

Perinatal Outcomes: A Comparison Between Family Physicians And Obstetricians

Mark E. Deutchman, MD, DeAnna Sills, and Pamela D. Connor, PhD

Background: This retrospective study compared obstetrician and family physician patient population demographics, obstetric outcomes, delivery methods, and medical risk factors.

Methods: Obstetricians and family practice faculty and residents provided delivery services at an urban community hospital. A retrospective case study of all deliveries by obstetrician-gynecologists and family physicians in a 20-month period was analyzed with descriptive statistics, chi-square analysis, logistic regression, and power analysis. A modified risk score analysis was completed on all patients to assess comparability between the obstetrician and family physician patients.

Results: Risk score analysis of the two patient populations demonstrated no difference in high-risk patients ($P=0.102$). Family physicians' patients had a lower incidence of Cesarean section, use of forceps, diagnosis of cephalopelvic disproportion, and low-birth-weight babies. They had a higher incidence of spontaneous vaginal delivery, vaginal birth after previous Cesarean section, and vacuum extraction use. The overall Cesarean section rate for family physicians was 15.4 percent, compared with 26.5 percent for obstetricians.

Conclusions: These findings support the high-quality outcomes of perinatal care provided by family physicians. They also provide evidence for training and privileging family physicians to perform their own Cesarean sections. (J Am Board Fam Pract 1995; 8:440-7.)

Obstetrics is a traditional part of the required curriculum in training family physicians.¹ Until recently the number of family physicians providing obstetric care has been decreasing as medicine in the United States has become more subspecialized. Some family physicians have even questioned the appropriateness of obstetrics in their essential training.² Forty-six percent of family physicians included obstetrics in their practices in 1978, but only 24.2 percent provided obstetrics in 1992.^{3,4} This trend appears to be reversing, as the 1994 figure shows that 30.4 percent of family physicians now do obstetrics.⁵ Family physicians are the main providers of obstetric care for high-risk patients in some practice environments.⁶⁻⁸

Family physicians play an increasingly important role in providing high-quality, cost-effective health care, including the care of pregnant

women and of newborns, regardless of geographic area.⁹⁻¹⁵ The specialty of family medicine has taken upon itself increasing responsibility for training its members in the knowledge and skills needed for modern perinatal care.¹⁶⁻¹⁸ Thus, the outcomes of obstetric care by family physicians must be examined and reported. If strengths and good outcomes are found, teaching programs and efforts of family physicians to obtain needed hospital privileges will be supported. If weaknesses are found, they will need to be detailed and remedied. It was with this type of quality assurance in mind that we initiated a study to examine the outcomes of perinatal care provided by family physicians using outcomes of obstetricians at the same hospital for comparison.

Factors such as patient population, hospital site and facilities, and support staff must be considered when comparing the outcomes of perinatal care provided by different physician groups. Researchers conducting studies in teaching environments have found equivalent outcomes regardless of whether prenatal care was provided by family physicians or obstetricians, but these researchers have not always clarified whether obstetricians or family physicians supervised intrapartum care, made management decisions once labor became abnormal, or performed surgical interventions.¹³

Submitted, revised, 2 June 1995.

From the Department of Family Medicine, University of Colorado, Denver (MED), the Department of Family Medicine, University of Tennessee, Memphis (MED, DS, PDC), and the University of Tennessee, American Medical International-St. Francis Hospital Family Practice Residency Program, Memphis (MED). Address reprint requests to Mark E. Deutchman, MD, University of Colorado Department of Family Medicine, 1180 Clermont, Denver, CO 80220.

Our study differs from previous studies in that (1) all prenatal and intrapartum care of family practice patients was provided by family practice residents and supervised by family practice faculty, (2) family practice faculty used modern assessment tools (e.g., nonstress testing and obstetric sonography) to perform diagnostic procedures without the assistance of a subspecialist, (3) a family physician with surgical privileges performed more than one-half (57 percent) of surgical interventions, (4) a cooperative relationship existed between family physicians and obstetricians for consultation and surgical intervention at the discretion of the family physician faculty member supervising the care of the patient, and (5) an immediate comparison group of patients supervised by obstetricians delivering in the same facility was available.

