A Comparison of Capitated and Fee-for-Service Medicaid Reimbursement Methods on Pregnancy Outcomes

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Objective. To determine if the payment method influenced the likelihood of selected obstetrical process measures and pregnancy outcome indicators among Medicaid women.

Data Source/Study Setting. Data from the live birth certificates computer file for 1993 from the State of California. The computer files contain information about the demographic characteristics of the mother, her medical conditions prior to delivery, medical problems during labor and delivery, delivery method, newborn and maternal outcomes, and expected principal source of payment for prenatal care and for hospital delivery.

Study Design. The study sample consisted of singleton live births to women in the California Medi-Cal program residing in one of two counties in which a mixed-model managed care plan was the method of reimbursement or in one of three counties in which fee-for-service was the payment method. The study and control counties were matched in terms of geographic proximity and sociodemographics.

Principal Findings. Among Medi-Cal women, the likelihood of low birth weight (LBW) was lower in the capitated payment group than in the fee-for-service payment group even when controlling for maternal and newborn characteristics and adequacy of prenatal care. There was no difference in either the adequacy of prenatal care, the cesarean birth rate, or the likelihood of adverse pregnancy outcomes other than LBW between the two payer groups.

Conclusions. Results of this "natural experiment" suggest that enrollment of pregnant Medi-Cal beneficiaries in capitated healthcare services through a primary care case management system in a county-organized health system/health insuring organization can have a beneficial effect on low birth weight and provide care comparable to a fee-for-service system.

Key Words. Capitated care, Medicaid, obstetrical services, maternal and newborn outcomes

According to the Health Care Financing Administration (HCFA) (1996a), the government agency responsible for implementing and evaluating the Medicaid program, 36.3 million people, or 14 percent of the U.S. population, were Medicaid recipients in 1995, a 275 percent increase since 1967. As of June 1995, 11.6 million Medicaid beneficiaries were enrolled in some form of "capitated care," which is provided through primary care case management programs (PCCMs) or through a prepaid capitated arrangement (HCFA 1996b). Federal expansions of eligibility requirements, legislated between 1984 and 1993, particularly for pregnant women, contributed to this large increase according to the United States General Accounting Office (GAO) (1995). The intent of these expansions was to channel more low-income pregnant women into prenatal care with the goal of preventing low-birthweight babies, who often require expensive hospitalizations. States offering capitated care Medicaid options initially targeted the Aid to Families with Dependent Children (AFDC) population for enrollment rather than the aged or disabled (General Accounting Office 1993). This population was targeted for enrollment into capitated care plans due to high resource utilization rates. Nationwide, 68 percent of the Medicaid-eligible population consists of mothers, children, and newborns enrolled in AFDC and related programs (HCFA 1996c). Expenditures for healthcare services for AFDC recipients and for children under 21 years was $30.1 billion in 1993 (HCFA 1996c).

States also reported a frustration with the rising and uncontrollable Medicaid costs under fee-for-service arrangements, poor access to healthcare for beneficiaries, and uncertain quality (General Accounting Office 1993). Moreover, numerous reports of declining participation of providers, problems in patient compliance, excessive use of emergency rooms and prescription medications, and fraud were emerging in association with the Medicaid

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program (Freund, Hurley, Paul, et al. 1989; Jesilow, Geis, and Pontell 1991). By challenging healthcare providers to assume some level of risk for patient outcomes, while offering incentives, it was reasoned that capitated payment arrangements might provide a solution by lessening the fiscal difficulties of state Medicaid programs and by addressing the access, quality, and coordination problems found in some Medicaid fee-for-service settings.

In part because of these problems, community leaders in two California counties have sought to pilot a different approach to Medicaid capitated care. The first such initiative, formed in Santa Barbara in 1983, is named the Santa Barbara Regional Health Authority (Freeman 1995). Subsequently, in 1987, the Board of Supervisors of San Mateo County (1987) formed the Health Plan of San Mateo (Sheremeta 1994). Both initiatives were developed to operate as not-for-profit mixed-model managed care plans whose regulatory framework is characterized as a county-organized health system/health insuring organization (COHS/HIO). The COHS/HIO is a local agency under contract with the state to arrange for the provision of healthcare services to the county's eligible Medi-Cal population. Both plans involve providers, beneficiaries, local government officials, and other interested parties in their operations.

