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N 1996 and 1997, Balti-
more, Maryland, had the 
highest rate for primary and 
secondary syphilis among 
U.S. cities.1,2 From 1993 to 
1996, the rate for congenital syphi-
lis (CS) in Baltimore increased from 
62 to 282 per 100,000 live-born in-
fants. To assess the magnitude of 
the syphilis epidemic in pregnant 
women and to identify ways to im-
prove CS prevention, the Baltimore 
City Health Department (BCHD), 
the Maryland Department of Health 
and Mental Hygiene (DHMH), and 
CDC analyzed CS surveillance data 
for and reviewed medical records of 
pregnant women with syphilis. This 
report summarizes the results of this 
investigation, which indicated that 
90% of cases could have been pre-
vented by adequate prenatal care and 
more timely syphilis screening and 
treatment.

BCHD surveillance data and 
hospital discharge records were 
reviewed to identify women who had 
active syphilis during pregnancy and 
deliveries during January 1, 1996-
March 30, 1997, and to assess com-
pleteness of surveillance data. To 
identify factors associated with CS 
and possible prevention strategies, 
medical records of pregnant women 
with syphilis and of their infants 
were reviewed, and mother-infant 
pairs were classified as CS cases ac-
cording to the CDC surveillance case 
definition for CS3 or as controls.

The CS rate in Baltimore in-
creased from 62 per 100,000 live-
born infants in 1993 to 282 in 1996. 
The increase among blacks was from 
113 in 1993 to 564 in 1996. During 
the study period, 90 women were 
identified who had active syphilis 
during pregnancy and who deliv-
ered infants. Of these, 62 (69%) 
women delivered infants with ill-
nesses meeting the CS case defini-
tion; 28 (31%) women (controls) 
who were adequately treated for 
syphilis during pregnancy deliv-
ered infants who did not have CS. 
All infants with CS had been re-
ported to BCHD. Of the 62 moth-
ers of case-patients, four (7%) de-
ivered stillborn infants. Mothers of 
case-patients and mothers of con-
trols had similar demographic char-
acteristics. Of the 90 women, the 
mean age was 26 years; 86 (96%) 
were black; 72 (80%) were single; 78 
(87%) were unemployed; 28 (31%) 
had multiple addresses during preg-
nancy; and six (11%) of 56 moth-
ers tested were HIV-infected. A to-
total of 54 (60%) had either a positive 
toxology screen or self-reported co-
caine or heroin use during preg-
nancy; 24 (44%) of 54 had a record 
of substance-abuse treatment. Of 
those women tested by toxicology 
screen at delivery, nine (23%) of 40 
mothers of case-patients and 10 
(53%) of 19 mothers of controls 
were positive for cocaine (p < 0.03), 
four (10%) of 40 mothers of case-
patients and one (5%) of 19 moth-
ers of controls were positive for 
heroin, and 13 (33%) of 40 moth-
ers of case-patients and one (5%) of 
19 mothers of controls (p < 0.05) 
were positive for both drugs.

Mothers of case-patients and 
mothers of controls differed with re-
spect to several prenatal care-
related factors. Of the 58 mothers 
of case-patients, 43 (74%) had a third 
trimester diagnosis of syphilis com-
pared with eight (29%) of 28 moth-
ers of controls (p < 0.01). Records of 
mothers of case-patients were more 
likely than mothers of controls 
to include documentation sug-
jecting their pregnancy was unin-
tended (37% versus 14%) (p < 0.05). 
Among the 90 mothers, three were 
allergic to penicillin; none was de-
sensitized and treated with penicil-
lin during pregnancy. Therefore, 
the three mothers delivered infants who 
had illnesses meeting the CS case 
definition.

Thirty-six (58%) mothers of 
case-patients had no prenatal care or 
initiated prenatal care late in the 
third trimester. Approximately 80% 
of these women had missed oppor-
tunities to be reached and referred 
during pregnancy: six (17%) had 
spent time in jail; 22 (61%) had con-
tact with a social worker, and at least 
16 (44%) were clients of other so-
cial service agencies.

Missed prevention opportuni-
ties also were identified for most of 
the mothers of case-patients who had 
had early prenatal care. At the time 
of this investigation, Maryland law 
required syphilis screening of all 
pregnant women in the first and 
third trimesters, but there was no 
stipulation on the timing of the third 
trimester test. Of the 54 case-
patients whose mothers had en-
tered prenatal care by 28 weeks' ges-
tation, syphilis screening and 
treatment at 28 weeks' gestation and 
other routine serologic testing could 
have prevented 18 (29%) of the 62 
cases. An additional six (10%) case-
patients were infected too late in 
pregnancy to prevent CS, includ-
ing two who seroconverted after de-
livery.

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CDC Editorial Note: Congenital syphilis is one of the most devastating yet preventable outcomes of a sexually transmitted disease (STD). Fetal complications include spontaneous abortions and stillbirths, and infant complications include multisystem disorders and death. Treatment of maternal syphilis with penicillin is highly effective in preventing CS. However, infants born to inadequately treated mothers can require parenteral therapy at an estimated cost of more than $12,000 per infant. The findings in this report indicate that adequate prenatal care and timely syphilis screening and treatment could have prevented 90% of CS cases that occurred in Baltimore during the study period.

The CS epidemic in Baltimore occurred despite dramatic declines in syphilis incidence in the United States. Nationally, CS declined 72% from a peak of 107 cases per 100,000 live-born infants in 1991 to 30 in 1996; in Baltimore, the rate was nearly 10-fold higher in 1996 than the national rate. Among blacks, the national rate was 128 per 100,000 live-born infants in 1996 compared with 564 in Baltimore. The large racial differential in CS rates suggests that other factors for which race is often a proxy (e.g., differential access to and quality of health-care services) may be contributing to this epidemic and differentially affecting blacks.

The prevalence of drug use was high among all women who had syphilis during pregnancy. However, in this investigation, the type of drugs used differed between mothers of case-patients and mothers of controls. For example, heroin use, either alone or in addition to cocaine use, was significantly associated with CS, and cocaine use alone was not significantly associated with CS among this group of women who had syphilis during pregnancy. These results may not be generalizable to other populations.

The findings in this report are subject to at least two limitations. First, most of the data were gathered through record review. As a result, key variables (e.g., unintended pregnancy and detention history) may be underreported. Second, because spontaneous abortions were not included, stillborn infants may be underestimated. Despite these limitations, the finding that lack of adequate prenatal care was associated with CS is consistent with other studies.

Although reducing the risk for CS will ultimately depend on control of adult syphilis, prevention specific to pregnant women with active syphilis is feasible. In response to this epidemic, BCHD has alerted prenatal-care providers and worked with other health-care service providers to initiate screening and treatment programs for women of reproductive age. Through collaborative efforts of DHMH, BCHD, the Maryland Department of Public Safety and Correctional Services, and CDC, a rapid screening and treatment program for detainees and female arrestees was initiated at the Baltimore Central Booking Intake Center. Such interventions have been successful in other settings. STD clinical services have been strengthened at public STD clinics, including additional clinicians and other staff.

In addition, the Maryland regulation on syphilis testing during pregnancy was amended in January 1998 to require a third trimester screening test at 28 weeks’ gestation or the first visit thereafter to ensure diagnosis in time to prevent perinatal transmission. A Baltimore City Commissioner’s order was also issued mandating syphilis screening at delivery.

REFERENCES

3. CDC. Case definitions for infectious conditions under public health surveillance. MMWR 1997; 46 (no. RR-10).