Methods

This study examined 1942 deliveries between May 1991 and December 1992 in a 600-bed community hospital with a 22-bed labor-delivery-recovery-postpartum unit that accommodates an average of 1312 newborns annually. Patients accepted for care came from the community at large. Some patients, however, were excluded from care at the family practice center because of risk factors including uterine or cervical malformation, thromboembolic disease, psychiatric disease, severe cardiac disease, chronic renal disease, bleeding disorders requiring medication, hemoglobinopathies, and autoimmune disorders. Patients excluded from the family practice setting were referred to a high-risk facility, not to the obstetricians in this study. The obstetricians in this study were in solo or small-group practices having no common criteria for acceptance or exclusion from care. Nevertheless, all physicians practicing at this hospital used the same facilities and nursing staff and were subject to the same limitations on the complexity of patients that could be cared for based on facilities, staff, and availability of neonatal intensive care. Sixteen obstetricians delivered 1364 (70.2 percent) newborns, and 28 family practice faculty and residents delivered 578 (29.8 percent). Twelve births were excluded from the study because the mothers had received no prenatal care.

Patients were assigned to the family practice or obstetrician group for data analysis based upon

who provided the prenatal care and labor management, not by the specialty of the physician who performed the delivery. This method insured that a Cesarean section performed on a family practice patient by a consulting obstetrician would not be assigned to the obstetrician group.

As a standard measure of risk for the two study groups (patients of family physicians and patients of obstetricians), a risk assessment score was applied to each patient. Factors contributing to obstetric risk are numerous and interact to such a degree that risk-scoring systems are suspected of being no better than good clinical judgment in predicting pregnancy outcomes.^{19,20} Nonetheless, a risk assessment score provides a standard objective means of comparing the two patient groups. A review of obstetric risk scores by Wall²¹ indicated that the index by Goodwin and colleagues²² had superior predictive value. We therefore applied a modified version of the Goodwin, et al. index to our study population. The modifications were made to the scoring system based on availability of data.

The Goodwin, et al.²² index assesses obstetric risk by examining conditions in three categories. The first category assesses base-line risk status, including age, parity, and preexisting medical conditions. The second category incorporates complications arising during pregnancy. Each of these categories has a maximum score of 3 points. The final category is gestational age, with a maximum score of 4 points. A total score of 0 is lowest risk, and a score of 10 is highest risk.

We modified the Goodwin, et al. index for use in our study (Table 1). In addition to risk points for advanced maternal age, we assigned 1 point if maternal age was less than 16 years. Pregnancy during adolescence has been found to increase the likelihood of poor fetal outcome.^{23,24} We therefore accounted for this risk factor in our prenatal risk index. Another modified risk factor was diabetes. The type of diabetes was not reliably indicated on the birth certificate; any form of diabetes was given 2 points. Historical patient information from the birth certificate was included in the base-line category. Hypertension was not specified as being chronic or pregnancy-induced on the birth certificate. Both types of hypertension are detrimental to a developing fetus²⁵; we assigned a score of 1 point for hypertension regardless of type. Any bleeding resulted in a score of

Table 1. Perinatal Risk Scoring System.

Risk Factor	Points
Base-line data	
Age ≤ 16 years	1
Age > 35 years	1
Age > 40 years	2
Para 0	1
Para > 6	2
Diabetes	2
Hypertension	2
Other*	1 or 2
Present pregnancy	
Bleeding, any	1
Spontaneous premature rupture of membranes	1
Anemia	1
No prenatal care	2
Fewer than 3 prenatal visits	1
Toxemia	1
Eclampsia	3
Polyhydramnios	3
Multiple pregnancy	2
Maternal pyrexia	1
Gestational age	
≤ 28 weeks	4
≤ 32 weeks	3
≤ 35 weeks	2
≤ 37 weeks	1
≥ 42 weeks	1

Note: Modified from an index developed by Goodwin, et al.²²

*One point for one of the following; 2 points for two or more: previous abortion, previous stillbirth, neonatal death, history of Cesarean section, previous large infant.

