Continuous Emotional Support During Labor in a US Hospital

A Randomized Controlled Trial

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The continuous presence of a supportive companion (*doula*) during labor and delivery in two studies in Guatemala shortened labor and reduced the need for cesarean section and other interventions. In a US hospital with modern obstetric practices, 412 healthy nulliparous women in labor were randomly assigned to a supported group (n = 212) that received the continuous support of a *doula* or an observed group (n = 200) that was monitored by an inconspicuous observer. Two hundred four women were assigned to a control group after delivery. Continuous labor support significantly reduced the rate of cesarean section deliveries (supported group, 8%; observed group, 13%; and control group, 18%) and forceps deliveries. Epidural anesthesia for spontaneous vaginal deliveries varied across the three groups (supported group, 7.8%; observed group, 22.6%; and control group, 55.3%). Oxytocin use, duration of labor, prolonged infant hospitalization, and maternal fever followed a similar pattern. The beneficial effects of labor support underscore the need for a review of current obstetric practices.

(*JAMA*. 1991;265:2197-2201)

PROMISING results from two studies in Guatemala demonstrated that the continuous presence of a supportive female companion during labor and delivery could significantly reduce the need for cesarean section.[1,2] Additionally, providing a labor companion resulted in fewer obstetric interventions, shorter labors, and fewer perinatal problems in the fetuses and neonates. The possibility that similar results could occur in the technologically advanced obstetric units in US hospitals is important because of the potential financial, physical, and emotional consequences. In particular, a low-cost, low-risk intervention that reduces the extremely high cesarean section rates in US hospitals could have a major impact on obstetric practices.[3-6]

See also pp 2202 and 2236.

Compared with the obstetric practices in place at the time of the Guatemalan studies, current US obstetric practices provide considerably more control over the process and progress of labor. Specifically, electronic fetal monitoring is routinely used to evaluate the condition of the fetus. Epidural anesthesia is widely available for pain relief. Oxytocin and artificial rupture of membranes are used frequently to augment labor. Do these technological interventions dilute or override the influence of continuous support during labor? If effects similar to those in Guatemala could be demonstrated in a US hospital, the implications for the quality and cost of perinatal health care could be substantial. The present randomized controlled study examined the medical effects of support during labor in a US teaching hospital that had full availability of contemporary obstetric techniques and equipment.

METHODS

Setting

The study was conducted at Jefferson Davis Hospital in Houston, Tex, a public hospital providing care for a low-income Hispanic, black, and white population, with care provided by the Department of Obstetrics and Gynecology, Baylor College of Medicine. All patients were in the staff service, with care directed by English-speaking residents who followed established obstetric protocol. At this obstetric teaching facility, companions were not routinely permitted to be with a woman during labor and delivery because most patients labored in a 12-bed ward that had insufficient privacy to allow visitors. Due to the volume of patients and the number of hospital personnel involved, patients were usually in the presence of strangers and did not receive continuous support from the staff. Interpreters were available if needed to translate conversation between Hispanic patients and non–Spanish-speaking medical personnel.

Participants

Participants were nulliparous women ranging in age from 13 to 34 years, with single-gestation, term, uncomplicated pregnancies. These women were asked to participate in the study after they were admitted to the hospital in active labor. Because of the difficulty in precisely measuring cervical dilatation, women were admitted to the study with initial cervical dilatation of either 3 or 4 cm. Women with pregnancy-induced hypertension, breech presentation, gestational diabetes, a history of drug or alcohol abuse, or other high risk conditions were not enrolled. The 412 women who met the criteria and consented to be in the study were randomly assigned to a supported group (n = 212) or an observed group (n = 200). After 255 participants were enrolled, a control group (n = 204) was added to the design to examine potential supportive effects of the observer on women in the observed group. Following delivery, patients were asked to be in the control

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group if they had been admitted to the hospital on days that *doulas* were already assigned to patients and if hospital chart information indicated that they met the enrollment criteria.

