extrapolations from those cases, appear to be flawed. The report's methodology and conclusions likewise appear to be deficient in critical respects.

10. At the outset, it must be recognized that the investigators' conclusion rests on the observation that there were only three or four "extra" cases from among the over 20,000 estimated to have had MBP over a period of over five years. This is a very small number. Indeed, a report published just last year in the *Journal of Sexually Transmitted Diseases* based on nearly the same data, warned that "[t]he relatively limited number of case limits our ability to make definitive statistical comparison among our cases and ... makes certain statistical analyses unstable." (Exh. 1, at 6.)

11. Moreover, because of the small sample size, any change to either the number of actual cases involving MBP, the number of actual cases *not* involving MBP, or the estimated total number of children to have undergone MBP, could drastically affect the report's ultimate conclusion. All of these, however, are quite dubious.

12. *First*, during the mandatory reporting period used to establish the relative risk figure of 3.4, only *two* of the five alleged cases were "confirmed" to have involved MBP, while the other three cases were only "probable." This alone raises doubts about the accuracy of the data. Without 100% certainty as to the performance of MBP, no meaningful conclusions can be reached. Furthermore, the report indicates that it treated a case as "confirmed" to have involved MBP if the parents so reported. But I personally am aware of one case from the earlier period that was listed as "confirmed" even though the *mohel* stated on many occasions that he *did not* perform MBP, and even passed two polygraph tests regarding this statement. This raises uncertainty about even the cases reported to have involved "confirmed" MBP. Moreover, one of the two "confirmed" cases involved *untyped* HSV, not HSV-1. An untyped case should not be considered at all in the analysis. All of this translates into the fact that only one "confirmed" case of MBP was connected to HSV-1 during the five years of mandatory reporting used by the investigators as their key evidence—entirely in line with the investigators' projected number of one or two cases.

13. *Second*, the figure of five cases is additionally problematic because there is no evidence that each of these cases was *independently* linked to MBP—and, in fact, there is reason to believe otherwise. In particular, two of the five cases were siblings, one in 2008 and the second in 2011. Given that, during the four-year period between 2008 and 2011, there was only one other case reported in all of New York City, it is much more plausible to conclude that these siblings were infected by a common household source, or from one brother to the next, rather than by the *mohel*. Why would there be no other reported cases from this *mohel* or any other *mohel* in New York City from 2008 until 2011, aside from these two brothers (and one other case in 2008)? If only one of the siblings was infected by the *mohel* (and the other infected from his brother), the number

of cases would drop to four; if both siblings were infected from a common household source, the number would drop to three—relative to a baseline expectation, according to the researchers, of one or two cases. Finally, in one of the five cases, there is strong reason to believe that the virus was actually transmitted from a symptomatic sibling, who had extended and close physical contact with the infant shortly before the latter fell ill, even to the point of sharing a pacifier. *See* Debbie Maimon, *Behind the Campaign Against Metzitzah B'peh*, YATED NE'EMAN, July 13, 2012.

14. *Third*, the report calculated its projected rate of infection based on the total number of reported cases of HSV during the period from 2006 through 2011. The rate of diagnosis, however, is not the same as the rate of actual incidence of infection. To make a diagnosis of HSV-1, the treating physician must first consider the possibility of such a diagnosis and then do the appropriate diagnostic studies. It is likely that HSV-1 would be more likely to be suspected, and therefore tested for, in a boy suspected to have had MBP than in one who was not, even with an identical clinical presentation, because of a heightened awareness of the possibility of transmission through MBP. In other words, for a boy who was not suspected to have had MBP, it is quite possible that cases were missed, as the diagnosis was never considered. If so, the projected number of cases in the MBP sub-group would be higher than the figure of 1.46 used by the researchers. One way to analyze this possibility would be to account for the number of diagnostic tests that were performed to search for HSV-1 in boys suspected to have had MBP, versus in those who were not—but the CDC report does not include such an analysis.

15. *Fourth*, the report's relative risk figure was premised, and very dependent, upon its estimate of the number of boys upon whom MBP was performed during the five years in question. The report estimated that number at 20,943, based on statistics from a national census of Jewish day schools. However, a new population study presented by the UJA-Federation of New York, *Jewish Community Study of New York: 2011*, reports that there has been an explosion of births of Orthodox Jewish children in New York City in the past few years. (*See* Exh. 2.) These new statistics would substantially change the estimated number of boys who had MBP, and changes to that estimate would significantly impact the projected rate of infection and thus the relative risk figure.

16. Although the study bases its relative risk figure only on data from the mandatory reporting period, it also draws support for its conclusions from six cases reported during the prior study period. There are serious flaws in the evaluation of those six cases as well. Only five were shown to be HSV-1, whereas the sixth was untyped. As with the sample used to compute the relative risk figure, only four of the six cases from this earlier period were "confirmed" to have had MBP, while the two other cases were listed as "probable." And, as mentioned above, as to one of these four "confirmed" cases, the *mohel* has stated that he did not perform MBP, and was supported by two different polygraph tests. Furthermore, of the six cases, two were twins, and it has been medically proven that if one baby acquires the infection, it can easily be transmitted to the second baby through a caretaker or through direct contact, if no special precautions are taken. There is no indication that such precautions were taken in the case of these twins. The *mohel* who performed MBP on these twins—the same *mohel* who has stated

that he did *not* perform MBP in one of the other four "confirmed" cases—was one of the busiest and most experienced *mohelim* in the New York area, and had performed many thousands of circumcisions prior to these babies, without any case of HSV-1.