Each COHS/HIO obtained a 1915(b) waiver of federal Medicaid law from HCFA in order to receive reimbursement for the delivery of healthcare services while evaluating an alternative to existing Medi-Cal (the name of the California Medicaid program) financing methods and delivery of health services. The 1915(b) waiver, or "Freedom of Choice Waiver," is approved for two-year periods and may be renewed at two-year intervals. Even with a waiver, counties were still required to adhere to the criteria for Medicaid eligibility as determined by state and federal regulations. In California, Medi-Cal eligibility is determined by the county social services department or the federal Social Security Administration in accordance with federal and state standards. Eligible populations include Aid to Families with Dependent Children (AFDC), AFDC-related, Supplemental Security Income (SSI), SSI-related, other public assistance, blind/disabled, and all medically needy. Enrollment in the county's capitated plan is mandatory for all Medicaid eligibles in each county, but choice of provider is allowed during the intake interview. The financing of healthcare and delivery of services in 1993 was similar in the two COHS/HIOs. Both plans negotiated a capitated rate with the state to provide nearly all Medi-Cal services to eligible persons in the county. The county-based plans contract with providers, who may be individual physicians, physician groups, clinics, or hospitals. Both plans

allocate a monthly per capita amount to a primary care provider (PCP), who serves as a primary care case manager (PCCM) for each beneficiary. PCP types are general practitioners, family practitioners, pediatricians, internists, and obstetricians who choose to provide the full range of primary care services. Obstetricians providing obstetrial and gynecological services only are reimbursed as specialist physicians. PCCMs assume risk by providing primary care on a capitated basis less a withheld payment per month. In San Mateo, hospitals also assume risk through a withhold applied to their per diem reimbursement. The withhold was 20 percent of the prearranged capitated amount in Santa Barbara and 15 percent of the prearranged capitated amount and per diem reimbursement in San Mateo at the time of this study. Physician allocations and the physician and hospital withholds are placed into a trust account, and services are debited to this account. PCCMs are not at risk beyond the withhold, nor, in San Mateo County, are the hospitals. If budgeted costs exceed actual costs, the surplus in the trust account is split at the end of the year between the hospital and the PCCM, and is recorded as an expense in the subsequent year (Sheremeta 1994; Freeman 1995; Coopers & Lybrand 1994). Further descriptions of aspects of these plans can be found in Freund, Hurley, Paul, et al. (1989); Anonymous (1993); Freeman (1995); Health Plan of San Mateo (1996); and Rivera (1996).

Capitated care to pregnant women and newborns has been suggested as successful in terms of improving access, continuity of care, and selected health outcomes when compared to the experience of the general population (Quick, Greenlick, and Roghmann 1981). Studies to date have not shown a difference between Medicaid capitated and fee-for-service care for pregnancy outcomes, cesarean section rate, timing of the first prenatal visit, number of total prenatal visits, and the percentage of low-birthweight babies (Goldfarb, Hillman, Eisenberg, et al. 1991; Krieger, Connell, and LoGerfo 1992; Carey, Weis, and Homer 1991). The small sample sizes of these studies do not have sufficient power to allow differences in pregnancy outcomes, most of which are low-prevalence events. Hence, no convincing information could be provided regarding the impact of capitated care on pregnancy outcomes relative to fee-for-service arrangements.

Today, capitated healthcare to the Medicaid population may be delivered through a vast myriad of forms; these have been summarized by the National Academy for State Health Policy (Horvath and Kaye 1995). However, the models most suited to the needs of vulnerable and low-income populations have not been determined. This study examines the impact of

one model of capitated arrangement on an especially vulnerable population subgroup, pregnant women and their newborns covered by Medicaid. The existence of two county-based Medicaid capitated care plans allows population-based evaluation of the impact of this type of payment system on pregnancy outcomes. Further, since the health plans are population-based, the use of vital records in conducting this evaluation is feasible. Thus, the purpose of this study was to compare pregnancy outcomes between Medicaid capitated care (MCC) and Medicaid fee-for-service (MFFS) settings.