Procedures

Indications for specific procedures were standardized prior to the start of the study and were consistent with the routine obstetric protocol at Jefferson Davis Hospital at that time. Patients were confined to bed as soon as possible after admission to allow for electronic fetal monitoring. When admission blood work was completed, an intravenous infusion was started for each patient. Artificial rupture of membranes was done routinely after 5 cm of cervical dilatation so that internal monitoring could be obtained if needed. For the management of pain, butorphanol tartrate (Stadol) or epidural anesthesia was used at the patient's request or if, in the judgment of nursing and/or medical staff, the patient was unable to deal with her pain, as evidenced by vocalization, restlessness, or lack of cooperation between contractions. Epidural anesthesia was considered if the patient was not near delivery. Epidural anesthesia was also used for operative deliveries. Oxytocin was administered following failure to progress in effacement or dilatation after 1 1/2 hours when uterine inertia was thought to be the cause. Oxytocin was also given to patients with ruptured membranes if cervical dilatation had not reached 5 cm 12 hours after rupture. Patients did not have a labor coach, although brief visits by family members were permitted if the labor area was not too busy. Due to the crowded conditions in the postpartum units, mothers with an uncomplicated hospital course went home within 24 hours of delivery, and infants were routinely discharged within 48 hours of delivery.

Doula Intervention

The Greek word *doula* refers to an experienced woman who guides and assists a new mother in her infant-care tasks. In the current study the term is used to describe the women who provided continuous labor support to the participants in the supported group. Eleven women served as *doulas* over the course of the study, but the majority (82%) of the supported deliveries were accompanied by one of four *doulas*. The *doulas* ranged in age from 22 to 55 years, were fluent in both Spanish and English, had experienced a normal labor and vaginal delivery with a good outcome, and were comfortable dealing with patients and medical staff from diverse backgrounds. All *doulas* went through a 3-week training period, during which they became familiar with the course of normal and abnormal labor, obstetric procedures, and hospital policies as well as a wide variety of supportive techniques. While *doula* support was intended to be individualized to meet the needs of each patient, the *doulas* met with one another almost daily and with the principal investigator weekly throughout the study to ensure a degree of consistency in their methods of supporting patients. *Doulas* were paid from research funds on an hourly basis for the time they were present in the hospital, for an average cost of $200 per patient supported.

Doula intervention was provided for women randomly assigned to the supported group after informed consent was obtained. The *doula* met the study participants for the first time after hospital admission. The *doula* stayed at her assigned patient's bedside from admission through delivery, soothing and touching her patient and giving encouragement. In addition, the *doula* explained to her patient what was occurring during labor and what was likely to happen next. When necessary, she translated medical instructions for the patient. The *doula* also kept a written record of staff contacts, interventions, and procedures. Women in the observed group received routine hospital care, and an observer kept a record of staff contacts, interactions, and procedures. The observer never spoke to the laboring woman and attempted to remain as inconspicuous as possible in the midst of the large number of labor room personnel.

Data

Demographic data (race, annual family income, marital status, mother's and father's ages and education levels, amount of prenatal care, and attendance at childbirth education classes) were obtained from interviews with the participants within 24 hours after delivery. Prenatal care was categorized as none, minimal (first visit after 27 weeks or fewer than four visits), moderate (first visit between 13 and 27 weeks, with at least four visits), or optimal (first visit before 13 weeks, with at least six visits).

Intrapartum data (cervical dilatation at the time of admission and minutes of attention from hospital staff for participants in the supported and observed groups) were obtained from hospital charts or from the research labor record. Newborn data (birth weight, length, and head circumference; gestational age at delivery; and sex) were obtained from the infants' hospital charts.

Intrapartum and newborn outcome data were obtained from hospital charts or the research labor record. The intrapartum outcome data were defined as follows: anesthesia (epidural, spinal, general, pudendal, local, or none), narcotic analgesia (yes/no, number of 2-mg doses), oxytocin (yes/no), duration of labor (from time of admission at 3 or 4 cm of cervical dilatation to delivery), delivery type (cesarean section, forceps delivery, or spontaneous vaginal delivery), and maternal fever (temperature $\geq$37.8°C at any time during labor). The newborn outcome data were 1- and 5-minute Apgar scores, hospital course (normal was $\leq$48 hours, abnormal was >48 hours), and the presence or absence of neonatal problems (jaundice requiring phototherapy, tachypnea, meconium aspiration, or sepsis evaluation).

RESULTS

All women who agreed to participate in the study agreed to do so. However, a total of 14 women who agreed to participate were not included in the study. (Four were transferred to the birth center because of staffing limitations. Five were sent home because they were not in active labor. Three withdrew from the study. One had an undetected breech presentation. One had interrupted observations.)