17. I also have concerns regarding the accuracy of the charge that MBP was the cause of the infection in the reported cases. The report considers the distribution of the lesions in dermatomes associated with the genital area (region of the skin that is fed by a specific nerve) as evidence of transmission through MBP. However, in the case of the twins, the report also describes lesions on the abdomen, buttocks, and perineum, including the genitals. This is a very wide area that includes many dermatomes. In the third case associated with the same *mohel*, lesions were described on the penis, perineum, buttocks, back, and foot. This is an even wider area of distribution. Medically speaking, it is very difficult to draw conclusions as to the source of the infection when such a large area is affected.

18. In addition, it is well established in medical literature—and confirmed through DNA testing—that Herpes virus has been transmitted to infants through household contacts. Indeed, transmission from a symptomatic individual is far more likely to occur than transmission from an asymptomatic individual, like a *mohel*. Yet the investigators failed to consider the possibility of household contacts as potential sources of infection in any of the cases. The report does discuss excluding healthcare workers as potential causes, but makes no mention of the exclusion of the more proven possibility of household contacts. Strict infection control is used to prevent transmission in the hospital setting, while such infection-control policies are not in effect in most homes, where the baby is just as susceptible from a biological standpoint to contract Herpes simplex infection. Furthermore, many Orthodox children live in homes with many siblings and crowded conditions, which would make transmission of HSV-1 from household contacts even more possible.

19. Finally, the gold standard for demonstration of transmission of HSV is DNA fingerprinting, which could (if the investigators' conclusions were correct) connect the infection to the *mohel* definitively. This has been done in other studies demonstrating HSV infection. But there has been not one single case in history, let alone the 11 cases in question, where DNA fingerprinting has proved transmission through MBP.

20. The absence of evidence linking MBP to HSV-1 transmission is not surprising, because *mohelim* typically undertake precautions to prevent transmission. For example, the oral-genital contact is very brief, which greatly reduces the likelihood that any virus would be transmitted. Moreover, *mohelim* generally rinse their mouths with some type of antiseptic prior to performing MBP, and rinsing with antiseptic mouthwash has been scientifically proved to kill the herpes virus in the saliva.

Conclusions

21. My professional opinion is that the data relied upon by the CDC report to establish its observed number of cases, and the data and estimates relied upon to establish

the projected number of cases, are deeply flawed, casting serious doubt on the validity of the report's findings.

22. In sum, I see no evidence for the transmission of HSV-1 through ritual circumcision. The evidence in the CDC report simply is not sufficient to prove any cause-and-effect relationship between MBP and HSV-1 infection.

I declare under penalty of perjury under the laws of the State of New York that the foregoing is true and correct to the best of my knowledge.

Executed this 5 day of October, 2012, at Bronx, New York.

Daniel S. Berman, M.D.

STATE OF NEW YORK
COUNTY OF Bronx

Subscribed and sworn before me this 5 day of October, 2012.

Notary Public

My commission expires on: 7/31/2013

CHARLENE R. BROWN
NOTARY PUBLIC STATE OF NEW YORK
No. 03-4648048
Qualified in Bronx County
Term Expires

EXHIBIT B-1

ORIGINAL STUDY

Population-Based Surveillance for Neonatal Herpes in New York City, April 2006–September 2010

Shoshanna Handel, MPH,† Ellen J. Klingler, MPH,† Kate Washburn, MPH,† Susan Blank, MD, MPH,†‡ and Julia A. Schillinger, MD, MSc†‡*

Background: Population-based data for neonatal herpes simplex virus (HSV) infection are needed to describe disease burden and to develop and evaluate prevention strategies.

Methods: From April 2006 to September 2010, routine population-based surveillance was conducted using mandated provider and laboratory reports of neonatal HSV diagnoses and test results for New York City resident infants aged ≤60 days. Case investigations, including provider interviews and review of infant and maternal medical charts and vital records, were performed. Hospital discharge data were analyzed and compared with surveillance data findings.

Results: Between April 2006 and September 2010, New York City neonatal HSV surveillance detected 76 cases, for an average incidence of 13.3/100,000 (1/7519) live births. Median annual incidence of neonatal HSV estimated from administrative data for 1997 to 2008 was 11.8/100,000. Among surveillance cases, 90.8% (69/76) were laboratory confirmed. Among these, 40.6% (28/69) were HSV-1; 39.1% (27/69) were HSV-2; and 20.3% (14/69) were untyped. The overall case-fatality rate was 17.1% (13/76). Five cases were detected among infants aged >42 days. In all, 80% (20/25) of the case-infants delivered by cesarean section were known to have obstetric interventions that could have increased risk of neonatal HSV transmission to the infant before delivery. Over half (68%, or 52/76) of all cases lacked timely or ideal diagnostics or treatment.

Conclusions: Administrative data may be an adequate and relatively inexpensive source for assessing neonatal HSV burden, although they lack the detail and timeliness of surveillance. Prevention strategies should address HSV-1. Incubation periods might be longer than expected for neonatal HSV. Cesarean delivery might not be protective if preceded by invasive procedures. Provider education is needed to raise awareness of neonatal HSV and to assure appropriate testing and treatment.