METHODS

STUDY SAMPLE

The study sample consisted of women ages 10–50 years enrolled in the California Medi-Cal Program who had a singleton live birth in 1993 and who lived in one of five counties. Two of the counties (San Mateo and Santa Barbara) delivered healthcare to their Medi-Cal beneficiaries only through a capitated care arrangement and three of the counties (Kern, Santa Cruz, and Ventura) delivered care to its Medi-Cal beneficiaries only through fee-for-service reimbursement (FFS). Medicaid eligibility requirements were identical in the capitated care and fee-for-service county plans. Comparison counties (where Medi-Cal was administered under a FFS arrangement) were chosen based on their geographic proximity and because their population size and sociodemographics were the most similar that could be identified from the 58 California counties (Table 1). In addition, the percentage of the population on Medicaid was similar in the MCC and MFFS counties.

Source of Data

All data used in this study were obtained from a computer file of 1993 California live birth certificate records. Data available from birth certificates included maternal characteristics (date of birth, Hispanic ethnicity, race, county of residence, years of education, month prenatal care began, date of last menstrual period, total number of prenatal visits, pregnancy complications, labor and delivery complications, delivery method, expected principal payor for prenatal care, and expected primary payor for hospital care) and newborn characteristics (date of birth, plurality of birth, birth weight, and gestational age). Births where the infant weighed less than 500 grams were eliminated

Table 1: Characteristics of Study Counties by Medi-Cal Payment Group

	Capitated Care		*Fee-for-Service*		
Characteristic	*San Mateo*	*Santa Barbara*	*Kern*	*Santa Cruz*	*Ventura*
Sociodemographics					
County population*	663,531	375,522	587,680	230,992	686,560
% Below poverty level†	4.3	7.4	13.7	6.2	5.0
% Spanish spoken at home‡	13.6	19.1	20.9	15.6	20.1
No. live births‖	10,302	6,601	12,529	3,888	12,183
Health Outcome Indicators					
Age-adjusted death rate per 100,000 population	426.3	386.7	551.2	424.6	408.0
Infant mortality rate per 1000 live births†	4.0	6.4	10.8	6.2	5.5
% Low birth weight†	5.8	5.0	6.3	3.7	3.8
% Cesarean section†	17.2	21.4	20.6	20.8	22.9
% Kindergarten students needing one or more immunizations†	7.7	5.0	6.3	3.7	3.8
Practicing physicians per 100,000 population§	2.5	2.3	1.2	1.7	1.7
Medi-Cal Indicators					
% Population Medi-Cal eligible¶	7.0	10.8	19.2	9.9	9.4
No. Medi-Cal births†	2,947	3,283	7,014	1,863	4,832
Avg. monthly users of physician services¶	10,498	6,263	19,439	5,096	9,805
Avg. monthly users of any health services¶	22,559	17,567	49,152	11,442	30,743
Health service utilization rate per Medi-Cal eligible¶	476	423	428	488	472

* Dept. of Health Services. *Advance Report: California Vital Statistics, 1993.* State of California, 1995.

† Dept. of Health Services. *Health Data Summaries for California Counties.* State of California, 1994.

‡ U.S. Dept. of Commerce. *County and City Data Book.* Washington, DC: U.S. Govt. Printing Office, 1994.

§ American Medical Association. *Physician Characteristics and Distribution in the U.S.* Chicago: The Assn., 1993.

‖ Dept. of Health Services. Live birth computer file. State of California, 1993.

¶ California Medical Assistance Program. *Annual Statistical Report, Calendar Year 1992.* State of California, 1993.

because of the low likelihood of viability. Maternal deliveries involving more than one fetus were also eliminated as multiple-birth newborns often are low in birth weight for reasons that have nothing to do with the manner in which healthcare is delivered.