The supported, observed, and control groups did not differ in race, marital status, mother's age, father's education, annual family income, and prenatal care (Table 1). Mother's education in the supported group did not differ significantly from that in the observed or control groups. However, mother's education was slightly lower in the observed group than in the control group ($P<.05$). Ninety-three percent of the women in the study reported receiving some prenatal care. The women in the control group had significantly more prenatal childbirth education ($P<.0006$), although only 15% of the sample attended childbirth education classes, and 40% of these women had attended only one class. The mean gestational age of the infants was 39.8 weeks (SD, 0.96 weeks), with a mean birth weight of 3268 g (SD, 423.5 g), mean length of 50 cm (SD, 3.9 cm), and mean head circumference of 34 cm (SD, 2.7 cm). The three groups did not differ in gestational age, neonatal sex, or birth measurements. There were no stillbirths, neonatal deaths, or detectable malformations in the sample. All participants were enrolled with an initial cervical dilatation between 3 and 4 cm. The proportion of patients with an initial

cervical dilatation of 4 cm differed among the three groups (supported group, 84%; observed group, 83%; and control group, 75%; $P = .04$). Hospital staff interacted with patients for an average of 21% of the time patients were in labor (defined as minutes of contact with staff divided by total minutes in labor), and the amount of interaction did not differ between the supported and observed groups. The mean proportion of time a family member was present was greater in the observed group than in the supported group (5.6% vs 3.7% of total minutes in labor, $P<.02$). (Because the control group participants were enrolled after delivery, minutes of staff and family time could not be collected.)

Anesthesia/Analgesia

Because of the expected association between delivery type and anesthesia use, forceps and cesarean deliveries were excluded in this analysis to allow a clearer analysis of the effect of labor support on anesthesia use. Among participants who had spontaneous vaginal deliveries, epidural anesthesia was used in 14 (7.8%) of 179 women in the supported group, 31 (22.6%) of 137 women in the observed group, and 68 (55.3%) of 123 women in the control group ($\chi^2[2] = 86.9$, $P<.0001$). The use of pudendal anesthesia for spontaneous vaginal deliveries did not differ significantly across the three groups (4% for the supported group and 2% for both the observed and control groups). In addition, regardless of the type of delivery, there were no significant differences across the three groups in the number of women who received butorphanol tartrate for pain (21.7% in the supported group, 28.0% in the observed group, and 25.5% in the control group) or in the mean number of 2-mg doses given (mean, 1.2 doses). No other narcotic or nonnarcotic analgesia was administered.

Oxytocin Use

The use of oxytocin to augment labor differed across the three groups when all delivery types were considered (Table 2). Among women who went on to deliver vaginally without forceps, oxytocin use also differed across the three groups. When forceps or cesarean deliveries were considered alone, the difference in the percentage of women receiving oxytocin across the three groups did not achieve statistical significance.

Duration of Labor

The mean duration of labor differed ($P = .0001$) across the three groups for all delivery types combined, with the supported group having the shortest duration of labor (Table 3). When only vaginal deliveries without forceps were considered, the mean duration of labor differed across the three groups. Among women who had spontaneous vaginal deliveries without labor augmentation by oxytocin, the mean duration of labor differed across the three groups. There were no statistically significant differences in mean duration of labor across the three groups for unmedicated, nonaugmented, unanesthetized, spontaneous vaginal deliveries. The pattern of results in the analyses of duration of labor did not change when