Infection with herpes simplex virus type-1 (HSV-1) or type-2 (HSV-2) during the neonatal period, or neonatal herpes (neonatal HSV), causes severe morbidity and high mortality rates even when treated.[1,2] The majority of infections (85%) are acquired perinatally, although postnatal (10%) and congenital (5%) infections do occur.[3] There is evidence that an increasing proportion of adult genital HSV infections are attributable to HSV-1[4,5]; however, approaches for preventing neonatal HSV are limited and focused on HSV-2.[1,2,6]

Experts have advocated for making neonatal HSV a nationally notifiable disease; however, neonatal herpes is currently only reportable in a few jurisdictions in the United States (US).[7–10] Estimates of national incidence from other countries range from 1.15/100,000 to 8/100,000 live births.[11–16] Incidence estimates from different parts of the United States are higher, ranging from 8.4/100,000[17] to 69/100,000 live births[9]; this range includes estimates that are not population based, as well as a nationally representative incidence estimate gleaned from a database of pediatric hospital admissions.[18,19,20] Given variability in the prevalence of genital herpes across geographic regions of the United States,[5] variation in incidence of neonatal HSV is expected. Variations are also likely caused by differences in methods used to measure neonatal HSV disease burden. We present findings from a population-based surveillance system for neonatal HSV for the first time in the United States, and compare these findings with analyses of administrative data for the same population.

MATERIALS AND METHODS

In late March 2006, neonatal HSV infection became a reportable disease in New York City (NYC).[21] Clinical laboratories were required to report positive results for HSV on specimens from infants aged ≤60 days who were residents of NYC, and healthcare providers were required to report diagnoses of neonatal HSV infection for the same age group, regardless of whether laboratory results confirmed infection. Certificates of birth, death, and spontaneous termination of pregnancy (fetal death before delivery) were obtained from the NYC Bureau of Vital Statistics for all cases. To identify cases not reported by a provider or laboratory report, a retrospective search of vital records was performed at regular intervals.

The NYC Department of Health and Mental Hygiene investigated reported cases using a standard form. Investigations included confirmation of laboratory testing, telephone interviews with providers involved with each case, review of infant medical records, and maternal labor and delivery records. Interviews with parents were conducted only where

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The authors thank Jennifer Norton, PhD, of the New York City Department of Health and Mental Hygiene Epidemiology Services Department and Sarah Walters, MPH, of the New York City Department of Health and Mental Hygiene Bureau of Environmental Surveillance and Policy for providing SPARCS data; and Joseph Kennedy, MPH, Richard Genovese, BA, and Wenhui Li, PhD, of the New York City Department of Health and Mental Hygiene Vital Statistics Department for their support in obtaining vital statistics data for this manuscript. None of these individuals received any compensation for their assistance.

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Received for publication June 28, 2010, and accepted January 6, 2011.
DOI: 10.1097/OLQ.0b013e31821b178f

postnatal infection was considered probable. Data collected regarding infant patients included demographics; gestational age; birth weight; circumcision status and date (males only); whether ill at birth; presence and anatomical distribution of lesions; comorbidities; HSV test and its results; acyclovir treatment; cerebrospinal fluid (CSF) and liver function tests and their results; and dates of: first symptom, first seeking medical attention, hospital admission and discharge, specimen collection, diagnosis, and treatment initiation and completion. Data collected regarding infant patients' mothers included demographics, gravidity and parity, history of HSV infection, prenatal HSV serologic testing status, antiviral medication during pregnancy, and presence of genital herpes lesions at delivery. Data collected regarding delivery of infant patients included presentation (vertex or breech), mode of delivery (vaginal or cesarean section), interval between rupture of membranes and delivery, and artificial rupture of membranes or any invasive obstetric procedures.

We defined a confirmed case of neonatal HSV infection as one occurring in an infant aged ≤60 days who tested positive for HSV by culture, direct immunofluorescence assay or other antigen detection test, or polymerase chain reaction. The upper limit for the age range was 60 days to test our hypothesis that some perinatally transmitted cases may not appear until shortly after the neonatal period. We defined a probable case of neonatal HSV as one occurring in an infant aged ≤60 days with no laboratory confirmation of HSV infection, but who had each of the following: (1) a diagnosis of HSV, (2) treatment with acyclovir for ≥7 days, (3) illness clinically compatible with neonatal HSV, and (4) no alternative diagnosis. In NYC, postnatal HSV-1 infections have occurred after ritual Jewish circumcision practices in which the ritual circumciser (mohel) uses his mouth to suck blood away from the incision on the newly circumcised penis.[22] Infection after ritual circumcision was defined as a confirmed case of HSV-1 or untyped HSV, or a probable case, in a male infant who had been circumcised outside of a hospital, with date of illness onset occurring after circumcision; if the date of illness onset was missing, then the date of first specimen collection for HSV testing was used.

Incidence was calculated for infants aged ≤60 days and for infants aged ≤42 days using the number of cases reported during 4.5 years as the numerator. In the denominator, we added three-quarters the number of live births in 2006 plus the number of live births for 2007 to 2009 plus three-quarters the number of live births in 2009 to estimate the number for January to September 2010. Maternal age and race/ethnicity-specific incidence were calculated using maternal age and race-ethnicity data obtained from birth certificates. To obtain a denominator for these incidence calculations, we used a similar method as described earlier and the number of live births by age and race/ethnicity from 2008 to estimate the numbers for 2009 and 2010, since more current data were not available. Case-fatality rates were calculated overall and by viral type.

