tive explanations for the obtained results are not persuasive; however, the racial difference in costs merits further investigation.

Conclusions

The purpose of this study was to provide a better answer to the question of whether the EPSDT program in Michigan is improving the health status of its participants, and at what cost. Generally, but not in all instances, the results showed EPSDT participation to be associated with desirable outcomes of health status and costs.

Analysis of referral rates indicated that the program is having beneficial effects. This was evidenced by the general presence of an inverse relationship between referral rates and the number of lifetime screenings received by 153,923 EPSDT participants. Those with more screenings tended to have fewer referrals for suspected problems, and this difference is what the program is intended to accomplish. On average, as the number of screenings increased from 1 to 2, 2 to 3, and 3 to 4, decreases in referrals were 9.14, 5.60, and 3.75 percent. The cumulative decrease in referrals was thus 18.35 percent from first to fourth screening. One may question whether this decrease is large enough to be considered meaningful, but its presence was established for a large population of participants.

An analysis of medical cost data from a sample of 16,303 persons eligible for EPSDT did not show an inverse relationship between cost and screenings. However, when the mean medical costs for nonparticipants and for all EPSDT participants in the sample were compared, the costs for participants were nearly 13 percent lower. This difference was significant at the 0.007 level of confidence, but it did not take program costs into consideration. When program costs were considered and a relationship between EPSDT program participation and medical costs was assumed, the difference favoring EPSDT participants was reduced to about 7 percent.

In summary, this study did find EPSDT participation to be associated with modest decreases in both medical costs and health problems as measured by the incidence of referable conditions. Whether these associations also indicate that a relationship of causality exists between program and outcomes has not been conclusively proved by this study or any of its predecessors. Indeed, a determination of such causality is not likely to be attainable in the foreseeable future. However, I believe that the preponderance of findings in this study and other studies of EPSDT outcomes favors continued support for the program as well as continued effort to replicate findings and explore further the program's effects.

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Ophthalmia Neonatorum Prophylaxis in Vermont

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SYNOPSIS

Vermont birth certificates and hospital medical charts for 1979 were reviewed to determine whether

infants born at home or in hospitals had documentation of prophylaxis against gonococcal ophthalmia neonatorum. Of the 139 home births recorded in 1979, 78 infants (54.0 percent) received no prophylaxis, compared with 97 (1.4 percent) of 7,156 infants born in hospitals (P <0.0001). Ophthalmic medications that have not been recommended for use for neonatal prophylaxis were being used in two hospitals in the State.

A followup review of 7,668 Vermont birth certificates for 1980 indicated that hospital practices improved in that year, after the hospitals received a reminder on proper prophylactic procedures from the Vermont Department of Health.

GONOCOCCAL OPHTHALMIA NEONATORUM is a serious illness that may cause corneal ulceration, scarring, and blindness in an affected infant. Transmission occurs during a vaginal delivery when the newborn's eyes contact an infected cervix. The usual incubation period in the newborn is 3 days, with a range of 1 to 13 days (*1*). Silver nitrate is an effective prophylaxis when used during the incubation period (*2-7*).

The Vermont communicable disease regulations require that prophylaxis for ophthalmia neonatorum be administered to all newborns immediately after birth. The approved medications are 1 percent silver nitrate solution, erythromycin, or tetracycline eye drops (*8*).

Over the last several years there has been a movement toward alternative forms of health care, and the number of home deliveries, often attended by lay midwives, has been steadily increasing.

In 1979, the Vermont Department of Health received one report of a neonate who developed gonococcal ophthalmia. This infant was delivered at home and did not receive any ophthalmic prophylaxis. The child received intravenous penicillin and did not develop sequelae from the infection.

As a result of this report, staff of the Vermont Department of Health initiated a study to determine the extent of the failure of prophylaxis in both home and hospital births. The confidential portion of the Vermont birth certificate includes the question, "Was silver nitrate or other suitable prophylactic used in the baby's eyes?" and provides for a "yes" or "no" answer. The study compares the number of neonates who did not have birth certificate documentation of prophylaxis, and thus apparently failed to receive adequate preventive care, in Vermont hospitals and in home deliveries.