Study Variables

Independent variables were payor group, characteristics of the mother and newborn, and adequacy of prenatal care. Payor group for the newborn delivery was identified from the birth certificate. All eligible births in the study counties coded as "Medi-Cal" as the expected payor for prenatal care or for the hospitalization for newborn delivery were included in the analysis. Classification as either Medicaid capitated care (MCC) or Medicaid fee-for-service (MFFS) was determined by the mother's county of residence as recorded on the live birth record, since the mother's residence determined the method by which healthcare services were paid. The mother's characteristics studied were age at delivery, race, ethnicity, education, and pregnancy complications. The pregnancy complications selected as independent variables in our analyses have been shown to have a strong association with low birth weight (LBW) (Arias 1993). These were chronic hypertension, renal disease, anemia, cardiac disease, lung disease, diabetes, hemoglobinopathy, hepatitis B, rubella, sexually transmitted diseases, premature labor, preeclampsia, eclampsia, or tobacco use during pregnancy. Women were classified as having a pregnancy complication if one or more of these conditions were identified on the birth certificate. Gestational age was derived from the birth certificate. Newborns with gestational age under 38 weeks are considered preterm. Prenatal care is also known to affect pregnancy outcomes, independent of payer group. It was necessary, therefore, to control for the level of adequacy of prenatal care. We used the Kessner Index (Kessner 1973), which considers both the gestational age and the total number of prenatal visits during pregnancy, to assess the adequacy of prenatal care given to an individual mother. Adequacy of prenatal care is also a proxy indicator of access to healthcare.

Dependent variables were birth weight, adverse pregnancy outcomes, and delivery method. Birth weight was determined from the birth certificate. A newborn was assigned to the low-birthweight category if he or she weighed less than 2,500 grams at birth. Adverse pregnancy outcomes selected for study were those that were likely to occur as a result of lack of prenatal care, inadequate prenatal care, or problems occurring with the medical management of the delivery. Pregnancy outcomes included both maternal and newborn adverse outcomes. Adverse maternal outcomes included eclampsia, convulsions during labor, maternal death, anesthetic complications, excessive bleeding (other than abruptio placenta or placenta privia), febrile (>100°), or unsuccessful vaginal birth after cesarean section. Newborn adverse outcomes included low birth weight, fetal alcohol syndrome, drug withdrawal

syndrome, congenital rubella, meconium aspiration syndrome, birth injury, hyaline membrane disease, seizures, or admission to a neonatal intensive care unit after 24 hours. All listed pregnancy complications and maternal or newborn outcomes were elicited from the birth certificate to determine the presence or absence of any of these variables. The delivery method was classified as cesarean or vaginal. High cesarean rates were viewed unfavorably given the potential risks to the mother and newborn associated with this procedure.

For all study variables, not more than 5 percent of the observations were missing. Staff from the Department of Health Services follow a protocol for editing the data (State of California 1993). The National Center for Health Statistics also routinely monitors the quality of the California birth certificate computer files. Data entry errors are less than 2 percent and identified errors are corrected (National Center for Vital Statistics 1991).

Analysis

The unit of analysis for this study was the newborn delivery, which was assigned into either the MCC or MFFS group based on the county of the mother's residence. Comparisons of proportions between the capitated care and fee-for-service groups were performed with a binomial test using a z-statistic to assess significance. Separate multiple logistic regression analysis was performed using SPSS/PC+ to estimate the odds ratios and 95 percent confidence intervals for the dependent variables. With the exception of maternal age, which was treated as a continuous variable, the variables were coded as binary terms with the low-risk level as the referent; thus, odds ratios greater than one represent an increased likelihood of the occurrence. For Medi-Cal payer group, MCC was the referent.

RESULTS

Sample Characteristics

The study sample consisted of 19,575 Medi-Cal singleton births in the five identified counties—13,453 occurring in the three fee-for-service counties and the 6,122 from two counties with capitated care. Table 2 provides the characteristics of the study sample contrasted between the MCC and MFFS groups. The Medi-Cal women in the two groupings of counties were not significantly different with respect to mean age or percentages Hispanic, Black, or with less than a high school education. The only difference among women

was a higher, but numerically small, prevalence of smoking among those women in the capitated county grouping. Among newborns, the percentage of newborns of low gestational age was similar in the two groups (MCC: 10.6%; MFFS: 10.4%).

Bivariate Analysis

Access to healthcare appears to be comparable, with no statistically significant difference between the two county groups with respect to the adequacy of prenatal care (Kessner Index) (percentage of women with adequate prenatal care: MCC: 61.6% vs. MFFS: 61.4%). The cesarean section rate did not differ between the two payor groups (MCC: 17.2/100 births; MFFS: 17.7/100 births). A significantly lower proportion of low-birthweight babies were observed in the MCC group than in the MFFS group (4.5% vs. 6.1%, $p < .001$). The percentage of maternal adverse outcomes was not significantly different between the two payor groups (MCC: 1.4% vs. MFFS: 1.7%); however, the percentage of newborns with adverse outcomes was somewhat higher in the MCC group than in the MFFS group (4.5% vs. 2.7%, respectively, $p < .001$).