Pearson chi-square testing was performed by using SAS 9.1 (SAS Institute, Inc., Cary, NC) to identify statistically significant differences in distribution of characteristics among cases with regard to viral type, fatality, infant sex, clinical manifestation, presence of lesions and fever, delivery mode, maternal race, and age at presentation.

We classified cases as follows: skin, eye, or mucous membranes (SEM) infections were those in which herpetic lesions were present or SEM specimens tested positive for HSV with no evidence of central nervous system (CNS), disseminated, or congenital infection. CNS infections were those that were CSF-positive for HSV with no evidence of disseminated or congenital infection. Disseminated infections were those in which there was no evidence of congenital infection, and both aspartate aminotransferase and alanine aminotransferase levels were elevated.[23] Congenital infections were those with signs of HSV-related illness or those from which HSV-positive specimens were collected within 24 hours of birth, or those with stigmata of congenital infection (e.g., microcephaly, microphthalmia, or retinal scarring) noted at birth.

We measured delays in seeking care, diagnosis, and treatment, as well as instances of inappropriate medical treatment. We defined a delay in seeking medical care as >1 day between date of first symptom and date medical care was first sought, a delay in diagnosis as >1 day between date medical care was first sought and date of diagnosis or first specimen collection for HSV testing, and a delay in treatment as >1 day between herpes diagnosis or first specimen collection and beginning treatment with acyclovir. Cases were classified as adequately evaluated if lumbar puncture and liver-function testing were recorded as performed. Inappropriate treatment was defined as administration of less than the recommended course of acyclovir (60 mg/kg/d of intravenous acyclovir for 14 days for SEM cases and 21 days for CNS and disseminated cases); we considered 21 days appropriate therapy for congenital neonatal HSV.[24]

To explain how HSV might have been transmitted despite the protective effect of cesarean delivery, we recorded obstetric factors that might have increased risk for disease transmission before the cesarean delivery. An interval of >4 hours between rupture of membranes and delivery was considered to pose a risk for HSV transmission,[25] as were artificial rupture of membranes, vacuum extraction, and use of fetal scalp electrodes, intrauterine pressure catheters, or forceps.

We used hospital discharge data to measure number of cases of neonatal HSV diagnosed among infants with an NYC zip code of residence who had been discharged from a New York State hospital during January 1997 to December 2008 and who were aged ≤60 days at time of admission, and included any hospital discharges listing an International Classification of Diseases (ICD) Version 9 (ICD-9) code for herpes (codes 054.0–054.9) as the principal, primary, or other diagnosis code. A unique identifier was created by concatenating the encrypted date of birth, sex, and the zip code of the patient's residence to identify infants with more than one hospital discharge listing a herpes ICD-9 code, and only the first such admission was counted. Annual incidence was calculated using annual neonatal HSV hospital discharges as the numerator and annual number of live births in NYC as the denominator.

RESULTS

During the first 4.5 years (April 2006–September 2010) of neonatal HSV surveillance in NYC, 75 reported cases met our case definitions. One additional case was identified by death certificate search, providing 76 cases for analysis. Overall incidence of neonatal HSV was 13.3/100,000 live births or 1/7519 live births; among infants aged ≤42 days, incidence was 12.4/100,000 live births or 1/8065 live births. Among 72/76 (94.7%) cases with information regarding maternal age at delivery, median maternal age was 25 years (range, 16–43 years). Age-specific incidence was highest among infants born to women aged <20 years (47.4/100,000 live births or 1/2110) and declined thereafter (Table 1). Infants born to black non-Hispanic mothers were 1.5 times as likely to be infected with HSV as those born to white non-Hispanic or Hispanic mothers. Black non-Hispanic mothers had the youngest median age at

TABLE 1. Distribution of Cases by Maternal Age and Race/Ethnicity

	All Race/ Ethnicities			Black Non-Hispanic		Hispanic		White Non-Hispanic		Asian		Other/ Unknown	
Maternal Age (yr)	n	Incidence	%	n	Incidence	n	Incidence	n	Incidence	n	Incidence	n	Incidence
All ages ($P < 0.0001$)	76	13.3	100.0	23	18.0	24	13.2	18	10.4	4	4.9	7	259.3
<20	18	47.4	23.7	10	79.8	2	9.3	2	72.7	0	0.0	4	2,191.8
20–24	21	18.3	27.6	6	19.4	7	14.4	5	21.5	1	8.6	2	353.1
25–29	15	10.1	19.7	4	12.1	5	10.0	3	7.8	2	7.6	1	135.6
30–34	10	6.7	13.2	0	0.0	5	13.5	5	8.7	0	0.0	0	0.0
>34	12	10.1	15.8	3	12.8	5	19.9	3	5.8	1	5.8	0	0.0

delivery (20 years, as compared with 27.5 years for white non-Hispanic and 26 years for Hispanic mothers).