1 point. Other items included in our index received the same point value as in the original Goodwin, et al. index. Gestational age was scored as in the Goodwin, et al. index. Scores from the three categories (base-line data, present pregnancy, and gestational age) were added together to determine a total risk score.

An obstetrician-gynecologist joined the family practice faculty for the last 11 months of the study. Board-certified family physician faculty, however, directly supervised the majority of the prenatal and intrapartum care. For purposes of this study, patients brought to the family practice setting from the obstetrician's private practice were classified as members of the obstetricians' delivery group because he cared for them independently. The criteria for accepting patients into prenatal care in the family practice center did not change. The rates of both primary and repeat Cesarean section were compared for the periods before and after the obstetrician joined the faculty to discern whether his addition to the faculty affected outcome data.

A medical data recorder, blinded to physician specialty, obtained initial data through a comprehensive review of birth certificates and fetal death certificates from May 1991 to December 1992. Data collection items included facility name, certifier's name, patient's name and age, number of previous pregnancies and previous deliveries, prenatal care, baby's weight, Apgar scores, medical risk factors, weight gained during pregnancy, use of oxytocin, complications of labor and delivery, type of delivery, and gestational age. The data were analyzed to compare risk factors, population composition, delivery methods, and pregnancy outcomes. Delivery outcomes were confirmed in the hospital's labor-and-delivery logbook maintained by the nurses. Statistical analysis included descriptive statistics, chi-square analysis, logistic regression, and power analysis.

Results

In our study population, the majority of babies with a birth weight of less than 2000 g had a risk score of 5 or greater. This result adds validity to our risk-scoring system, because low birth weight is an indicator of poor fetal outcome. The majority of the patients in both study groups were low risk. Ninety-nine percent of the family practice patients and 99.2 percent of the obstetricians' patients had risk scores between 1 and 5. There was no statistically significant difference in the relative proportion of high-risk (risk scores 6 to 10) patients for the two specialties ($P=0.102$). The family physicians provided care for one patient with a risk score of 6 or greater. The obstetricians had 16 patients (1.14 percent) with a risk score of 6 or greater.

The risk-scoring system was applied in an effort to evaluate comparability of the obstetrician and family physician patient populations. Even though there were more high-risk patients in the obstetricians' group, the difference was not statistically significant. In an effort to eliminate any bias between the two groups, all of the patients with a risk score greater than 5 and all twins were eliminated from the data analysis for both groups. The resultant comparison groups therefore were groups with equivalent risk scores.

Family practice residents and faculty managed labor and delivery for 578 (29.8 percent) of the 1942 patients. Private obstetricians managed labor and delivery for 1364 patients (70.2 per-

cent). Family physicians' patients were significantly younger (23.4 years) than obstetricians' patients (26.2 years; $P=0.0001$). Ninety-one percent of each group, however, was between the ages of 18 and 35 years. Family physicians treated more patients younger than 19 years, whereas obstetricians treated more patients older than 35 years. Almost 81 percent of the family physicians' patients were insured by Medicaid, compared with 14 percent of the obstetricians' patients ($P=0.01$).

Individual medical risk factors were compared between the two groups (Table 2). No significant differences were found regarding parity, maternal weight gain, or number of prenatal visits. The family physicians' patients tended to be primigravidas (40.7 percent), compared with the obstetricians' patients (38.9 percent), but the difference was not statistically significant. The populations were also similar when considering such risk factors as diabetes, hydramnios, and excessive bleeding.

The only complication of labor and delivery that differed significantly between the two patient groups was the diagnosis of cephalopelvic disproportion (CPD) (Table 3). The family physicians diagnosed CPD in 3.46 percent of patients, whereas the obstetricians diagnosed CPD in 9.6 percent of patients ($P=0.0002$). No complications were reported in 84.6 percent of family physicians' patients and 75.4 percent of obstetricians' patients.

