

[“Maternal and Perinatal Outcomes Associated with a Trial of Labor after Prior Cesarean Delivery” \(2004\), Mark B. Landon et al. \[1\]](#)

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In 2004 Mark Landon and his colleagues in the United States published “Maternal and Perinatal Outcomes Associated with a Trial of Labor after Prior Cesarean Delivery,” which compared the risks of vaginal delivery and cesarean section for delivery of a [fetus](#) [2] after a previous cesarean delivery. During a cesarean section, a physician surgically removes a [fetus](#) [2] from a pregnant woman through an incision in her abdomen. By the late 1900s, most clinical guidelines viewed attempting a vaginal birth after a previous cesarean delivery as a reasonable option for most women. Yet, physicians often noticed an increased risk of uterine ruptures as more patients underwent vaginal deliveries following previous cesarean sections. As such, many physicians continued to recommend cesarean deliveries for women who had a past cesarean section. Landon and his team evaluated the risks of both delivery methods and published their results in the *New England Journal of Medicine* in 2004. In “Maternal and Perinatal Outcomes,” the authors found that there was no significant difference between the risks of vaginal birth after cesarean and repeat cesarean sections, providing more evidence for clinical guidelines recommending vaginal births after cesarean sections.

All the authors of “Maternal and Perinatal Outcomes” researched in the fields of maternal and fetal medicine. Landon was a physician who specialized in the female reproductive system, including labor and delivery of infants. Landon’s research focused on many aspects of maternal and fetal medicine, including the impact high blood pressure and diabetes have on [pregnancy](#) [3]. He and his team developed “Maternal and Perinatal Outcomes” in conjunction with the National Institute of Child Health and Human Development Maternal–Fetal Medicine Units Network in Rockville, Maryland. That [organization](#) [4], established in 1986, helped to design clinical trials in maternal-fetal medicine with the goal to reduce maternal, fetal, and infant morbidity. Landon and his team wrote “Maternal and Perinatal Outcomes” to report the results of a study that evaluated the risks to fetuses and pregnant women’s bodies when women deliver a [fetus](#) [2] vaginally after they had a cesarean section for a previous [fetus](#) [2].

Clinical recommendations for post-cesarean delivery methods were inconsistent during the late 1900s. Prior to the late 1900s, physicians recommended repeat cesarean deliveries for pregnant women who had delivered a previous [fetus](#) [2] via cesarean section. However, by the late 1990s, public health officials and physicians became concerned as the rate of cesarean sections rose. That led medical societies to formulate new clinical guidelines, which recommended vaginal births after cesarean sections, also known as VBAC. However, physicians observed an increase in frequency of uterine rupture and other complications as women underwent vaginal deliveries following a previous cesarean section. A uterine rupture is a tear in the wall of the [uterus](#) [5], which can cause bleeding, infection, and death. Physicians noted that uterine ruptures often occurred along the line of the previous cesarean incision scar. Physician’s perceived risk of uterine ruptures in women who underwent vaginal deliveries led to a decrease in vaginal deliveries and conflicting recommendations.

The study presented in “Maternal and Perinatal Outcomes” consisted of an observational review of all cases of vaginal deliveries following a previous cesarean and repeat cesarean sections at nineteen hospitals throughout the United States. The authors originally developed a three-year study, but extended the trial another year to collect more patient data. Landon and his team aimed to quantify the risks of both delivery methods to formulate clear, universal clinical guidelines.

Landon and his associates organize “Maternal and Perinatal Outcomes” into four sections. They begin by introducing the [evolution](#) [6] of physician recommendations for the safest delivery method after previous cesarean section. In the next section, “Methods,” the authors describe the study design, including how they collected data and separated cases into vaginal delivery and repeat cesarean cases. In the “Results” section, the authors discuss the complications affecting the pregnant women and the infant, before and after birth. The authors include several tables detailing the frequency of outcomes such as uterine rupture, infant brain damage, and death. In the final section, “Discussion,” the authors identify trends associated with each delivery method, but assert that there is little evidence to suggest that there is a greater risk associated with either delivery method.