Among the 76 cases, 69 (90.8%) were confirmed and 7 (9.2%) were probable; all had laboratory testing performed. Among the 69 confirmed cases, 28 (40.5%) patients were infected with HSV-1; 27 (39.1%) with HSV-2; and 14 (20.3%) had positive laboratory results that were not type specific. No statistically significant differences between HSV-1 and HSV-2 cases were identified with regard to sex, fatality, clinical manifestation, presence of lesions or fever, delivery mode, or maternal race. In all, 43 (56.6%) of the cases were boys. Of the 13 deaths, 8 (61.5%) were among girls; 9 (69.2%) occurred within the first 2 weeks of life (Table 2). Although not statistically significant, the fatality rates differed by HSV type (21.4% among HSV-1 cases and 18.5% among HSV-2 cases). Most of the cases (56.5%) were SEM; 23.2% were disseminated, 17.4% were CNS infections, and 2.9% were congenital infections. Lesions were present among 41 (60.3%) of the 68 cases for which lesion data were available. Fever was present among 19 (31.1%) of the 61 cases for which data were available. Among the 61 cases with known fever and lesion data, 19.7% had neither fever nor lesions (Table 3). In all, 27 (69.2%) SEM cases had lesions noted, compared with 5 (41.7%) CNS cases, 7 (43.8%) disseminated cases, and both (100%) of the congenital cases.

Four (9.3%) of the 43 male patients met the definition for infection after ritual Jewish circumcision. All 4 case patients had lesions on the penis or the scrotum (2 on the penis only, 1 on the scrotum only, and 1 on both the penis and the scrotum); 3 of the 4 case-patients were laboratory-confirmed HSV-1 cases. The interval between circumcision and illness onset ranged 2 to 12 days (median, 3.5 days).One of the case-patients had CNS infection, the remaining 3 had SEM disease.

Of all cases, 56 (73.7%) were diagnosed at age ≤14 days; 12 (15.8%) at age 14 to 30 days; 3 (3.9%) at age 31 to 42 days; and 5 (6.6%) at age 43 to 60 days. Case-patients diagnosed at age ≤14 days had a higher fatality rate than those diagnosed at age ≥15 days (21.4% vs. 5%; $P = 0.094$). Of the 5 cases diagnosed among infants >42 days, 2 were HSV-1 (delivered by cesarean section); 2 were HSV-2 (one vaginally, and the other with unknown mode of delivery); and 1 was a probable case (cesarean section). Among the 57 case mothers for whom we had data, 11 (19.3%) had a known history of HSV, and 5/52 (9.6%) of those for whom data were available

TABLE 2. Characteristics of Fatalities

Sex	HSV Type	Syndrome	Mode of Delivery	Obstetric Risk Factors	Maternal History of HSV	Age at Diagnosis (in Days)	Age at Death (in Days)	HSV Indicated on Death Certificate
Male	1	Disseminated	Cesarean	Yes*†	Unknown	7	12	No
Female	1	SEM	Vaginal	Unknown	Unknown	N/A	0	No
Female	1	Disseminated	Vaginal	Yes†	No	8	5	Yes‡
Female	1	Disseminated	Cesarean	Yes†§	Unknown	8	14	Yes‡
Male	2	Disseminated	Cesarean	Unknown	Unknown	11	11	Yes¶
Male	2	Disseminated	Cesarean	Yes†	No	6	12	No
Male	2	Disseminated	Cesarean	Yes†	No	5	8	Unknown
Male	1	SEM	Cesarean	No	No	14	20	Unknown
Female	Unknown	Congenital	Cesarean	Yes§	No	0	3	Unknown
Female	Unknown	Disseminated	Cesarean	No	No	10	23	Yes¶
Female	1	Disseminated	Vaginal	Yes§	No	8	11	Unknown
Female	2	Disseminated	Cesarean	Yes†§	No	12	15	Unknown
Female	2	Disseminated	Vaginal	Yes†§**	No	16	29	Unknown

*Internal monitor.
†Prolonged rupture of membranes.
‡Underlying cause.
§Artificial rupture of membranes.
¶Immediate cause.
Intrauterine pressure catheter.
**Vaccuum extraction.