Table 2. Maternal Demographics and Medical Risk Factors of Family Physicians' and Obstetricians' Patients.

Demographics and Risk Factors	Family Physicians' Patients (n=578) No. (%)	Obstetricians' Patients (n=1364) No. (%)	P Value
Age < 18 years	35 (6.0)	43 (3.1)	0.05
Age > 35 years	13 (2.2)	86 (4.6)	0.05
Primigravidas	234 (48.8)	529 (47.4)	NS
Diabetes	13 (2.2)	18 (1.3)	NS
Fewer than 4 prenatal visits	4 (0.6)	9 (0.6)	NS
Medicaid	471 (80.9)	194 (14.0)	0.01
Toxemia	0 (0)	6 (0.4)	NS
Hydramnios	0 (0)	1 (0.1)	NS
Bleeding	6 (1.0)	9 (0.6)	NS

NS=not significant.

Table 3. Complications of Labor and Delivery of Family Physicians' and Obstetricians' Patients.

Complications	Family Physicians' Patients (n=578) No. (%)	Obstetricians' Patients (n=1364) No. (%)	P Value
Febrile	1 (0.17)	7 (0.51)	NS
Meconium	5 (0.87)	3 (0.22)	NS
Premature membrane rupture	1 (0.17)	5 (0.37)	NS
Prolonged membrane rupture	2 (0.35)	0 (0.0)	NS
Abruptio placentae	4 (0.69)	9 (0.66)	NS
Placenta previa	2 (0.35)	6 (0.44)	NS
Seizures during labor	0 (0.0)	0 (0.0)	NS
Precipitous labor	6 (1.04)	8 (0.59)	NS
Prolonged labor	1 (0.17)	6 (0.44)	NS
Dysfunctional labor	0 (0.0)	1 (0.07)	NS
Breech	14 (2.42)	38 (2.79)	NS
Malpresentation	0 (0.0)	4 (0.29)	NS
Cephalopelvic disproportion	20 (3.46)	131 (9.60)	0.0002
Cord prolapse	3 (0.52)	2 (0.15)	NS
Anesthetic complications	0 (0.0)	0 (0.0)	NS
Other complications	22 (3.81)	69 (5.06)	NS

NS=not significant.

Overall, 69.5 percent of patients experienced spontaneous vaginal delivery. Slightly more than 4 percent were delivered with assistance by forceps (3.6 percent) or vacuum extraction (0.93 percent). Cesarean sections were performed in an average of 25 percent of deliveries. The methods of delivery, however, varied significantly between the two specialties ($P<0.0001$). Family physicians had 11.2 percent more unassisted vaginal deliveries and performed vacuum extraction and vaginal birth after Cesarean section more often than obstetricians (Table 4). Forceps, primary Cesarean section, and repeat Cesarean section were used more frequently by obstetricians. The primary Cesarean section rate for family practice patients was 12.9 percent, compared with 20.2 percent for obstetricians' patients ($P=<0.001$).

The method of delivery was analyzed by age and specialty, because family physicians treated significantly more patients younger than 18 years, and obstetricians treated more patients older than

Table 4. Outcomes of Delivery for Family Physicians' and Obstetricians' Patients.

Outcomes	Family Physicians' Patients (n=578) No. (%)	Obstetricians' Patients (n=1364) No. (%)	P Value
Gestational age < 37 weeks	26 (4.6)	77 (6.8)	<0.05
Forceps	7 (1.2)	62 (4.6)	<0.01
Vacuum extractor	13 (2.3)	5 (0.4)	<0.05
Cesarean section			
Repeat	14 (2.4)	122 (6.3)	<0.001
Primary	74 (12.9)	274 (20.2)	<0.01
Vaginal birth after Cesarean section	9 (1.6)	10 (0.7)	<0.001
Unassisted vaginal delivery	470 (81.3)	901 (66)	<0.001

35 years. No significant difference between the delivery methods of these age groups by specialty was found. The significant differences in delivery methods occurred in the 92 percent of the population who were aged between 18 and 35 years. Cesarean section rates were significantly higher for obstetricians' patients.