Methods

All 7,295 Vermont birth certificates for 1979 were reviewed. Medical records were reviewed for those infants, delivered in hospitals, whose birth certificates indicated an unknown prophylaxis status. For infants delivered at home, the "unknown" category was assumed to have received prophylaxis.

Head nurses on obstetrical units in each of 13 Vermont hospitals were interviewed by telephone to determine which medications were routinely used for ophthalmic prophylaxis. They were also asked about situations that may have led to the omission of prophylaxis.

After information had been gathered on prophylaxis for 1979, the State health department sent a letter to hospitals reminding them that neonatal ophthalmic prophylaxis is required by law. There was no attempt to inform lay midwife practitioners of this law.

Eye prophylaxis for neonates, by place of birth, Vermont, 1979

	No prophylaxis		*Prophylaxis*		
	Number	*Percent*	*Number*	*Percent*	*Total*
Home deliveries	75	54.0	64	46.0	139
Hospital deliveries	97	1.4	7,059	98.6	7,156
Total	175	...	7,120	...	7,295

Relative risk = 54.0 ÷ 1.4 = 38.6
X^2 = 1638.7; P < 0.0001

All 7,668 birth certificates and hospital charts for 1980 births were reviewed in the same manner to determine if there had been any change in the rates of omission of prophylaxis after the above intervention.

Results

There were 7,156 hospital deliveries in Vermont in 1979. The birth certificate review revealed 7,032 "yes," 91 "no," and 33 "unknown" responses. Medical record reviews showed that 27 of the 33 infants whose status was "unknown" had actually received appropriate prophylaxis; therefore, prophylaxis was apparently omitted in 97 (1.4 percent) of 7,156 hospital deliveries (see table). The rates of omission of prophylaxis ranged from 0 percent to 10.9 percent among the 13 hospitals with obstetrical services. Three hospitals accounted for 67.7 percent of the omissions of prophylaxis for neonates, but for only 11.1 percent of the recorded births for 1979. The average rate of omission of prophylaxis was 7.8 percent for all infants delivered at those hospitals.

There were 139 home deliveries in Vermont in 1979. The birth certificate review revealed 56 "yes," 75 "no," and 8 "unknown" responses, for a prophylaxis omission rate of 54.0 percent. The differences in omission rates between hospital and home births were significant ($P < 0.0001$, chi square).

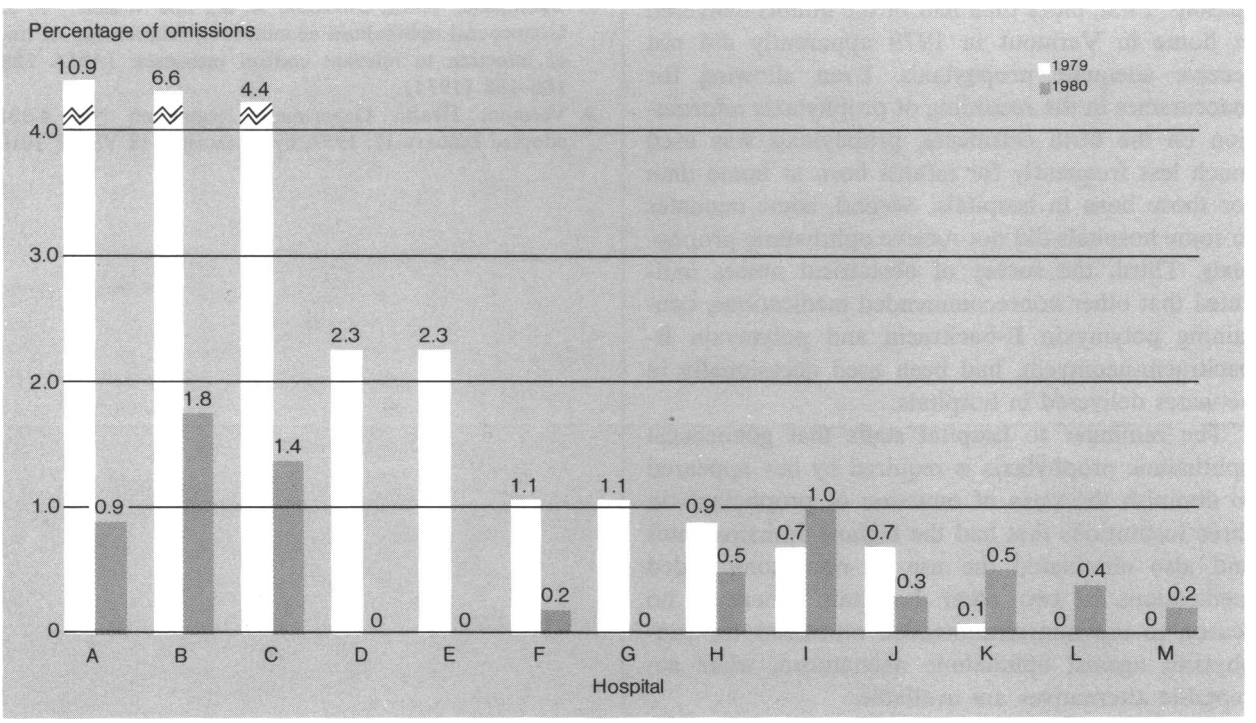
'The three hospitals that accounted for most of the omissions of prophylaxis in 1979 each had a lower omission rate in 1980 after the health department's intervention.'