TABLE 3. Characteristics of Case Infants and Their Births, by Viral Type

	All Cases		Confirmed Cases							Probable Cases	
			Untyped		HSV-1		HSV-2		*P* (HSV-1 vs. HSV-2)		
	N	%*	n	%*	n	%*	n	%*		n	%*
Total	76	100%	14		28		27			7	
Deaths (case-fatality rate)	13	17.1	2	14.3	6	21.4	5	18.5	0.787	0	0
Sex (n = 76)											
Male	43	56.6	8	57.1	16	57.1	13	48.1	0.504	6	85.7
Female	33	43.4	6	42.9	12	42.9	14	51.9		1	14.3
Mean/median age at diagnosis, in days (n = 76)	12.5/9.5		7.9/8.0		13.8/9.5		13.6/11.0		0.957	11.9/7.0	
Clinical manifestation (n = 69)			13		27		23			6	
SEM	39	56.5	9	69.2	17	63.0	8	34.8	0.135	5	83.3
CNS	12	17.4	1	7.7	3	11.1	7	30.4		1	16.7
Disseminated	16	23.2	2	15.4	7	25.9	7	30.4		0	0
Congenital	2	2.9	1	7.7	0	0	1	4.4		0	0
Lesions present (a case can have lesions in multiple sites) (n = 68)			13		27		22			6	
Yes—head	20	29.4	2	15.4	8	29.6	7	31.8	0.951	3	50.0
Yes—trunk	13	19.1	3	23.1	4	14.8	4	18.2	0.804	2	33.3
Yes—genitals/buttocks	13	19.1	5	38.5	4	14.8	1	4.5	0.219	3	50.0
Yes—extremities	12	17.6	4	30.8	2	7.4	6	27.3	0.073	0	0
None	27	39.7	3	23.1	15	55.6	9	40.9	0.308	0	0
Fever present (n = 61)			13		25		18			5	
Yes	19	31.1	2	15.4	8	32.0	9	50.0	0.234	0	0
No	42	68.9	11	84.6	17	68.0	9	50.0		5	100.0
Delivery mode (n = 72)			13		28		24			7	
Vaginal	45	62.5	10	76.9	17	60.7	14	58.3	0.862	4	57.1
Cesarean	27	37.5	3	23.1	11	39.3	10	41.7		3	42.9
Obstetric risk factor† (n = 63)			13		25		19			6	
Yes	52	82.5	11	84.6	22	88.0	13	68.4	0.111	6	100.0
No	11	17.5	2	15.4	3	12.0	6	31.6		0	0
Maternal genital lesions at delivery (n = 52)			12		19		16			5	
Yes	5	9.6	1	8.3	2	10.5	1	6.3	0.653	1	20.0
No	47	90.4	11	91.7	17	89.5	15	93.7		4	80.0

*Column percentages.
†Obstetric risk factors include the following: rupture of membrane >4 h preceding delivery, artificial rupture of membrane, and invasive monitoring or procedures.
HSV indicates herpes simplex virus; SEM, skin, eye, and mucous membrane infection; CNS, central nervous system infection.

had lesions at delivery. None of the 8 cases diagnosed after 30 days of age were born to a mother with a known history of HSV or acyclovir use during pregnancy.

We found a delay in seeking care for 12/59 (20.3%) cases (median: 2 days; range: 2–10 days), a delay in diagnosis for 26/66 (39.4%) cases (median: 4.5 days; range: 2–21 days), and a delay in initiating acyclovir treatment for 18/61 (29.5%) cases (median: 3 days; range: 2–18 days). Overall, 38/54 (70.4%) cases with complete information with which to judge delays had one or more delays. Of the 38 cases where there were delays, 12 (31.6%) had fever, 27 (71.1%) had lesions, and 4 (10.5%) had neither fever nor lesions. Of 66 liveborn infants with complete information regarding lumbar puncture, 57 (86.4%) received lumbar puncture with HSV testing. Of 63 infants, 50 (79.4%) with available information had liver-function tests performed. Only 19 (51.4%) of the 37 patients for whom we had data related to treatment had received an appropriate acyclovir regimen; all of these had received an adequate evaluation. Over half (68%, or 52/76) of all cases lacked timely or ideal diagnostics or treatment.

Length of hospitalization was calculated for 61/76 (80.3%) cases; median was 15 days and varied with clinical manifestation—disseminated cases, median was 11 days (range, 2–39); SEM cases, median was 15 days (range, 0–86 days); and CNS cases, median was 22 days (range, 10–46). The 2 congenital cases were hospitalized for a median of 40.5 days (range, 3–78).

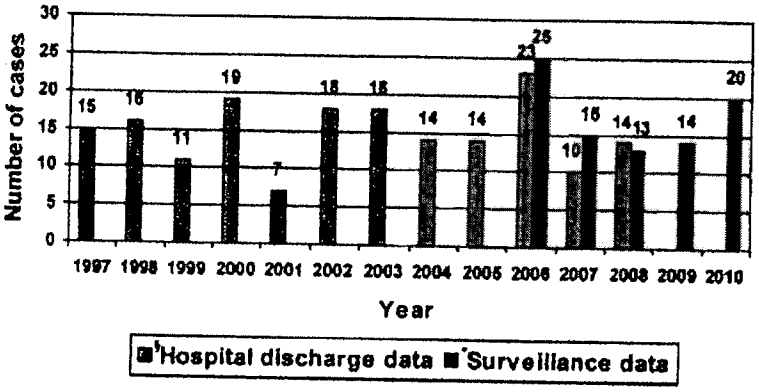

Figure 1. NYC resident neonatal herpes cases identified using an administrative data set of discharges from New York State (including New York City) hospitals during 1997–2008, compared to those reported to New York City through routine public health surveillance during 2006–2010. [§]Hospital discharge data for 2009 and 2010 are not yet available. *For 2006, and for 2010, the total number of cases was estimated by annualizing 9 months of reported cases.

Where mode of delivery was known, 37.5% (27/72) of the infants were delivered by cesarean section. Among the 25 cases delivered by cesarean for whom we had data related to obstetric risks for HSV transmission, 20 (80.0%) had at least one such risk. (17 had >4 hours between rupture of membranes and delivery, 10 had artificial rupture of membranes, 5 had invasive instrumentation including vacuum extraction, fetal scalp electrodes, intrauterine pressure catheters, or forceps.) Only 2 of the cesarean deliveries were performed because of a perceived risk of HSV transmission. In both cases, the mother had a known history of genital HSV, and active genital lesions were noted at delivery. Among 45 cases delivered vaginally, 31 (68.9%) had at least one known obstetric risk for neonatal HSV transmission. (20 had >4 hours between rupture of membranes and delivery; 16 had artificial rupture of membranes; 12 had invasive instrumentation including vacuum extraction, fetal scalp electrodes, intrauterine pressure catheters, or forceps.)