The two specialties also differed significantly in the method of delivery for primigravidas (Table 5). Primigravid patients made up a nearly identical proportion of the patient populations of both family physicians (40.1 percent) and obstetricians (38.2 percent). Patients cared for by family physicians, however, were more likely to have their babies delivered vaginally and, when assisted, were more likely to have vacuum extraction than forceps.

A number of obstetricians (n=14) were involved in the comparison group, so their birth statistics were analyzed by call-sharing group (n=8). The primary Cesarean section rates of these groups ranged from 13.4 to 41.7 percent. Total Cesarean section rates ranged from 20.1 to 45.8 percent. When the call groups with fewer than 100 births were excluded from analysis, primary Cesarean section rates ranged from 15.5 to 25.5 percent, and total Cesarean section rates were from 21.4 to 37.7 percent.

No significant difference was evident in perinatal morbidity or mortality despite the difference in methods of delivery between family physicians and obstetricians. Median Apgar scores were

8 and 9 at 1 and 5 minutes, respectively. The average infant birth weight was 3363 g. The difference in gestational age at delivery was not clinically significant but was statistically significant ($P<0.008$). Obstetricians' patients were delivered on average at 39.2 weeks, and family physicians' patients delivered on average at 39.5 weeks. The obstetricians delivered significantly more infants with a gestational age of less than 37 weeks.

A power analysis showed some minimum detectable differences for the statistics given in Tables 2 through 5. All power calculations were made with the indicated sample sizes for an alpha of 0.05 and a power of 0.80. For the sample sizes of 578 and 1364 in Table 2, the minimum detectable differences ranged between 1.1 percent and 6.2 percent. In Table 3, the sample sizes were 578 and 1364, and the minimum detectable difference ranged between 0.7 percent and 3.5 percent. The minimum detectable difference for the statistics in Table 4 ranged between 1.4 percent and 6.2 percent; the sample sizes were 578 and 1364. In Table 5, the sample sizes were 232 and 527; the minimum detectable difference ranged between 2.5 percent and 10.5 percent. In most cases the minimum detectable difference is smaller than a clinically significant difference. Some minimum differences might seem large when compared with the very small prevalence found; however, an impossibly large sample size in the 10,000 to 100,000 range would be required to detect a small significant difference in these instances.

Discussion

The most striking finding of this study is the significantly lower Cesarean section rate among patients cared for by family physicians compared with the rate among those cared for by obstetri-

Table 5. Primigravidas by Delivery Method for Family Physicians' and Obstetricians' Patients.

Delivery Method	Family Physicians' Patients (n=232) No. (%)	Obstetricians' Patients (n=527) No. (%)	P Value
Unassisted vaginal	166 (70.9)	317 (59.6)	<0.2
Forceps	6 (2.6)	33 (6.2)	<0.05
Vacuum extractor	6 (2.0)	2 (0.4)	<0.01
Cesarean section	54 (23.1)	175 (33.1)	<0.05

cians. Examining the data for any factors other than physician specialty to explain this discrepancy is important. Patient populations were not significantly different, as indicated by maternal demographic variables, with the exception of Medicaid insurance coverage and maternal age.

The difference in Medicaid status between the two populations might be important. Medicaid, a common indicator of low socioeconomic status, was six times as prevalent in family physicians' patients. Low socioeconomic status has been shown to put a patient at increased risk for adverse perinatal outcome.^{6,26,27} On this basis family physicians' patients could be considered a higher risk group than the obstetricians' patients, which would have been expected to lead to a higher, not lower, Cesarean section rate.