All 13 hospitals routinely used silver nitrate for ophthalmic prophylaxis. As alternatives, ophthalmic tetracycline was used in five hospitals and erythromycin was used in three. Two hospitals reported the occasional use of two other medications: polymyxin B-bacitracin and polymyxin B-bacitracin-neomycin ointments.

Hospital staff cited several circumstances in which prophylaxis could be withheld. Seven of the 13 hospitals withheld prophylaxis if parents or attending physicians requested it. Two of the hospitals withheld prophylaxis on deliveries performed by cesarean section, but only if the amniotic membranes were intact at the time of delivery.

A review of birth certificates in 1980 by staff of the Vermont Department of Health identified 7,668 Vermont births. Home births still had a high rate

Rates of omission of neonatal ophthalmic prophylaxis in 13 Vermont hospitals with obstetrical services, 1979 and 1980



'Even allowing for inaccuracies in the recording of prophylaxis information on the birth certificate, prophylaxis was used much less frequently for infants born at home than for those born in hospitals.'

of omission of prophylaxis (43.6 percent). In the 13 hospitals providing obstetrical services, the average rate of omission of prophylaxis in 1980 was 0.3 percent (range 0 percent to 1.8 percent).

The three hospitals that accounted for most of the omissions of prophylaxis in 1979 each had a lower omission rate in 1980 after the health department's intervention. The prophylaxis omission rate for infants delivered in those hospitals in 1980 averaged 1.3 percent. A comparison of 1979 and 1980 prophylaxis omission rates, by hospital, is shown in the chart.

A followup survey of the head nurses in all hospitals indicated that only approved medications were used for gonococcal prophylaxis in 1980.

Discussion

The results of this study are disturbing for three reasons. First, more than half of the infants delivered at home in Vermont in 1979 apparently did not receive adequate prophylaxis. Even allowing for inaccuracies in the recording of prophylaxis information on the birth certificate, prophylaxis was used much less frequently for infants born at home than for those born in hospitals. Second, some neonates in some hospitals did not receive ophthalmic prophylaxis. Third, the survey of obstetrical nurses indicated that other nonrecommended medications, containing polymyxin B-bacitracin and polymyxin B-bacitracin-neomycin, had been used occasionally in neonates delivered in hospitals.

The reminder to hospital staffs that gonococcal ophthalmic prophylaxis is required by law appeared to diminish the rates of omission of prophylaxis in three institutions that had the highest omission rates and also eliminated the use of nonrecommended medications in two other hospitals. There is no reason to use nonrecommended ointments for prophylaxis against ophthalmia neonatorum when acceptable alternatives are available.

One reason for omission of prophylaxis in infants born at home may be that they are often attended by nonmedical personnel who may lack access to prophylactic medications. Indeed, this conjecture was supported by discussions with a few of the midwives who could be contacted during this study. Physicians and public health officials should consider making silver nitrate or other suitable alternatives available to all health-care providers who deliver infants. Education could also be provided to these groups on the hazards of omission of prophylaxis and on the proper technique of administering the prophylactic medications.

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