Administrative Data Findings

During the 12-year interval from 1997 through 2008, a total of 179 infants were discharged with an ICD-9 code for herpes after an admission at age ≤60 days; 84/179 (46.9%) were male. Only 20/179 (11.2%) infants had been admitted at age >42 days. Median duration of admission was 14 days. During 1997 to 2008, annual incidence of neonatal HSV ranged from 5.6/100,000 live births (in 2001) to 18.3/100,000 live births (in 2006); median annual incidence was 11.8/100,000 live births. For infants aged ≤42 days, incidence ranged from 4.8/100,000 live births (in 2001) to 15.1/100,000 live births (in 2006); median incidence was 11.0/100,000 live births (Fig. 1).

DISCUSSION

We present the first population-based surveillance findings for neonatal HSV in the United States, as well as a comparison with findings from an administrative data set for the same population. Both methods yielded similar incidence rates, and were within the range of previously reported estimates. Our findings provide insight into neonatal HSV epidemiology. Laboratory-confirmed cases were diagnosed well after the first 30 days of life, and these included HSV-2 infections, suggesting a longer-than-expected incubation period. Our findings also reveal a substantial proportion of cases attributable to HSV-1.

The similarity in incidence estimates gleaned from NYC surveillance, and administrative data indicate that the latter may provide a reasonable means of measuring HSV disease burden in jurisdictions without resources to implement neonatal HSV surveillance. However, administrative data are often untimely and therefore do not allow for a public health response to epidemiologic findings. In addition, administrative data can be difficult to deduplicate, rely on ICD-9 codes that are not specific to neonatal HSV, and often lack detailed clinical and laboratory information, thereby limiting accuracy and utility.

Disparities in risk for neonatal HSV by maternal age and race/ethnicity were apparent in our findings. Younger mothers might be less likely to be infected with HSV at the start of a pregnancy and at increased risk for acquiring HSV during pregnancy. Moreover, because genital HSV-2 infections are particularly prevalent among black non-Hispanic New York residents,[26] they might be more likely than women of other races/ethnicities to be exposed to HSV.

Our findings differed in several ways from those reported by other North American investigators. We found a lower proportion of CNS cases (17.4%, as compared to 30%) and a higher proportion of SEM cases (56.5%, as compared to 45%) than previously reported.[3] The former was surprising, especially because highly sensitive nucleic-acid amplification tests are increasingly being used to test CSF specimens,[27,28] and the majority of our cases (76.0%) had CSF testing. However, our findings on distribution of cases by clinical manifestation was similar to what was found in Canadian surveillance.[11] Our findings on prevalence of fever (31.1%) was also similar to what has been previously reported.[29] We also found a higher case-fatality rate among disseminated cases (62.5%) than previously reported (29%), but no fatalities among CNS cases, in contrast to previous reports of fatality rates of 4% to 15%[2,29] among CNS cases. These findings may be explained, at least in part, by our use of a definition for disseminated disease which selects for only very severe disease and by the increasing use of highly sensitive tests (polymerase chain reaction) to test CSF, which may classify as CNS disease cases who might have been considered SEM in the past.

Over one-third of the reported case-patients had been delivered by cesarean section, suggesting that the protective effect of cesarean delivery can be undermined when other obstetric risk factors for transmission have already occurred. Because a majority of neonatal HSV cases were among infants born under circumstances that would not prompt provider suspicion of risk for HSV infection, opportunities for intervention are limited. Prenatal screening of pregnant women and their sex partners could enable providers to counsel seronegative women with seropositive partners about abstinence or safer sex during pregnancy,[17] or to recommend acyclovir suppressive treatment during the third trimester to HSV-positive women,[30–32] but

both of these strategies are unproven, expensive, and carry risks (of undue strain on the woman's relationship and possible toxicity to the infant,[1] respectively).

Postpartum infections could be reduced by educating parents and caregivers about ways to avoid transmitting infection. Unfortunately, it is difficult to modify the practice of ritual Jewish circumcision with oral suction because of the religious value attached to it by certain sects.[3,4] A vaccine for HSV would be the best prevention strategy, but the HSV vaccine in Phase III trials has recently proven ineffective.[6] To prevent the majority of neonatal HSV cases, a vaccine would have to be effective against both HSV types and be administered before sexual debut.

Opportunities to intervene in the progression of disease were missed, evidenced by delays in diagnosis for over 1/3 of cases and delays in initiating antiviral treatment in nearly 1/3 of cases. A majority (89.5%) of those cases where delays in care seeking, diagnosis, and/or treatment were present had fever or lesions, which may support the case for increased caregiver and provider education. Nonspecific presentation, like the 19.7% of cases we found with neither fever nor lesions, does make diagnosis of neonatal HSV difficult, so pediatric providers should be encouraged to consider neonatal HSV in the differential diagnosis of ill infants, to perform SEM testing, lumbar puncture, and liver function tests, and to initiate intravenous acyclovir treatment immediately when neonatal HSV is suspected.

