The authors analyzed mode of delivery and resuscitation rates in a group of 1410 newborns. Comparisons were made between vaginal and cesarean deliveries, and these were further stratified with regard to whether cesarean section was performed as a routine elective procedure or whether an indication existed that necessitated operative delivery of the child (nonelective). A significantly increased risk for resuscitation was found in the cesarean section group overall when compared to vaginal deliveries. The risk of resuscitation after repeat elective cesarean section was low, and this risk increased significantly in the nonelective cesarean delivery group. As the risk of resuscitation after elective repeat cesarean sections is not significantly increased, it may not be necessary that a pediatrician be present at these deliveries.

(Key words: childbirth, pediatrics, cesarean section, vaginal delivery)

It is often routine to expect the presence of a pediatrician at cesarean deliveries in most hospitals in the United States, as it is believed that this mode of delivery poses increased risks to the newborn—risks that may result in the need for aggressive resuscitation. In addition, it may be impractical for the delivering physician to leave the mother to attend to the needs of the baby if resuscitation becomes necessary. Despite multiple reports indicating that the risk to the newborn is low in repeat elective cesarean sections in which there is no evidence for fetal distress,1-6 there has been little change in clinical practice.

In anticipation of neonatal depression requiring resuscitation, all hospitals in the Fort Worth, Texas, area require that a pediatrician, neonatologist, or nursery nurse practitioner (care provider for the newborn) attend all nonelective operative deliveries. Most hospitals have a qualified nursery or obstetrical nurse attend elective cesarean sections and vaginal deliveries in which no antenatal distress has been noted. Some require the presence of a physician or nurse practitioner to care for the newborn at all operative deliveries. Attendance by a physician or nurse practitioner at vaginal deliveries is requested by the obstetrician if the presence of maternal or fetal distress or meconium-stained amniotic fluid is noted before delivery. This retrospective study of 1410 deliveries over a 2-year period analyzed the rate of resuscitation after vaginal and cesarean section deliveries. Resuscitation was defined as the use of positive pressure ventilation via bag and mask with oxygen or cardiopulmonary resuscitation, which represent clear indications of significant neonatal distress.

The American Academy of Pediatrics and the American College of Obstetricians and Gynecologists state in Guidelines for Perinatal Care that “elective repeat cesarean delivery does not establish a high-risk situation for the neonate. However, a qualified person who is skilled in neonatal resuscitation should be in the operative delivery room, with all equipment needed for neonatal resuscitation, to care for the neonate. A second individual to assist in resuscitation should be readily available.”7 In addition, “A physician for the neonate need not be present at a delivery, provided that no complications are anticipated and another skilled individual is present to care for the neonate.”7

Methods
A total of 1410 deliveries during 1997 and 1998 were reviewed. The study group consisted of newborns less than 1 hour of age and represented a wide heterogeneity with regard to race and socioeconomic background. Data gathered included the type of delivery, the indication for all cesarean deliveries, and resuscitative treatments needed by the baby. Cesarean sections were differentiated based on (1) presence of fetal or maternal indications necessitating operative delivery (nonelective), and (2) repeat elective sections, whether in labor or not, but without evidence for fetal distress.

Fetal indications for operative delivery included all causes resulting in fetal distress. Fetal distress was determined by the presence of fetal bradycardia (heart rate less than 100 beats/min), persistent late decelerations, poor beat-to-beat variability, or other factors as noted on fetal monitoring. Maternal indications for cesarean section included failure of labor to progress, failed vacuum delivery, malpresentations (breech and transverse lies), placenta previa, and preeclampsia. Statistical analysis compared rates of resuscitation in the two cesarean groups to the vaginal delivery group using \( \chi^2 \) analysis.
Results
Of the 1410 deliveries, 279 were by cesarean section and 1131 were vaginal deliveries. There were 169 nonelective cesarean sections performed and 110 repeat elective cesarean sections (Table 1).

A total of 61 resuscitations were performed. Of these, 40 were necessary after vaginal delivery and 21 were performed after cesarean section. Of the resuscitations performed after cesarean section, 16 occurred in the nonelective group and only 5 in the repeat section group (Table 2). Of the 40 resuscitations occurring after vaginal delivery, 24 (60%) had no known predisposing factor noted before delivery. The other 16 resuscitations after vaginal delivery followed instrument-assisted deliveries (vacuum extraction, 8; forceps, 1), the presence of a nuchal cord (4), twin delivery (2), or after narcotic administration to the mother (1). No neonates in any group required cardiopulmonary resuscitation or advanced drug management. There were no deaths in this study group.

A significant difference was found when comparing the rate of resuscitation after cesarean section to the rate after vaginal delivery. An increased risk of resuscitation was demonstrated in the cesarean section group as a whole (uncorrected \( P \) value, .0033; odds ratio, 2.22). This difference was due to an increased risk in the nonelective cesarean section group (uncorrected \( P \) value, .0004; odds ratio, 2.85) when compared to the elective group (uncorrected \( P \) value, .59; odds ratio, 1.30). Because of the small sample size of the repeat cesarean section group, risk was reevaluated via the Fisher exact method and compared favorably (2-tailed \( P \) value, .59).

These results are expected because the nonelective cesarean section group presented with fetal distress, maternal distress, or both, predisposing the newborn to perinatal depression and the need for resuscitation. The elective group did not present with signs of fetal or maternal distress, and this is reflected in a lower rate of perinatal depression requiring resuscitation. Most resuscitations after vaginal delivery were unanticipated and performed by nursing personnel.

Discussion
It is evident that certain maternal and fetal conditions develop during the labor and delivery process which require the presence of an individual skilled in the resuscitation of the newborn.
The obstetrician should request the attendance of a pediatrician or nurse practitioner at all deliveries when conditions exist that place the newborn at risk. Each hospital and their pediatrics and obstetrics/gynecology departments must develop policies that define the circumstances requiring pediatric attendance at cesarean sections as well as define the responsibilities of the staff in attendance at deliveries. Adequate training must be provided to all staff involved in the delivery process. The most appropriate training vehicle available today is the Neonatal Resuscitation Program sponsored by the American Heart Association and the American Academy of Pediatrics. Appropriate equipment must be present in each delivery suite and be well maintained.

It is clear that when a cesarean section is performed under elective circumstances, the risk to the newborn is low and compares favorably to the risk seen after vaginal delivery. Many reports that agree with this conclusion have been published. A physician or nurse practitioner is not routinely present during most vaginal deliveries and should not be necessary during elective cesarean sections. The expense and time expended by the physician or nurse practitioner is significant, and in today’s managed care environment it may be more practical to have the newborn care giver attend only those deliveries for which the risk of resuscitation is greatest, ie, nonelective cesareans and vaginal deliveries with identified risk factors. The presence of properly trained nursery or obstetrical nurses at most vaginal deliveries and elective cesareans is acceptable as long as appropriate backup is readily available in the event that unforeseen circumstances arise.

Acknowledgment
The authors thank John Licciardone, DO, MBA, Texas College of Osteopathic Medicine, University of North Texas Health Science Center at Fort Worth, for his assistance in providing the statistical analysis for this study.

References