Table 1.—Demographic Characteristics

	Group		
	Supported (n = 212)	Observed (n = 200)	Control (n = 204)
Race, No. (%)			
Hispanic	136 (64)	129 (65)*	116 (57)*
Black	53 (25)	50 (25)	56 (27)
White	21 (10)	21 (11)	29 (14)
Asian	2 (1)	0	3 (1)
Marital status, No. (%)			
Single	105 (50)	109 (55)*	115 (56)
Married	107 (50)	91 (46)	89 (44)
Income level, No. (%)			
<$8000	105 (50)*	115 (58)*	108 (53)
$8000-$15 000	65 (31)	54 (27)	44 (22)
>$15 000	15 (7)	9 (5)	5 (2)
Unreported	27 (13)	22 (11)	47 (23)
Prenatal care, No. (%)			
Optimal	43 (20)	40 (20)*	57 (28)
Moderate	86 (41)	85 (43)	83 (41)
Minimal	63 (30)	61 (31)	55 (27)
None	18 (8)	12 (6)	7 (3)
Unknown	2 (1)	2 (1)	2 (1)
Childbirth education, No. (%)†			
Yes	19 (9)	30 (15)	46 (23)
No	193 (91)	170 (85)	158 (77)
Mother's age, y			
Mean (SD)	19.9 (3.5)	19.7 (3.6)	20.3 (3.8)
Range	14-34	14-34	13-33
Father's age, y			
Mean (SD)	23.6 (5.5)	22.9 (4.7)	23.6 (4.9)
Range	15-50	16-40	15-42
No data, No. of participants	5	4	2
Mother's education, y‡			
Mean (SD)	9.5 (3.1)	9.2 (2.8)	10.2 (2.8)
No data, No. of participants	2	1	2
Father's education, y			
Mean (SD)	9.9 (3.4)	10.0 (3.0)	10.5 (2.9)
No data, No. of participants	23	23	19
Initial dilatation, No. (%)§			
3 cm	34 (16)	34 (17)	51 (25)
4 cm	178 (84)	166 (83)	153 (75)

*Percentages do not add to 100% because of rounding.
†$\chi^2(2) = 14.8$, $P = .0006$.
‡$F(2, 608) = 3.7$, $P = .03$.
§$\chi^2(2) = 6.4$, $P = .04$.

Table 2.—Oxytocin Use

Type of Delivery	No. of Participants	Oxytocin Use by Group, No. (%)		
		Supported	Observed	Control
Total*	**616**	**36/212** (17.0)	**46/200** (23.0)	**89/204** (43.6)
Spontaneous vaginal†	439	25/179 (14.0)	18/137 (13.1)	46/123 (37.4)
Forceps	97	6/16 (37.5)	12/37 (32.4)	20/44 (45.5)
Cesarean section‡	80	5/17 (29.4)	16/26 (61.5)	23/37 (62.2)

*$\chi^2(2) = 40.2$, $P<.0001$. $P<.0001$ for the supported group vs the control group and for the observed group vs the control group.
†$\chi^2(2) = 31.0$, $P<.0001$. $P<.0001$ for the supported group vs the control group and for the observed group vs the control group.
‡$\chi^2(2) = 5.7$, $P = .06$.

Table 3.—Duration of Labor

Type of Delivery	Duration of Labor by Group, h					
	Supported		Observed		Control	
	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n
All deliveries*	7.4 (3.8)	212	8.4 (4.2)	200	9.4 (4.2)	204
Vaginal, no forceps†	6.8 (3.5)	179	7.3 (3.1)	137	8.2 (3.9)	123
Spontaneous vaginal, no oxytocin‡	6.1 (3.0)	154	7.1 (3.1)	119	6.8 (3.3)	77
Vaginal, no medications	5.5 (2.8)	116	6.3 (2.5)	62	5.3 (2.7)	25

*$F(2, 613) = 12.8$, $P = .0001$. $P < .02$ for the supported group vs the observed group, the supported group vs the control group, and the observed group vs the control group.
†$F(2, 436) = 5.5$, $P = .004$. $P = .002$ for the supported group vs the control group. $P = .03$ for the observed group vs the control group.
‡$F(2, 347) = 3.3$, $P = .04$. $P = .01$ for the supported group vs the observed group.

Table 4.—Neonatal Course

	No. (%) by Group		
	Supported (n=212)	Observed (n=200)	Control (n=204)
Abnormal course (remained in the hospital >48 h for medical reason)*	22 (10.4)	34 (17.0)	49 (24.0)
Sepsis evaluations (as the reason for abnormal course)†	9 (4.2)	19 (9.5)	30 (14.7)
Maternal fever (as the indication for sepsis evaluation)‡	3 (1.4)	14 (7.0)	21 (10.3)

*$\chi^2(2) = 13.7$, $P = .001$. $P = .05$ for the supported group vs the observed group. $P = .001$ for the supported group vs the control group.
†$\chi^2(2) = 13.3$, $P = .001$. $P = .05$ for the supported group vs the observed group. $P = .0005$ for the supported group vs the control group.
‡$\chi^2(2) = 14.5$, $P = .0007$. $P = .009$ for the supported group vs the observed group. $P = .002$ for the supported group vs the control group.

initial cervical dilatation (3 vs 4 cm) was used as a covariate.