Maternal age differed significantly between the two groups of patients. Family physicians cared for younger patients, and obstetricians cared for older patients; however, 92 percent of each group was between the ages of 18 and 35 years. To find out whether the age difference that existed in the remaining portion of the respective patient populations accounted for the different Cesarean section rates, we analyzed the method of delivery for those patients younger than 18 and those older than 35 years. We found that the Cesarean section rate for family practice patients in these age groups was also lower, but it did not reach statistical significance. The higher Cesarean section rates for obstetricians' patients occurred in the 18 to 35 year age group, which constituted an identical proportion of both the family physicians' and obstetricians' patients.

The diagnosis of CPD was more than twice as common in obstetricians' patients than in family physicians' patients. Previous studies by Hueston²⁸ and Applegate and Walhout²⁹ reported that obstetricians' patients were more likely to be delivered by Cesarean section for CPD despite similar rates of antepartum risk factors. Diabetes, which can lead to macrosomia and, therefore, to CPD, was more prevalent in the family physicians' patients, but the difference was not significant. Other factors must have led to delivery by Cesarean section in the obstetrician's group.

An obstetrician was added to the family practice group during the study, which made it necessary to determine the impact this addition might have had on delivery methods within the family

practice setting. The obstetrician's call-sharing group had a primary Cesarean section rate of 25.5 percent and a total Cesarean section rate of 37.7 percent. These numbers are similar to the higher Cesarean section rates among the other obstetrician call-sharing groups. It seems unlikely, therefore, that adding the obstetrician to the family practice setting lowered the family practice Cesarean section rates. Instead, these figures might show that the family physicians' management style preserved the lower Cesarean section rates in their patient group, despite adding an obstetrician to the family practice call-sharing group.

Another condition unique to this study was the process of consultation and actual surgical management. The intrapartum care system involved family physicians providing essentially all labor management and requesting consultation from obstetricians only when needed according to the judgment of the family physician. No protocols or formal requirements for consultation were followed. In addition, a family physician with Cesarean section surgical privileges was available to the family practice group most of the time. This physician performed 57 percent of the Cesarean sections on the family practice patients. A consulting obstetrician performed the surgery or assisted with complicated vaginal delivery in the remaining 43 percent of cases. Overall, 13.2 percent of the family practice patients were delivered by a consulting obstetrician, and 4.8 percent of the obstetricians' patients were delivered by a family physician.

In a patient population with equal risk scores, family physician care was associated with a lower Cesarean section rate. Physician factors and management style, therefore, are highly likely to be responsible for the lower Cesarean section rate, less use of forceps, and more common use of vaginal birth after Cesarean section and vacuum extraction by family physicians. Other researchers have described the same trend.^{14,30-35} Obstetricians have unique training to handle high-risk births. The techniques that benefit women with high-risk pregnancies could actually increase interventions in women with low-risk pregnancies.³⁰ Furthermore, patients might respond better to less intervention for low-risk pregnancies.³¹ Many family physicians practice a less interventionist style of care. Epidural anesthesia and fetal monitors are used less often.¹³ Similarly, patients

of family physicians have been reported to be more likely to experience spontaneous vaginal delivery with less use of oxytocin.³⁴ Family physicians are known to have a higher success rate than obstetricians in helping patients deliver vaginally after previous Cesarean section.^{36,37}

Other factors that this study did not examine could have affected patient outcomes. The birth certificates used as the primary data source were not always reliable in indicating use of oxytocin or type of anesthesia. Knowledge of these factors might have helped to distinguish physician management styles contributing to delivery method. Also, patients were not randomly assigned to a physician, so patient self-selection factors could have affected birth outcomes or method of delivery.^{15,28,38} The modified risk-scoring assessment tool used in this study has not been validated on a separate clinical population. This system is subject to the same limitations, assumptions, and data collection pitfalls as are other risk-scoring systems.

It is notable that these family physicians managed to maintain a significantly lower Cesarean section rate in an environment shared with obstetricians, because family physicians practicing in such an environment tend to assume the characteristics of an obstetrician's practice.^{11,39} The obstetricians at this particular hospital had a Cesarean section rate about 1.8 times the 15 percent rate set as a national goal, yet in this setting the family physicians managed to meet that goal.⁴⁰ A family practice approach to patient care might have been preserved through the availability of a Cesarean section-capable family physician and the fact consultations were not mandated.

