

# Patient Selection and Outcomes for Out-of-Hospital Births in One Family Practice

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*This paper reports a study of the pregnancies followed to delivery in one family medicine group practice that offered a choice of childbirth settings. Those choosing out-of-hospital birth (OHB) were a self-selected group of highly motivated couples interested in natural childbirth or desiring to minimize the cost of pregnancy care. Of 790 singleton pregnancies followed to term, 71 (9.0%) planned home births, 510 (64.6%) planned clinic births, and 209 (26.5%) planned hospital births. Of those planning clinic or home birth, 73% gave birth outside the hospital as planned (44 at home and 379 in the clinic), 81 (14%) changed plans prenatally and gave birth in a local hospital, 46 (8%) were transferred to the local hospital intrapartum, and 29 (5%) were referred to tertiary care. Primiparas who initially chose OHB were more likely than multiparas to give birth in a hospital (46% vs 16%).*

*Controlling retrospectively for obstetric risk and parity, there were few differences in outcome between local hospital and out-of-hospital births. The observed rates of serious complications for OHB were low, but overall, 27% of those initially considered candidates for birth outside the hospital required a change to a higher level of care. For primiparas initially planning clinic or home birth, discriminant analysis revealed five variables that together might have improved the prediction of the eventual decision for hospital delivery in 46%. Clinical pelvimetry was the most powerful variable, in keeping with the finding that most intrapartum transfers were for arrests of labor. The results also suggest that financial factors and other features of the physician-patient relationship influenced clinical decision making. J FAM PRACT 1990; 31:128-136.*

Long a tradition or necessity in some rural areas, the opportunity for childbirth outside the hospital surged in urban America as a response to the "natural childbirth" movement and more recently has been curtailed by concerns about litigation.<sup>1</sup> Yet out-of-hospital childbirth is a lower-cost alternative in a time of rising medical care costs and decreased insurance coverage. Furthermore, the hypothesis that low-risk births have good outcomes in low-technology systems of care has found support from numerous case series and a few retrospectively controlled studies, and has attracted the attention of policymakers.<sup>1-15</sup> Thus, a continued examination of the choice to deliver outside the hospital is needed.

This study describes the outcomes of pregnancies cared for in a family practice offering a choice of settings for childbirth, with a philosophy of avoiding unnecessary medical interventions and of fostering maximum involvement of patients in decisions about their care. The study differs from most other published case series by recording more prenatal variables, thereby allowing analysis of outcomes to control for obstetric risk status. The following questions were addressed: How do those patients who planned out-of-hospital birth (OHB) differ from others in the practice? Judging by outcomes, was selection of the childbirth setting appropriate? In the subgroup of women who planned OHB, could the eventual decision for transfer to the hospital have been predicted?

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## METHODS

The subjects for this study were all of the pregnant patients followed to delivery during a 4-year period from

1980 to 1984 in one family medicine group practice (two or three family physicians and a nurse practitioner) located in a suburb of a large Pacific Northwest city. The office suite (clinic) adjacent to a community hospital contained birth rooms where selected patients could give birth with a nurse and physician in attendance. Patients apparently at low risk, living close to the clinic, and able to pay a higher fee could choose to give birth at home. Only women prepared for natural childbirth were eligible for clinic or home birth. Intravenous fluids, oxygen, local (but not systemic or regional) analgesia, and drugs and equipment for resuscitation were available for all clinic and home births. Patients giving birth at the clinic could be accompanied by friends and family members of their choice and were usually discharged to home about 2 hours after the birth. Hospital deliveries occurred if the patient so requested or because of a need for a more intensive level of care. Most of these occurred in the local hospital with private practice obstetricians and anesthesiologists as consultants, although a small number of patients were referred to a tertiary care facility.

Each pregnancy record summarized the patient's and family's initial requests about the birth and their stated reasons for these requests. After a 1- to 2-hour semistructured initial interview, physical examination, and discussion, the planned location of the birth was recorded in each chart. The physicians attempted to follow the patient's requests and to provide adequate information to patients and families for an informed choice. The physicians made the final decisions about location of birth and transfer during labor, taking into account past history, medical factors, patient's and family's motivation and ability to prepare for childbirth, financial factors, and social support. No formal risk-scoring system was used. In this study these decisions about birth location were analyzed in relation to outcomes of pregnancy.