Type of Delivery

The provision of social support also had an effect on the type of delivery. Thirty-seven (18%) of the 204 patients in the control group and 26 (13%) of the 200 patients in the observed group required a cesarean section for delivery, in contrast to 17 (8%) of the 212 patients in the supported group ($\chi^2[2] = 9.4$, $P = .009$; $P = .004$ for the supported group vs the control group). The rate of forceps use in vaginal deliveries also differed across the three groups ($P < .0001$), with the supported group having significantly fewer forceps deliveries (8.2%) than either the observed (21.3%) or control (26.3%) group ($P = .0006$ for both pairwise comparisons).

Neonatal Outcome

The proportion of infants remaining in the hospital for more than 48 hours because of neonatal problems differed across the three groups, with fewer infants born to mothers in the supported group requiring a prolonged hospital stay (Table 4). The reasons for the prolonged stays were distributed similarly across the three groups, with the exception of the number of infants kept in the hospital for a sepsis evaluation. Both the observed and control groups required more sepsis evaluations than the supported group. Most sepsis evaluations in the observed (14 [74%] of 19) and control (21 [70%] of 30) groups were performed because of maternal fever, and maternal fever was more common in these two groups than in the supported group. In the entire sample, maternal fever was associated with longer labor (11.6 ± 4.3 vs 8.2 ± 4.1 hours, $P < .001$) and more vaginal examinations (7 ± 2.1 vs 6 ± 2.2, $P = .002$). Anesthesia use also differed between febrile and afebrile patients, with significantly more women in the maternal fever group receiving epidural anesthesia (55.3% vs 32.2%, $P = .004$).

Timing of Interventions

The mean elapsed time between admission to the study and administration of epidural anesthesia for pain during labor differed across the three groups, with the control group receiving epidural anesthesia sooner than the supported group (control group, 6.2 hours after admission; supported group, 9.5 hours after admission; $P < .005$). Oxytocin was also administered sooner to the control group, with the mean elapsed time between admission and oxytocin administration differing across all three groups (supported group, 7.5 hours; observed group, 6.0 hours; and control group, 4.9 hours; $P < .0001$). Timing of cesarean section differed only between the supported and control groups (8.9 vs 11.8 hours, $P = .02$). Indications for cesarean section differed across the three groups, with the control group having more cesarean deliveries for "failure to progress" than either the supported or observed group (supported group, five of 17; observed group, 10 of 26; and control group, 25 of 37). The three groups did not differ in the number of cesarean deliveries performed because of fetal distress, cephalopelvic disproportion, or other indications.

COMMENT

The provision of support during labor in controlled trials has resulted in a consistent pattern of outcomes favorable to mothers and infants both in a modern US hospital and in Guatemala a decade ago. Unlike the participants in these studies, however, most women in US hospitals are now accompanied during labor by their spouses or male partners.[7] Women rate their partners' presence during labor and delivery as extremely important and helpful, but the partners' actual effect on the course of labor has not been adequately assessed.[7] While *doulas* and male partners fulfill similar roles for laboring women, the question remains whether the male partner has the same positive impact on perinatal outcome.

Recent research by Bertsch et al[8] indicates that male partners and *doulas* differed in the support that they provided to laboring women (while the laboring women were experiencing discomfort). For example, when all forms of touching (rubbing, stroking, clutching, and holding) by *doulas* and male partners were considered, on average the *doulas* touched the laboring women more than 95% of the time compared with less than 20% by the male partners. In addition, male partners chose to be present for less time during labor and to be close to the mother less often than the *doulas*. Studies have shown that under some circumstances the presence of the male partner reduces the pain medications given to the mother, but no randomized study of the presence of male partners during labor has reported any decrease in the duration of labor, the use of forceps, the rate of cesarean section, or the use of oxytocin.[7] Because of his personal involvement and lack of experience with labor, it is uncertain whether a male partner can have the same impact on perinatal outcomes as a *doula*.