Our study has several limitations. It is likely that neonatal HSV cases were underreported and those reported might be biased toward more severe disease. The relatively limited number of cases limits our ability to make definitive statistical comparisons among our cases and to those reported in other case series and makes certain statistical analyses unstable. Due to missing information on some cases, there may be some misclassification of disease syndrome; however, that is most likely to have resulted in an overestimate of SEM cases. We lack data concerning lumbar punctures performed at the end of treatment; therefore, we were unable to assess whether follow-up treatment was performed when needed. Length of hospitalization for neonatal HSV might have been overestimated because it includes hospitalization for non-HSV illness, and might appear misleadingly short for disseminated cases, which are more likely to result in death. The number of congenital cases might have been overestimated because we may have included infants' ill at birth with conditions other than neonatal HSV who were colonized with HSV, which might have cleared without treatment. Finally, some of our findings may not be generalizable outside of NYC. For example, the incidence is affected by the prevalence of genital HSV in the population, which varies. However, some of our findings (e.g., delays in diagnosis, treatment, and seeking care, and case fatality rates) are likely to be generalizable.

CONCLUSION

Administrative data may provide an adequate and inexpensive means to assess local neonatal HSV burden, although such data lack the detail and timeliness of surveillance data. We believe routine surveillance for neonatal herpes is of value; our data provide new insights, give a baseline incidence from which to evaluate the impact of future prevention efforts, and point to the need for parental and provider education regarding neonatal HSV. Challenges remain for reducing incidence of neonatal HSV, as all current prevention strategies are limited.

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EXHIBIT B-2

JEWISH COMMUNITY STUDY OF NEW YORK: 2011 COMPREHENSIVE REPORT

UJA-Federation of New York

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Jewish Policy & Action Research

June 2012

The recent increase in the area's Jewish population marks a reversal in a long-term trend dating back to 1950. As noted earlier, the best available sources suggest that New York's Jewish population peaked at that time, with about 2.5 million Jews living in the eight-county New York area. By 1981, the estimated number of Jews in the area had dropped to 1.67 million, and in 1991 it fell yet again to 1.42 million. The decline over those 40 years can be attributed in part to Jews, both young and old, leaving New York for economic opportunity and retirement communities in the Sunbelt and to others leaving for New Jersey, Connecticut, Rockland County, and other nearby destinations.[11] The stable Jewish population in the 1990s (leading up to 2002) can, in large part, be attributed to the migration of Russian-speaking Jews and the growth of the Orthodox population.

In contrast with long-term decline and subsequent stabilization, the last decade (precisely 2002 to 2011) has been a period of substantial Jewish population growth. That growth partly derives from high birthrates among the Orthodox and most particularly among the *Haredi* Orthodox (further discussed in chapter 7), as well as from the increased longevity of a presumably healthier population. In addition, there has been a dramatic increase in the number of people who consider themselves "partially Jewish," many the children of intermarriage.

Exhibit 1-3 **Jewish Households, Jews, and All People in Jewish Households, 1991–2011**

	1991	2002	2011	Net Change 1991–2002	Net Change 2002–2011	Percent Change 1991–2002	Percent Change 2002–2011
Jewish Households	638,000	643,000	694,000	+5,000	+51,000	+1%	+8%
Jews	1,420,000	1,412,000	1,538,000	–8,000	+126,000	–1%	+9%
Non-Jews	134,000	255,000	231,000	+121,000	–24,000	+90%	–9%
All People in Jewish Households	1,554,000	1,667,000	1,769,000	+113,000	+102,000	+7%	+6%

Eight-County New York Area

11 Ritterband, Paul. 1997. "Counting the Jews in New York, 1900–1991: An Essay in Substance and Method." In *Papers in Jewish Demography*, edited by Sergio DellaPergola and Judith Even, 199–228. Jerusalem: Hebrew University. Available as PDF at http://www.bjpa.org/Publications/downloadPublication.cfm?PublicationID=2762.

While the survey did not inquire about the total number of live births per woman, indirect evidence on the size of the next generation can be obtained from the number of children of all ages residing in the home for women respondents and wives or partners ages 35 to 44. In this age range, for the most part, children are too young to have left the home (although some certainly have done so, especially among Hasidic and Yeshivish households). Also, women have not completed bearing children, although among non-Orthodox women ages 36 to 45, only about 1 in 14 gave birth in the year prior to the survey, and very few did so after age 36. At the same time, these estimates include all children in the household, including stepchildren, and not just those children who are Jewish. Thus, the entries provide very approximate estimates of children born to women (female respondents and the wives or female partners of male respondents) ages 35 to 44.

To maintain a population at current levels, demographers look for a rate of 2.1 births per woman, roughly equivalent to the figure reported for the entire population (2.1 rounded in the above exhibit, or 2.06 to be more precise). The estimated non-Orthodox rate of 1.3, insofar as it approximates completed Jewish fertility, clearly falls in the region of negative population growth.

In contrast, the Modern Orthodox estimated fertility rate is firmly situated in the region of positive population growth, while the *Haredim* are experiencing explosive population growth. These fertility (and attendant intermarriage) patterns are reshaping the complexion of New York Jewry. They directly underlay the sharp increases in Orthodox population (in particular, its *Haredi* subpopulation), and they underlay the decline in the numbers identifying with Conservative and Reform Judaism reported in chapter 4.