Conclusion

Our findings from this study show that a family practice group can provide perinatal care, both prenatal and intrapartum, that results in outcomes comparable with or better than those of obstetrician-gynecologists practicing in the same location. With a medically similar patient population, family physician care resulted in a significantly lower Cesarean section rate, increased vaginal birth after Cesarean section, and equivalent infant outcome. Our study findings also suggest that at least part of this outcome might be the consequence of the relatively autonomous functioning of family physicians. A major component

of this autonomy could be maintaining Cesarean section privileges by a family physician. Recent data have shown that family physicians with surgical skills can produce excellent outcomes.⁴¹ More study of the effect of family practice autonomy on patient outcome is warranted.

References

1. Directory of graduate medical education programs for 1989-1990. Chicago: American Medical Association, 1989.
2. David AK. Obstetrics in family practice. A time for a decision. *Fam Med* 1991; 23:259-62.
3. Rosenblatt RA, Cherkin DC, Schneeweiss R, Hart LG, Greenwald H, Kirkwood CR, et al. The structure and content of family practice. Current status and future trends. *J Fam Pract* 1982; 15:681-22.
4. Facts about: family practice 1993. Kansas City, MO: American Academy of Family Physicians, 1993.
5. Facts about: family practice 1994. Kansas City, MO: American Academy of Family Physicians, 1994:30.
6. Onion DK, Mockapetris AM. Specialty bias in obstetric care for high-risk socioeconomic groups in Maine. *J Fam Pract* 1988; 27:423-7.
7. Wanderer MJ, Suyehira JG. Obstetrical care in a prepaid cooperative. A comparison between family practice residents, family physicians, and obstetricians. *J Fam Pract* 1980; 11:601-6.
8. Phillips WR, Rice GA, Layton RH. Audit of obstetrical care and outcome in family medicine, obstetrics, and general practice. *J Fam Pract* 1978; 6:1209-16.
9. Kurata JH, Werblun MN, Valenzuela G, Ziffer M, Kantor-Fish S, Richards E. Perinatal outcomes in obstetric and family medicine services in a county hospital. *J Am Board Fam Pract* 1989; 2:82-6.
10. Kriebel SH, Pitts JD. Obstetric outcomes in a rural family practice: an eight-year experience. *J Fam Pract* 1988; 27:377-84.
11. Chaska BW, Mellstrom MS, Grambsch PM, Nesse RE. Influence of site of obstetric care and delivery on pregnancy management and outcome. *J Am Board Fam Pract* 1988; 1:152-63.
12. Reid AJ, Carroll JC, Ruderman J, Murray MA. Differences in intrapartum obstetric care provided to women at low risk by family physicians and obstetricians. *Can Med Assoc J* 1989; 140:625-33.
13. Franks P, Eisinger S. Adverse perinatal outcomes. Is physician specialty a risk factor? *J Fam Pract* 1987; 24:152-6.
14. Mengel MB, Phillips WR. The quality of obstetric care in family practice: are family physicians as safe as obstetricians? *J Fam Pract* 1987; 24:159-64.
15. Rosenberg EE, Klein M. Is maternity care different in family practice? A pilot matched pair study. *J Fam Pract* 1987; 25:237-42.
16. Deutchman ME. A frontier of family medicine. The revival of obstetrics. *Arch Fam Med* 1993; 2:139-40.
17. Task Force on Obstetrics. Kansas City, MO: Am Acad Fam Pract Bull 1993.