Patients were included in this study if they had at least one initial obstetric visit. Out of a total of 1004 such patients during the study period, 119 either left the practice or aborted; for an additional 66, charts were not available for analysis, leaving 819 pregnancies followed to delivery that could be examined in detail. Twenty-four twin pregnancies were omitted from analyses of birth location, resulting in a study sample of 795 singleton pregnancies followed to delivery. Data on planned or actual birth location were missing for five of these.

The mother's charts were abstracted by one author; demographic, prenatal, delivery, and postpartum variables were independently coded for computer analysis. Each of the variables was routinely charted during pregnancy care; the frequency of missing data on single variables ranged from 0% to 13%. Smoking was divided into three categories according to amount smoked at the time of the initial visit: none, less than one pack per day, and

one or more packs per day. The obstetric risk-scoring systems of Halliday, Hobel, and Goodwin were retrospectively applied to the data, with minor modifications, as previously described.<sup>16</sup> Since the Goodwin et al score<sup>17</sup> was the best at predicting complications, it has been used in this study.

### Statistical Analysis

First, the univariate techniques of chi-square and one-way analysis of variance (ANOVA) were used to assess whether any of the prenatal variables were associated with planned birth location. Since the number of home births was small (44) in comparison to clinic births (387), and practice procedures did not differ between these two settings, these groups were combined for further analysis. Second, differences in the rates of selected birth outcomes were analyzed separately by planned and actual birth location using the chi-square statistic or Student's *t* test, and controlling, where appropriate, for parity (nulliparous vs parous) and obstetric risk score (actual Goodwin score for ANOVA; score  $\leq 3$  vs  $> 3$  for chi-square). Finally, for women planning out-of-hospital births, all prenatal variables with less than 10% missing data, and which had exhibited a significant univariate relationship with actual birth location, were entered into a stepwise discriminant analysis. The purpose of these analyses was to identify the best possible subset of independent predictors of hospital delivery in those initially planning OHB. Discriminant analysis was chosen instead of logistic regression because the events of interest, ie, hospital births, occurred with sufficient frequency to provide stable estimates of the discriminant regression coefficients. Each pregnancy was analyzed as a separate event. Subsequent pregnancies in the same woman accounted for 12% of the sample. In analyzing the demographic variables, only the data from the first pregnancy were used.

## RESULTS

### Description of Pregnant Patients

Table 1 shows that the average pregnant woman in this study was white, nonsmoking, in her mid-20s, married to a skilled manual worker, and about equally likely to be a homemaker or employed in a clerical or sales job (data on occupational class not shown).<sup>18</sup> One third were already patients of the practice, and 60% continued care there after the postpartum checkup. Thirty-eight percent of pregnancies occurred to primiparous women; 62% to multiparas. Almost all patients received at least 20 weeks of prenatal care and prepared in Lamaze classes for natural

TABLE 1. DESCRIPTION OF STUDY SAMPLE

Variables	Percent
<b>Demographic (n = 729)*</b>	
Currently married	85
White	96
Pregnant women employed	39
Mean age (years)	26
Already a patient of the practice	32
Continued care postpartum	60
Religious beliefs favor nontraditional care	16
No medical insurance	37
<b>Pregnancy (N = 819)†</b>	
Primiparas	38
Median gestational age at first prenatal visit (weeks)‡	12.1
Nonsmokers	81
Cesarean sections	11.7
Natural childbirth	80

\*Including only data from the first pregnancy for each individual.

†Including data from each pregnancy followed to delivery.

‡Corrected by omitting those who transferred from another provider.

childbirth; 80% were delivered with only local or pudendal anesthesia. The overall cesarean section rate was 11.7%. These data suggest a relatively low-risk population.