Table 2: Characteristics of Study Women by Medi-Cal Payment Method for Obstetrical Care in Select Counties, California, 1993

	Medi-Cal Payment Group		
Characteristic	*Capitated Care (n = 6,122)*	*Fee-for-Service (n = 13,453)*	p-*Value*
Sociodemographics			
% Hispanics	72.1	69.1	<.001
% African American	4.7	5.1	ns
Mean age of mother	24.6	24.5	ns
% Less than high school	59.0	57.6	ns
% Tobacco use during pregnancy	2.3	1.4	<.001
*% Pregnancy Complications**			
Renal, cardiac, or respiratory conditions	0.4	0.3	
Anemia	1.8	0.5	
Diabetes	2.4	0.8	
Rubella/Hepatitis B	1.2	0.3	
Premature labor	1.9	1.9	
Rh-Sensitization	0.2	0.3	
Sexually transmitted disease	0.9	0.3	
Preeclampsia/Eclampsia	1.2	1.0	
Other	1.5	0.6	

* Statistical test not performed because women may have more than one complication.

Multivariate Analysis

Multiple logistic regression was performed to examine the relationship between payment method and low birth weight and between payment method and other adverse pregnancy outcomes combined, controlling for maternal and newborn characteristics and adequacy of prenatal care (Table 3). We modeled the relationships using two methods of assessing the adequacy of prenatal care in two separate equations, one with all of the independent variables and the Kessner Index and the second with the same terms except that the term, "prenatal care began in first trimester," replaced the Kessner Index. The likelihood of a low-birthweight baby (adjusted odds ratio = 0.61, 95% C.I. 0.52 and 0.71) was found to be significantly lower in women in the MCC group than in the MFFS group, adjusted for mother and newborn characteristics and adequacy of prenatal care (Kessner Index). A virtually identical finding was observed when the term, "prenatal care in first trimester," was substituted in the models for the Kessner index. No difference between the two payor groups was found for other adverse pregnancy outcomes combined (maternal and newborn) in either model adjusting for the same covariates.

An examination of the significance of some of the covariate terms in the models of pregnancy outcomes warrants commentary as they provide clues regarding the factors that could mitigate patient outcomes regardless of the payment method (Table 3). As expected, the clinical covariates, medical complications of pregnancy and gestational age, were highly positively associated with low birth weight and with other adverse pregnancy outcomes combined. Also as expected, maternal Black race was associated with a higher likelihood of low birth weight, whereas maternal Hispanic ethnicity was not. In contrast, Hispanic ethnicity of the mother was associated with an increased likelihood of other adverse outcomes combined, but Black race was not. Inadequate prenatal care, as measured by the Kessner Index, was predictive of a higher likelihood of low birth weight, as expected. Low birth weight is a pregnancy outcome used as a marker of the efficacy of primary care health services. Inadequate prenatal care (Kessner Index) was also associated with the other adverse maternal and newborn outcomes more likely to emerge as a result of potential problems with the process of care in the hospital.

DISCUSSION

We found that Medi-Cal women whose obstetrical services were provided through a unique capitated arrangement are less likely to have a low-birthweight baby and are not more likely to have other adverse pregnancy

Table 3: Adjusted Odds Ratios of Low Birth Weight (LBW) and Adverse Outcomes Other than LBW, Medicaid Capitated Care (MCC) versus Medicaid Fee-for-Service (MFFS)