18. Tudor JM Jr. The specialty of women's health in family practice. *Am Acad Fam Pract Reporter* 1993; 20:2.
19. Lilford RJ, Chard T. Problems and pitfalls of risk assessment in antenatal care. *Br J Obstet Gynaecol* 1983; 90:507-10.
20. Alexander S, Keirse MJ. Formal risk scoring during pregnancy. In: Chalmers I, Enkin M, Keirse MJ, editors. *Effective care in pregnancy and childbirth*. New York: Oxford University Press, 1989.
21. Wall EW. Assessing obstetric risk. A review of obstetric risk-scoring systems. *J Fam Pract* 1988; 27:153-63.
22. Goodwin JW, Dunne JT, Thomas BW. Antepartum identification of the fetus at risk. *Can Med Assoc J* 1969; 101:57-*passim*.
23. Kondamudi VK, Bhattacharyya A, Nach PK, Noel D. Adolescent pregnancy in Grenada. *Ann Trop Paediatr* 1993; 13:379-83.
24. Buitendijk SE, van Enk A, Oosterhout R, Ris M. Obstetrical outcome in teenage pregnancies in The Netherlands. *Ned Tijdschr Geneesk* 1993; 137:2536-40.
25. Andrews WW, Cox SM, Sherman ML, Leveno KJ. Maternal and perinatal effects of hypertension at term. *J Reprod Med* 1992; 37:73-6.
26. Williams RL. Measuring the effectiveness of perinatal medical care. *Med Care* 1979; 17:95-110.
27. Phillips WR, Sevens GS. Obstetrics in family practice: competence, continuity, and caring. *J Fam Pract* 1985; 20:595-6.
28. Hueston WJ. Specialty differences in primary cesarean section rates in a rural hospital. *Fam Pract Res J* 1992; 12:245-53.
29. Applegate JA, Walhout MF. Cesarean section rate. A comparison between family physicians and obstetricians. *Fam Pract Res J* 1992; 12:255-62.
30. Brody H, Thompson JR. The maximin strategy in modern obstetrics. *J Fam Pract* 1981; 12:977-86.
31. Tilyard MW, Williams S, Seddon RJ, Oakley ME, Murdoch JC. Is outcome for low risk obstetric patients influenced by parity and intervention? *N Z Med J* 1989; 102:523-6.
32. Klein M, Lloyd I, Redman C, Bull M, Turnbull AC. A comparison of low-risk pregnant women booked for delivery in two systems of care: shared-care (consultant) and integrated general practice unit. I. Obstetrical procedures and neonatal outcome. *Br J Obstet Gynaecol* 1983; 90:118-22.
33. *Idem*. A comparison of low-risk pregnant women booked for delivery in two systems of care. Shared-care (consultant) and integrated general practice unit. II. Labour and delivery management and neonatal outcome. *Br J Obstet Gynaecol* 1983; 90:123-8.
34. Krikke EH, Bell NR. Relation of family physician or specialist care to obstetric interventions and outcomes in patients at low risk: a western Canadian cohort study. *Can Med Assoc J* 1989; 140:637-43.
35. DeMott RK, Sandmire HF. The Greenbay cesarean section study. II. The physician factor as a determinant of cesarean birth rates for failed labor. *Am J Obstet Gynecol* 1992; 166:1799-1810.
36. Vaginal delivery after cesarean. FP vs. ObGyn. *Fam Pract News* July 15, 1992:1, 23.
37. Clemenson N. Promoting vaginal birth after cesarean section. *Am Fam Phys* 1993; 47:139-44.
38. Morgan P. Research in obstetric care: questions and methods. *Can Med Assoc J* 1989; 140:591-2.
39. Carroll JC, Reid AJ, Ruderman J, Murray MA. The influence of the high-risk care environment on the practice of low-risk obstetrics. *Fam Med* 1991; 23:184-8.
40. US Public Health Service. *Healthy people 2000: national health promotion and disease prevention objectives*. Washington, DC: US Government Printing Office, 1990. DHHS publication no. (PHS) 91-50212.
41. Deutchman ME, Connor PD, Gobbo R, FitzSimmons R. Outcomes of cesarean sections performed by family physicians and the training they received: a 15-year retrospective study. *J Am Board Fam Pract* 1995; 8:81-90.