### Cost

This practice provided the least costly physician-attended birth care in the metropolitan area throughout the study period. In May 1984 the total charge to a patient in the study practice for pregnancy care, vaginal delivery, newborn care, and facility or hospital fee was \$1050 for home birth, \$988 for clinic birth, and \$2752 for hospital birth (2-day stay). Thirty-seven percent of the patients in this sample had no medical insurance. Eighty-eight percent of these planned OHB in contrast to 68% of those with private insurance ( $\chi^2 = 38.1$ ;  $P < .001$ ). (Practice policy dictated that patients on welfare be scheduled for a hospital delivery, since public assistance did not pay a facility fee for OHB.) Eighteen percent of patients stated that they chose this practice for financial reasons; 91% of these planned to give birth outside the hospital. Thus, cost was one impetus for patients to choose clinic or home birth.

### Patients' Requests

At the initial obstetric visit, couples' requests were recorded<sup>19,20</sup>: 44% requested support for natural childbirth; 4% specifically asked for a hospital birth. In contrast, 31% specifically requested a home or clinic birth. The reasons cited included fear of iatrogenic problems (17%), financial reasons (18%), and belonging to a reli-

gious group that discouraged formal medical care or supported alternative methods of healing (16%). For multiparas, previous birth experiences were highly relevant. One third of the multiparas had previously given birth outside the hospital; 93% of these again planned clinic or home birth. Twenty-three percent of those requesting a home birth later decided on the clinic, most commonly because they lived too far away to be eligible for birth at home.

### Medical Risk Factors

Clinical pelvimetry was customarily recorded at the initial examination. Forty-six percent of primiparas and 16% of multiparas were assessed as having small or "borderline" findings on clinical pelvimetry. Retrospective application of the Goodwin prenatal risk-scoring system classified 68% of primiparas and 76% of multiparas as low risk (score less than 4). Since most items in the Goodwin score pertain to prior obstetric history, it is most sensitive and specific for multiparas.<sup>15</sup> The mean Goodwin score differed significantly between those planning clinic or home birth and those planning hospital birth, however, for both primiparas (2.83 vs 3.31,  $t = 2.52$ ,  $P < .02$ ) and multiparas (2.21 vs 2.72,  $t = 2.85$ ,  $P < .01$ ). A similar relationship held when the groups were compared by actual birth location.

### Planned and Actual Birth Location

Table 2 shows that 73.5% of all patients (581) planned birth outside the hospital: 71 at home and 510 in the clinic; 209 (26.5%) planned a hospital birth. Forty-four patients (5.6% of the total) actually gave birth at home, 387 (49%) in the clinic, 317 (40%) at a local hospital, and 42 (5.3%) at a tertiary care center.

Smokers, single women, those with anemia, obesity, or poor nutrition, and those with small or borderline findings on clinical pelvimetry were more likely to plan hospital births (data not shown). As noted above, those belonging to certain religious groups, those with no medical insurance, and those with prior OHB experience were more likely to plan a clinic or home birth. The percentage choosing OHB did not differ between primiparas (72%) and multiparas (74%). Only 54% of primiparas planning home or clinic births actually were delivered outside the hospital, however, compared with 84% of the multiparas. Twenty percent of primiparas and 11% of multiparas developed social or medical problems during pregnancy, such as hypertension, malpresentation, vaginal bleeding, anticipated lack of postpartum support at home, or illness at term, and were advised to give birth in the hospital. Eighteen percent of primiparas required intrapartum

TABLE 2. PLANNED AND ACTUAL BIRTH LOCATIONS, BY PARITY

Locations	Primiparas	Multiparas	Total
<b>Planned home or clinic birth, No. (%)</b>	213	368	581 (73.5)
Planned home birth, No.	17	54	71
Planned clinic birth, No.	196	314	510
Gave birth at home, No.	8	36	44
Gave birth in the clinic, No.	107	272	379
Changed plans prenatally, %	20.2	10.6	14.1
Intrapartum transfer to local hospital, %	17.8	2.4	8.1
Referred to tertiary care, %	8.0	3.3	5.0
Gave birth outside hospital, as planned, %	54.0	83.7	72.8
<b>Planned hospital birth, No. (%)</b>	83	126	209 (26.5)
Gave birth in local hospital, %	89.2	87.3	88.0
Gave birth outside hospital, %	4.8	6.4	5.7*
Referred to tertiary care, %	6.1	6.4	6.4

\*Eight patients originally planning hospital births changed their minds and gave birth in the clinic, and four unintentionally gave birth en route.

transfer to the local hospital. Seventy-nine percent of transfers occurred because of a need for augmentation of labor or operative delivery. Only 2.4% of multiparas required intrapartum transfer for a variety of reasons. Five percent of those planning clinic or home birth were referred to the tertiary care hospital because of premature labor, other severe problems, or occasional unavailability of local obstetric consultants. About the same proportion (6.4%) of those who had planned hospital birth required tertiary care.