Variables (Contrast)	*Adjusted OR* for Care Not in First Trimester*	*95% C.I.* For Care Not in First Trimester*	*Adjusted OR* for Kessner Index*	*95% C.I. for Kessner Index*
Low Birth Weight				
Payor (MCC/MFFS)	0.61	(0.53, 0.72)	0.62	(0.52, 0.71)
Pregnancy complications (present/absent)	3.40	(2.88, 4.02)	3.48	(2.95, 4.12)
Mother Hispanic (yes/no)	0.87	(0.74, 1.02)	0.87	(0.74, 1.03)
Mother African American (yes/no)	2.34	(1.84, 2.99)	2.29	(1.79, 2.93)
Mother's age (years)	1.00	(0.99, 1.01)	1.00	(0.99, 1.01)
Gestational age < 38 weeks (yes/no)	10.00	(8.75, 11.44)	8.91	(7.78, 10.22)
Less than high school (yes/no)	1.05	(0.91, 1.22)	1.01	(0.87, 1.16)
Prenatal care (care not in 1st trimester/other)	1.08	(0.94, 1.24)	–	–
Prenatal care, Kessner Index (inadequate/other)	–	–	1.89	(1.51, 2.37)
Adverse Outcomes Other than LBW†				
Payor (MCC/MFFS)	1.01	(0.95, 1.28)	1.10	(0.95, 1.28)
Pregnancy complications (present/absent)	4.74	(4.02, 5.59)	4.80	(4.07, 5.66)
Mother Hispanic (yes/no)	1.27	(1.06, 1.52)	1.27	(1.06, 1.52)
Mother African American (yes/no)	1.19	(0.86, 1.65)	1.17	(0.84, 1.62)
Mother's age (years)	0.98	(0.96, 0.99)	0.98	(0.96, 0.99)
Gestational age < 38 weeks (yes/no)	3.37	(2.87, 3.95)	3.12	(2.65, 3.68)
Less than high school (yes/no)	0.81	(0.69, 0.94)	0.79	(0.68, 0.92)
Prenatal care (care not in 1st trimester/other)	1.06	(0.91, 1.23)	–	–
Prenatal care, Kessner Index (inadequate/other)	–	–	1.36	(1.17, 1.57)

* All terms listed are included in the model.

† *Adverse infant outcomes*: birth trauma, hyaline membrane disease, meconium aspiration syndrome, fetal alcohol syndrome, drug withdrawal syndrome, transfer to a neonatal intensive care unit ≥ 24 hours. *Adverse maternal outcomes*: mother's death, anesthetic complications, eclampsia, seizures during labor, excessive bleeding (not associated with placenta previa or placenta abruptio), unsuccessful vaginal birth after cesarean, or febrile (>100°F).

outcomes than Medi-Cal women receiving obstetrical care through a FFS arrangement. In addition, no significant difference was found between the two payor groups in other markers of quality of healthcare, adequacy of

prenatal care and the cesarean section rate. These findings do not appear to be explained by the general level of healthcare and utilization of healthcare services by Medicaid beneficiaries in the study counties. Nor are the findings due to differences in the characteristics of mothers and their pregnancy, since we controlled for these in statistical analyses. Despite the importance of this topic, to the authors' knowledge only four previous studies have been published in which the quality of care for pregnant women and their newborns was compared between capitated and fee-for-service arrangements in Medicaid populations. None of these studies found a significant difference between the Medicaid capitated care groups and the Medicaid fee-for-service groups with respect to pregnancy outcome (Balaban, McCall, and Bauer 1994; Krieger, Connell, and LoGerfo 1992; Goldfarb, Hillman, Eisenberg, et al. 1991; Carey, Weis, and Homer 1991). As mentioned previously, small sample sizes may explain, in part, why no statistically significant differences were found in these previous studies. However, with our large sample size, we had over 90 percent power to detect at least a 2 percent difference between payor type and all pregnancy outcomes studied (Elashoff 1995).

Despite favorable findings, the portability of the California COHS/HIO and PCCM models of delivering healthcare to other areas where racial composition is different needs to be explored as our study sample had fewer than 5 percent African Americans. In our study, African American women did not have a higher likelihood of "other adverse pregnancy outcomes"; however, they did experience a higher likelihood of low-birthweight infants. It has been found that even within an HMO setting, African American mothers used prenatal care less extensively and had higher incidence of newborns with low birth weights (Murray and Bernfield 1988). In contrast, Hispanic women were found not to be at greater risk of having a low-birthweight baby by virtue of their ethnicity. However, Hispanics were found to experience a higher risk for other adverse outcomes. One possible factor in the increase that is occurring in the newborns may be the higher incidence of diabetes in Latinas (Marshall, Hamman, Baxter, et al. 1993). This may increase the likelihood that the newborns of these women may likewise be experiencing diabetic complications, which, if not managed aggressively at birth, can lead to admission of the newborn to a neonatal intensive care unit.