The mechanism by which support influences labor, delivery, and perinatal outcome is not fully understood. The

fact that an observer who stayed in the labor room at some distance from the mother during the entire labor had a significant effect on obstetrical outcome measures even though she did not speak with the mother may provide a clue to the needs of a woman during labor. In trying to dissect the process by which the *doula* has an effect on labor, it is impressive that part of her effect may be solely her presence, without intimate interactions such as talking and touching. Even in a busy, well-staffed labor area, a mother may feel alone and needy. Some of the positive influence of the *doula* and the attentive (but noninteractive) observer could result from their effect on the hospital staff. The presence of a *doula* or observer clearly indicated that the patient was a participant in a research project. As a result, the staff might have followed hospital protocol more closely for the use of obstetric interventions such as anesthesia and oxytocin, which could explain the decreased use of these agents in the supported and observed groups and the shorter elapsed time between admission and the administration of such agents in the control group.[9]

The association between acute maternal anxiety and disturbances in the progress of labor is strongly suggested by studies of human and animal mothers.[10-14] Circulating catecholamines may be the mechanism by which anxiety influences the course of labor. For example, in humans, an increased level of catecholamines as a result of maternal anxiety has been shown to decrease uterine contractility.[10,11] In animal studies, uterine and placental blood flow reduction resulting in fetal distress has also been related to increased catecholamine levels.[12-14] Thus, a supportive companion may reduce catecholamine levels by reducing maternal anxiety and facilitating uterine contractile activity and uterine blood flow. A *doula* may decrease maternal anxiety by her interactions with the laboring woman—her constant presence, physical touch, reassurance, explanations, and anticipatory guidance. These aspects of *doula* support may make the laboring woman feel safer and calmer, needing less obstetric intervention for labor to proceed smoothly. While some obstetric interventions are necessary and have a positive impact, complications may arise. For example, obstetric pain relief during labor in the form of epidural anesthesia has recently been linked with maternal fever.[15] In the present study, the differing rates of epidural anesthesia use across the three groups may explain the group differences in maternal fever and associated sepsis evaluations. In addition, differences in epidural anesthesia use across the three groups may have played a role in the proportion of cesarean deliveries, as epidural anesthesia has been related to increased cesarean section rates.[16]

The long-term effects of support during labor on maternal-infant attachment, maternal self-esteem, and postpartum depression are areas requiring further investigation. However, the impact of labor support on maternal and infant health is apparent. Providing labor support decreases the need for obstetric interventions, such as oxytocin augmentation, epidural anesthesia, and cesarean deliveries, reducing the possibility of complications. If the incidence of maternal fever during labor is reduced, fewer infants will be kept in the hospital for sepsis evaluations. Thus, fewer infants will be exposed to nosocomial infections, fewer mother-infant pairs will be separated shortly after birth, and fewer mothers may discontinue breast-feeding.

Finally, a reduction in medical costs would be realized by the addition of a supportive companion for all laboring women.[17,18] Anesthesia costs would be significantly lower as more suported women labored and delivered with local or no anesthesia. Expenses would be reduced because fewer infants born to supported women would require an extended hospital stay. The greatest reduction in medical costs would occur with the decrease in cesarean deliveries and the accompanying reduction in operating room costs, decreased need for skilled delivery and postpartum staff, less use of medications, and shorter maternal hospital stays.

While there may be financial savings, the physical and emotional benefits of *doula* support for the welfare of mothers and infants make a compelling case for the review of current obstetric practices. The current study is the first demonstration in a technologically sophisticated US hospital of a behavioral intervention that significantly reduced cesarean section rates, forceps deliveries, need for oxytocin, and use of epidural anesthesia. In addition, the presence of a labor companion in this setting shortened labor and decreased the incidence of maternal fever. In light of the high level of obstetric technology used for the women in the present study, the results of this simple and noninvasive intervention are impressive. Labor support is centuries old, but its advantages have now been validated in three controlled studies and its positive benefits should not be overlooked in the trend toward more and increasingly complex technology. For those who provide care for mothers during labor, the challenge is to turn to obstetric technology only when necessary, relying instead on the practice of continuous labor support to help the birth process follow its natural, normal course.

This research was made possible in part by grant HD 16915 to assess Perinatal Effects of Support for Couples During Labor, awarded by the National Institute of Child Health and Human Development, Bethesda, Md; by the Arthur Vining Davis Foundations, Jacksonville, Fla; and by the Pittway Corporation Charitable Foundations, Chicago, Ill.

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