**Neonatal Outcomes by Location of Birth**

There were 10 perinatal deaths in the sample (1.2%): 4 premature infants, 5 with lethal congenital anomalies, and 1 stillborn after total placental abruption (Table 3). Only one perinatal death, from multiple anomalies, occurred to a child born outside the hospital. The rate of congenital anomalies (of all severities) in this group, 2.7%, is comparable to that in the general population.<sup>21</sup> Four premature infants, 35 to 37 weeks' gestation, were born outside

TABLE 3. NEONATAL OUTCOMES, BY BIRTH LOCATION

Outcome	Home or Clinic (n = 439) No. (%)	Local Hospital (n = 329) No. (%)	Tertiary Care (n = 51) No. (%)	Total (N = 819) No. (%)
Perinatal death	1 (0.2)	2 (0.6)	7 (14.0)	10 (1.2)
Congenital anomalies (all severities)	11 (2.5)	7 (2.1)	4 (7.8)	22 (2.7)
Premature (<37 wk)	4 (0.9)	8 (2.4)	22 (43.0)	34 (4.2)
Low birthweight (<2500 g)	2 (0.5)	7 (2.1)	17 (35.0)	26 (3.4)
Thick meconium	1 (0.2)	0	7 (14.0)	8 (1.0)
Resuscitation (bag/mask, intubation, or more)	16 (3.7)	27 (8.2)	10 (18.9)	53 (6.5)
Apgar <7 at 5 min	1 (0.2)	7 (2.1)	10 (18.9)	18 (2.2)
Birth asphyxia with permanent sequelae	1 (0.2)	1 (0.3)	2 (3.9)	4 (0.5)
Mean Apgar score (for living children)				
1 min	8.1	7.9	6.5	7.9
5 min	9.2	9.0	7.7	9.1

TABLE 4. OUTCOMES BY PLANNED AND ACTUAL BIRTH LOCATION AND PARITY

	Home or Clinic	Local Hospital	( $\chi^2$ )	P	Total
<b>Planned birth location</b>					
Number of patients (includes all singleton pregnancies)					790
Primiparas	213	83			296
Multiparas	368	126			494
Induction/augmentation of labor					
Primiparas, No. (%)	55 (26)	29 (35)	2.09	NS	83 (28)
Multiparas, No. (%)	24 (6.5)	18 (14)	7.20	<.01	42 (8.5)
Assisted delivery (forceps, vacuum extraction)					
Primiparas, No. (%)	19 (8.9)	14 (17)	3.16	NS	34 (12)
Multiparas, No. (%)	1 (0.27)	13 (10)	21.30	<.001	14 (2.8)
Primary cesarean section					
Primiparas, No. (%)	31 (15)	20 (24)	3.49	.06	53 (18)
Multiparas, No. (%)	10 (2.7)	5 (4.2)	0.66	NS	15 (3.0)
<b>Actual birth location</b>					
Number of patients (singleton pregnancies delivered at >34 wk gestation, excluding referrals to tertiary care)	435	313			
Primiparas	119	155			
Multiparas	316	158			
Postpartum hemorrhage					
Primiparas, No. (%)	14 (12)*	5 (3.4)	7.15	<.01	
Multiparas, No. (%)	35 (11)	10 (6.6)	2.40	NS	
Delivered with intact perineum					
Primiparas, No. (%)	19 (16)	7 (6.4)	5.68	<.05	
Multiparas, No. (%)	86 (27)	34 (26)	0.10	NS	
Breast-feeding at 6-weeks postpartum, No. (%)	387 (88)	256 (84)	2.82	NS	
Breast problems noted, No. (%)	99 (23)	41 (13)	11.55	<.01	