It is not clear why a lower rate of cesarean section was not found in the MCC group, assuming that a lower cesarean section rate suggests higher provider quality. A birth by cesarean is associated with a longer hospital stay and an increased risk of adverse outcomes from the procedure due to the operation itself (e.g., possibility of wound infection), anesthesia, or

a blood transfusion that may be required. Our finding is consistent with that of Carey, Weis, and Homer (1991), who studied similar populations in 1985. However, Balaban, McCall, and Bauer (1994) found the cesarean birth rate to be significantly higher in Arizona women in the Medicaid capitated program than in a comparison group from the New Mexico Medicaid program (18% vs. 12%, $p < .05$). Yet these authors did not find a difference between women from the two state groups in the number and type of complications, blood loss, or length of hospital stay for the cesarean procedure. Since physicians in the capitated plans in our study were not held accountable for the hospital risk, there was no incentive for not performing a cesarean. Thus, since the nature of the financial arrangement with the PCCM was not "full risk" (i.e., physicians were not penalized for hospitalization of a patient), physicians in both payor groups, given Medicaid populations similar with respect to their health status, performed the procedure (cesarean section) at a comparable rate. Additionally, the managed care plans in this study pay the same rate for vaginal and cesarean global and delivery-only services, so there is no financial incentive on a procedure-level basis for a physician to perform a cesarean over a vaginal delivery. From a quality of care perspective, another reason for the lack of differences in the cesarean section rates between the two payor systems may also suggest a similarity between the skill mix of physicians providing the services and the facilities at which newborn deliveries are performed.

Several factors of health plan operation could have contributed to the beneficial impact of the capitated arrangement on LBW. One is plan maturity. Plan maturity has been observed to be associated with favorable processes of care for cancer patients (Riley 1994). The health plan in Santa Barbara was in operation for at least ten years and the San Mateo health plan for six years at the time of our study. Thus, the experience in coordination of care, follow-up, and health education appropriate to this population, as well as aggressive diagnostic workup and early intervention, may in part explain the lower likelihood of LBW in the capitated care group relative to the fee-for-service group. Another feature of the plan that could have accounted for the difference we found is the manner in which the beneficiary is assigned a primary care physician who serves as a case manager. Upon determination of eligibility, the beneficiary is offered the choice of a PCP at a subsequent intake interview. Beneficiaries not appearing for this interview are notified of an assigned PCP in consideration of their zip code residence. Thus, the beneficiary does not have to initiate the search for a caregiver, a pursuit that may not be fruitful, or may possibly be too late, for many individuals on Medicaid. The process of notifying beneficiaries of their PCP assignment may

itself provide an impetus to the beneficiary for initiating early prenatal care. Knowing that a PCP is to "expect" a beneficiary may reduce access barriers to care. Indeed, in examining a 1986 study, Freund, Hurley, Paul, et al. (1989) found no difference in reported objective access measures between Medi-Cal beneficiaries in the Santa Barbara plan and those in Ventura County.

Finally, aspects of prenatal care itself may differ between the payor groups. The capitated care counties studied have extensive initiatives for getting a woman into care early in the pregnancy. The "Prenatal Care Promotion Program" in the Health Plan of San Mateo utilizes professional patient advocates, incentives for the use of prenatal care, and mass media, among other approaches (Mason 1992). In Santa Barbara, a perinatal outreach case manager identifies and works with high-risk mothers (Santa Barbara Regional Health Authority 1994). In both counties, pregnant women have direct access to an obstetrician. No authorization by the PCP is required. However, the measure of prenatal care adequacy used, the Kessner Index, indicated that the level of prenatal care was comparable for pregnant women in the two payor systems. Adequacy of prenatal care, according to the Kessner Index, considers the number and timing of prenatal visits. This Index does not measure the content of the visit (e.g., weight recorded, urine culture obtained, etc.) nor the support services provided, which some (Petitti et al. 1991; Murata, McGlynn, Siu, et al. 1994; Fiscella 1995) think would provide better insight into the mechanisms by which prenatal care influences maternal and newborn outcomes. State health departments may wish to consider modifying birth certificates to collect more detailed information on the content of prenatal care.