\*For these percentages, denominators vary slightly because of missing data.

the hospital, two of whom weighed less than 2500 g but did well. The incidence of low birthweight in the entire sample, 3.4%, was low.<sup>22-24</sup> One infant born at home had thick meconium. A pediatrician was in attendance to perform tracheal suction. Resuscitation, defined as at least one positive pressure breath, was required for 3.7% of children born in home or clinic. In the sample overall, 6.5% of children needed resuscitation. The mean Apgar scores at 1 and 5 minutes were comparable for all groups except those born at the tertiary care center. One child born in a breech delivery in the clinic had a 5-minute Apgar score less than 7 and suffered asphyxic brain damage. Statistical comparisons, controlling for Goodwin risk score, revealed no difference among home, clinic, or local hospital births in the prevalence of fetal heart-rate abnor-

malities, or of any of the above neonatal outcomes (data not shown). A higher mean birthweight for OHB was associated with the higher parity of these women.

### Labor and Delivery

The outcomes shown first in Table 4 are analyzed according to planned birth location. These data show that the selection process did not predict with statistical significance either the need for augmentation of labor or assisted delivery in primiparas or the rate of primary cesarean section. The primary cesarean section rate for primiparas was 18%, but only 3% for multiparas, however, indicating that the multiparas were a self-selected, lower-risk group.

Controlling for Goodwin score, the mean length of

TABLE 5. STEPWISE DISCRIMINANT ANALYSIS

Variable Entered	Delivered at Home or in Clinic (n = 105)	Delivered in Hospital (n = 90)	Univariate $\chi^2$ or F (2-tailed)	F to Enter: P
<b>Primiparas planning OHB</b> (birth >34 wk gestation)				
Clinical pelvimetry (small or borderline)	38%	58%	13.77*	<.001
Self-paying (no insurance)	54%	37%	12.20*	<.001
Goodwin prenatal risk score (mean $\pm$ SD)	2.55 $\pm$ 1.21	3.00 $\pm$ 1.62	4.86†	<.05
Prior patient of the practice	5%	0	3.53‡	<.05
Smoking (any amount)	16%	27%	2.61	<.10
<b>Multiparas planning OHB</b> (birth >34 wk gestation)				
Goodwin prenatal risk score (mean $\pm$ SD)	1.98 $\pm$ 1.52	2.73 $\pm$ 1.80	10.88§	<.001
Previous OHB in this practice	35%	18%	3.43‡	<.10
Self-paying (no insurance)	42%	30%	2.43	<.10
For 5-variable (those listed under heading Primiparas planning OHB) equation, F = 9.01; df = 5, 189; P < .0001. For 3-variable (those listed under heading Multiparas planning OHB) equation, F = 5.82; df = 3, 360; P < .001.				
*P < .001				
†P < .05				
‡P < .10, but > .05				
§P < .01				

labor did not differ among patients in home, clinic, or local hospital. The second stage of labor was slightly shorter and the third stage slightly longer for nonhospital births (data not shown). Table 4 shows certain other outcomes with respect to actual birth location, comparing those who delivered at home or clinic with those delivering in the local hospital. There was a higher rate of postpartum hemorrhage, defined as greater than 500 mL of bleeding in the immediate postpartum period, with clinic and home birth, especially for primiparas. Fewer primiparas delivered with intact perineum in the hospital, but there was no difference for multiparas. A large percentage of the patients nursed for longer than 6 weeks, with more breast problems, especially sore nipples, noted in those who took their babies home soon after delivery.

### Prediction of Hospital Birth

Table 5 shows the results of a stepwise discriminant analysis to determine how well a profile of independently associated factors could distinguish the 46% of primiparas who planned a clinic or home birth but gave birth in the hospital from those who succeeded with OHB. Of all variables examined, five contributed independently to prediction of successful OHB in primiparas. Clinical pel-

vimetry made the largest contribution, in keeping with the high proportion of intrapartum transfers due to arrests of labor. Primiparas with no insurance were less likely to be hospitalized, indicating that physicians and patients may have tolerated greater risks or uncertainty rather than cause the patient to incur financial hardship. Prior patients of the practice, who might be supposed to have a stronger relationship with their physicians, were also less likely to be hospitalized. A higher obstetric risk score and smoking were independently associated with the decision for a hospital birth. These five variables, taken together, identified 71% (74) of 105 primiparas who successfully gave birth outside the hospital, and 68% (61) of those planning home or clinic births who ultimately required hospital care (90). The predictive value for requiring hospital delivery was 66% (61 delivered in hospital of 92 predicted); the predictive value for nonhospital birth was 72% (74 delivered out of hospital of 103 predicted).

When the same analysis was performed for multiparas (Table 5), only 16% of whom required delivery in the hospital when they had planned otherwise, clinical pelvimetry was no longer important. The Goodwin prenatal risk score was the strongest predictor of need for transfer, suggesting that more stringent adherence to risk screening in the decision-making process would have resulted in

more realistic plans. The other factors appeared to be similar to those for primiparas, with women who had had a prior OHB in this practice and those with no insurance coverage being more likely to have a clinic or home birth as planned. For multiparas these variables correctly identified 62% of OHB (191 of 308) and 64% of those requiring hospital deliveries (36 of 56). In this group, with the need for transfer a relatively rare event, the positive predictive value for hospital delivery was 24% (36 delivered in hospital of 153 predicted), but the negative predictive value was 91% (191 OHB of 211 predicted).

## DISCUSSION

Several limitations of this study should be noted: First, since this is a descriptive, retrospective study, missing data and classification errors may be more common than in a prospective study. Coding bias was minimized by training a person unaware of the research questions to code the data. Potential bias remains, however, in the recording of some items requiring subjective judgment such as patient requests, length of labor, blood loss, and possibly Apgar scores and clinical pelvimetry.<sup>25</sup> Most important, the patients choosing OHB are not comparable to those choosing hospital births, medically (except by controlling for prenatal risk score), demographically, or in less tangible ways such as motivation. It is expected that these differences would strongly influence the process and outcome of care. As this and other studies show good outcomes of OHB for selected patients, others will be encouraged to study comparable groups of women in different birth settings or systems of care.<sup>6-8,10-15</sup>

Second, peculiarities of the sample may limit the generalizability of this study. During the study period, the cases reported from this practice constituted about 5% of OHB in the state (Jennifer Mayfield, personal communication, March 1986; Shy<sup>26</sup>). Only 5% of the patients were on public assistance, and they did not have a choice of OHB; thus, the results may not apply to this subpopulation. Primiparas in this study were much more likely than multiparas to encounter complications of pregnancy and delivery and to require transfer to a higher level of care or operative delivery. Although there may be some intrinsic risk attributable to primiparity, a selection bias may also have operated, with women choosing a family physician if their past obstetric experience was normal or an obstetrician if it was complicated. A similar selection process is probably typical of many family practices.

Finally, the practice described was probably at one end of the spectrum on avoidance of medical interventions and encouragement of patient autonomy. Virtually all patients had attended childbirth classes. Epidural analgesia

was used for only 9% of vaginal births. Continuous fetal heart-rate monitoring was employed in 33% of all labors. The cesarean section rate was low. On the other hand, although the rates of episiotomy and need for perineal repair reported by midwives and family physicians vary widely,<sup>6,10,11,27-29</sup> the rates observed in this study are comparatively high. The rate of breast-feeding in the study population is similar to that in the Pacific Northwest.<sup>30</sup> The results of this study may not be generalizable to systems of birth care in which parenteral or epidural anesthetics, continuous fetal heart-rate monitoring, or other interventions are more readily available, where medical personnel are less supportive, or the parturients less well prepared.

This study provides greater detail about medical risk factors and outcomes than most previously published case series of OHB, allowing for control of obstetric risk scores in assessing outcomes. Few differences in outcome were detected across childbirth settings. The higher rate of postpartum hemorrhage observed for clinic or home deliveries might result from bias in the recording of blood loss or from less frequent use of intravenous oxytocin infusions, and may be related to a significantly longer third stage of labor in out-of-hospital settings. The same finding has been reported by others.<sup>7,29</sup>

The recently published National Birth Center Study<sup>6</sup> examined outcomes for a large number of women admitted in labor to 84 birth centers throughout the United States. The sample was large enough to estimate the rates of serious complications, prematurity, low birthweight, infant morbidity, and perinatal death. The outcome data reported here are similar, and compare favorably with those in the United States, and in low-risk groups, during the study period.<sup>1,4,6,7,9,12,13,23,24</sup> The National Birth Center Study, unlike the current report, presents no information on selection of patients for birth center delivery, or on those initially registered for birth center care but changing plans before labor. This selection process may be crucial for achieving good outcomes of out-of-hospital birth.