STUDY LIMITATIONS

This study has several limitations. First, it is observational, and Medicaid beneficiaries were not randomly assigned to the payor groups. Thus, aspects of health status and socioeconomics not measured by this study and differences in the content of prenatal care may account for the findings and not a Medicaid capitated care program. In addition, because this study is limited geographically, both within California and within the United States, its generalization to Medicaid beneficiaries in other states should be considered with caution. Thus also, the beneficial effect of care through a capitated arrangement may not necessarily be observed in pregnant women of other races or ethnic groups. Further, since the birth certificate was the only data source used in this study

and it did not contain information on length of enrollment, we could not control for length of enrollment in the Medicaid capitated care arrangement.

A last limitation refers to the reliability and validity of the data available on the birth certificate. The accuracy of the information on the birth certificate is influenced by the data entry person as well as by healthcare personnel recording the status and characteristics of the mother and newborn at time of birth. However, the state of California (1993, 1995) conducts numerous quality control procedures to ensure completeness and accuracy of their data. Moreover, there is no reason to believe that the coding of the dependent variables was systematically any different among the counties. However, if the MCC group experienced lower lengths of hospital stay relative to the MFFS group, it is possible that maternal and newborn adverse events would not likely be identified during hospitalization where the birth certificate is completed. Unfortunately, length of stay information is not available on the birth certificate to allow us to estimate the effect of that bias. Coding errors concerning expected primary payor may also occur. We identified 6,230 births in the MCC group and 13,709 in the MFFS group from the birth certificate, whereas these numbers were 5,383 and 11,090, respectively, from the master Medi-Cal files for the same year (personal communication with Samira Al-Qazzaz, Medi-Cal Statistics Section). Although the numbers of Medicaid beneficiaries in our sample are somewhat higher than those indicated on California's Medicaid file, their magnitude is consistent. The discrepancy may be due to hospitals not billing or to their delay in billing for the delivery episode, and therefore, may not have been counted on the state's Medicaid claims files when we made this comparison.

CONCLUSIONS

The delivery of healthcare services through a county-organized health system/health insuring organization, from our evaluation, is a promising organizational form for the delivery of healthcare to the Medicaid population. As a quasi-public entity, this mixed-model managed health plan has features that would appeal both to those who consider healthcare as a right and those who believe that it should be transacted as a commodity. For the former, public accountability and safety net procedures are in place to provide for selected services (e.g., prenatal care, newborn delivery, and emergency care) for women and children presenting for healthcare in the county but not meeting Medi-Cal eligibility criteria and not having health insurance. For

the latter, physician-hospital risk pools and financial incentives available from the plans to healthcare providers promote prudent use of healthcare resources. Additionally, the governance structures of both COHS/HIOs have their roots in the community. Governance consists of a commission whose representatives are providers, consumers, and county officials who may be better able to respond to healthcare needs in the context of local practice patterns than would a national health insurance effort segmented toward pregnant women and their children. The nature of the data available in this evaluation study does not allow us to isolate the specific elements of the health plans that affect outcomes. Thus, one can only speculate if the availability of the resources and programs through health plans (care protocols, quality assurance activities, case managers, etc.) would generate the same impact among patients of the fee-for-service providers.

To merely assume that a new organizational form will provide the panacea for delivering cost-effective healthcare to an expanding and ever-changing population base in California or other states would be short-sighted. The influence of race and ethnicity, and prenatal care, independent of the method of payment, was reaffirmed in our multivariate models. The fact that African American maternal race (coded as Black on the birth) was highly associated with low birth weight whereas Hispanic ethnicity certificate was not suggests the importance of cultural and social factors in preventing LBW, a health outcome marker of the efficacy of primary care. In contrast, the association of Hispanic ethnicity, but not African American race, with a significantly higher likelihood of other adverse pregnancy outcomes is likely to emerge because of problems with the processes or quality of hospital care. Thus, the overall success of a managed care plan, regardless of its organizational form, can be only as successful as the quality of care of each of its providers and of his or her ability to accommodate the needs of a diverse population.

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