Several studies of general practice obstetrics do give data about the rate of transfer to a higher level of care when level I obstetric care has been planned.<sup>31-37</sup> These data are generally comparable to the present results, which show that approximately one fourth of those who planned OHB were referred for a higher level of care. The current data show that a formal risk-scoring system would have improved only slightly upon clinical judgment in suggesting a birth setting for primiparas. These data, however, suggest that clinical pelvimetry may be useful for predicting intrapartum transfers that result from abnormal labor progress. The "treatment fallacy" does not permit separation of those for whom transfer was necessary from those for whom it was only a precaution.<sup>16</sup> Exceptions to screening criteria occurred and may have contributed to a

poor outcome in at least one case.<sup>38</sup> The data suggest that clinicians and patients varied in their thresholds for acting on potential risks, depending on financial factors and prior experiences, an area that is potentially fruitful for future investigation.

## CONCLUSIONS

In summary, this study has described a self-selected group of highly motivated patients who were interested in natural childbirth or desiring to minimize the cost of pregnancy care. These data have shown low cost and low rates of serious complications for clinic or home birth, but at the expense of requiring a change to a higher level of care for 46% of primiparas and 16% of multiparas initially considered candidates for out-of-hospital delivery. For primiparas, discriminant analysis revealed five variables that, taken together, might have improved the prediction of the need for hospital delivery. Findings on clinical pelvimetry, an often neglected clinical tool, proved to be the most powerful of these variables. The study suggests that adherence to screening guidelines or exceptions to the criteria may have been influenced by financial and other factors in the physician-patient relationship. Even with strict adherence to a risk-screening protocol, close backup and ability to transfer between levels of care are necessary for unexpected emergencies and especially for failure to progress in labor.

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## References

- National Academy of Sciences: Research Issues in the Assessment of Birth Settings: Report of a Study by the Committee on Assessing Alternative Birth Settings. Washington, DC, National Academy Press, 1982
- Brody H, Thompson JR: The maximin strategy in modern obstetrics. *J Fam Pract* 1981; 12:977-986
- Rosenblatt RA: The future of obstetrics in family practice: Time for a new direction. *J Fam Pract* 1988; 26:127-129
- Mehl LE, Peterson GH, Whitt M, Hawes WE: Outcomes of elective home birth: A series of 1146 cases. *J Reprod Med* 1977; 19:281-290
- Cavanaugh AJM, Phillips KM, Sheridan B, Williams EMJ: Contribution of isolated general practitioner maternity units. *Br Med J* 1984; 288:1438-1440
- Rooks JP, Weatherby NL, Ernst EKM, et al: Outcomes of care in birth centers: The National Birth Center Study. *New Engl J Med* 1989; 321:1804-1811
- Baruffi G, Dellinger WS, Strobino DM, et al: A study of pregnancy outcomes in a maternity center and a tertiary care hospital. *Am J Public Health* 1984; 74:973-978
- Klein M, Papageorgiou A, Westreich R, et al: Care in a birth room versus a conventional setting: A controlled trial. *Can Med Assoc J* 1984; 131:1461-1466
- Tew M: Place of birth and perinatal mortality. *J R Coll Gen Pract* 1985; 35:390-394
- Scupholme A, McLeod AW, Robertson EG: A birth center affiliated with the tertiary care center: Comparison of outcome. *Obstet Gynecol* 1986; 67:598-603
- Baruffi G, Dellinger WS, Strobino DM, et al: Patterns of obstetric procedures use in maternity care. *Obstet Gynecol* 1984; 64:493-498
- Rosenblatt RA, Reinken J, Shoemack P: Is obstetrics safe in small hospitals? Evidence from New Zealand's Regionalized Perinatal System. *Lancet* 1985; 2:429-432
- Klein M, Lloyd I, Redman C, Bull M: 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. II. Labour and delivery management and neonatal outcome. *Br J Obstet Gynecol* 1983; 90:118-128
- 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; 1:152-163
- Expert Panel on the Content of Prenatal Care (Rosen MG, chairman): The Content of Prenatal Care. Public Health Service, Division of Maternal and Child Health, and the National Institute of Child Health and Human Development, Washington, DC, National Maternal and Child Health Clearinghouse, publication No. C082, 1989
- Kelly RB, Acheson LS, Zyzanski SJ: Comparison of three prenatal risk scores in a series of low-risk pregnancies. *Fam Med* 1988; 20:122-127
- Goodwin JW, Dunne JT, Thomas BW: Antepartum identification of the fetus at risk. *Can Med Assoc J* 1969; 101(8):57-60
- Hollingshead AB: Two Factor Index of Social Class Measurement. New Haven, Conn, privately published, 1957
- Cameron JC, Chase ES, O'Neal S: Home birth in Salt Lake County, Utah. *Am J Public Health* 1979; 69:716-717
- McClain C: Women's choice of home or hospital birth. *J Fam Pract* 1981; 12:1033-1038
- Nelson WE, Vaughn VC III, McKay RJ, Behrman RE: *Nelson Textbook of Pediatrics*, ed 11. Philadelphia, WB Saunders, 1979, p 370
- Hutchins V, Kessel SS, Placek PJ: Trends in maternal and infant health factors associated with low birth weight, United States, 1972 and 1980. *Public Health Rep* 1984; 99(2):162-172
- Koontz AM: Pregnancy and infant health: Progress toward the 1990 objectives. *Public Health Rep* 1984; 99(2):184-192
- Declercq ER: Out-of-hospital births, US, 1978: Birthweight and Apgar scores as measures of outcome. *Public Health Rep* 1984; 99(1):63-73
- Cherkin DC, Phillips WR, Gillanders WR: Assessing the reliability of data from patient medical records. *J Fam Pract* 1984; 18:937-940
- Shy KK, Frost F, Ullom J: Out-of-hospital delivery in Washington State, 1975 to 1977. *Am J Obstet Gynecol* 1980; 137:547-552
- Phillips WR, Rice GA, Layton RH: Audit of obstetrical care and outcome in family medicine, obstetrics, and general practice. *J Fam Pract* 1978; 6:1209-1216
- Wanderer MJ, Suyehira JG: Obstetrical care in a prepaid cooperative: A comparison between family practice residents, family physicians, and obstetricians. *J Fam Pract* 1980; 11:601-606
- Wood LAC: Obstetric retrospect. *J R Coll Gen Pract* 1981; 31:80-90
- Martinez GA, Krieger FW: 1984 Milk-feeding patterns in the United States. *Pediatrics* 1985; 76:1004-1008

31. Banwell GS, Hamilton IG: The use of maternity beds in a new general practitioner unit. *J R Coll Gen Pract* 1970; 19:282-285
32. Lloyd G: Retrospective normality: A comparison of the outcome of pregnancy of women booked in a GP maternity unit and a GP obstetric unit. *Practitioner* 1975; 214:261-263
33. Richmond GA: An analysis of 3199 patients booked for delivery in general-practitioner obstetric units. *J R Coll Gen Pract* 1977; 27: 406-413
34. Falson JB, Pisani BJ, Douglas RG, et al: The childbearing center: An alternative birth setting. *Obstet Gynecol* 1979; 54:527-532
35. Barton JJ, Rovner S, Puls K, Read PA: Alternative birthing center: Experience in a teaching obstetric service. *Am J Obstet Gynecol* 1980; 137:377-384
36. Bull MJV: Ten years' experience in a general practice obstetric unit. *J R Coll Gen Pract* 1980; 30:208-215
37. deHaan J, Smits F: Home deliveries in the Netherlands: Present situation and sequelae. *J Perinat Med* 1983; 11:3-8
38. James DK: Patients transferred in labour from general-practitioner maternity units. *J R Coll Gen Pract* 1977; 27:414-418