In their introduction, the authors explain the evolving recommendations for vaginal deliveries following cesarean section and repeat cesarean section throughout the last decade. They walk through the concern for uterine rupture and death associated with

both delivery methods and explain that previous research on the topic has been one-sided. The previous research typically focused on the risks of each delivery method individually, instead of in comparison with each other. The authors emphasize that new research to compare each delivery method is needed to produce proper recommendations for clinical counseling.

In the second section of “Maternal and Perinatal Outcomes,” Landon and his team detail their methods of data collection for the research. They state that they had complete access to patient charts from the nineteen hospitals included their study. The researchers trained a group of individuals to enter the hospital databases each day and collect information from cases that qualified for their study. They clarify that by collecting charts daily, the researchers could contact the physicians treating the patients for more details regarding the birth and complications of delivery. Landon and his associates explain that cases included in the study involved pregnant women who previously had given birth via cesarean section. The authors excluded any cases in which the woman had twins or other multiple births, delivered a fetus^[2] before twenty weeks’ gestation^[7], or delivered an infant weighing less than 1.1 pound. Those cases were considered high risk and abnormal and therefore should not be considered in making general recommendations. Besides the details of the current pregnancy^[3], Landon and his associates state that they were also interested in the demographic data of the patients, the details of their previous pregnancies, and the infant outcomes up to 120 days after delivery.

As their methods section continues, the authors explain how they evaluated the collected data on maternal and fetal outcomes of each delivery method. After collecting the data, they classified the patients into two groups, those who underwent vaginal delivery and those who underwent a repeated cesarean delivery. The authors explain that the outcomes of those two groups were ultimately compared to evaluate which posed a greater risk to the pregnant woman and the fetus^[2].

The authors of the study present the risk comparison of the two delivery methods in section titled “Results.” In the first subsection of the results, titled “Delivery,” Landon and his team discuss the occurrence rates of each type of birth. The authors describe that almost 46,000 women qualified for their study. Thirty-nine percent of the women attempted a vaginal delivery, thirty-four percent had an elective cesarean delivery, and the remaining twenty-six percent had unscheduled repeat cesarean deliveries. The data show that the majority of the patients included in the study completed a repeat cesarean section, as the authors suspected. However, the authors explain that there was a large variation in the rates of vaginal delivery at the different hospitals that participated in the study, ranging from eighteen to sixty-three percent of the deliveries. The researchers also note that the rate of vaginal delivery decreased from the start to the end of their study period. The authors argue that the decrease in vaginal delivery demonstrates the lack of clarity regarding the best practices for delivery method and could indicate that there were different standards of care at each hospital. In the article’s first table, the authors present the characteristics of the women undergoing trial of labor. The team writes that seventy-three percent of the attempts at vaginal delivery were normal, successful deliveries. They also explain that the women who underwent vaginal delivery were more likely to have undergone a successful previous vaginal delivery. Therefore, those women and their physicians may have been more confident in the success and safety of that delivery method, instead of electing a cesarean section which many recommend.

In the second section of the results, titled “Maternal Complications,” Landon and his co-authors describe the incidence of maternal complications for vaginal deliveries and repeat cesarean groups. The authors write that 124 women in their study experienced uterine rupture during vaginal deliveries, but that the majority of those ruptures occurred when vaginal delivery was not successful. Landon and the team state that there was a greater incidence of uterine rupture in women who had a prior cesarean section with a low vertical incision in the abdomen than those with a low transverse incision in the abdomen. The authors state that those numbers indicate that transverse incisions could be safer for women who plan to have future pregnancies. The authors also mention that uterine rupture was more common when a woman’s labor was induced instead of proceeding naturally. Finally, the authors explain that the rate of maternal death was not significantly different between the vaginal delivery group and cesarean delivery group. Therefore, they conclude that there is no increased risk of maternal death with either delivery method.

The authors then move on to discuss the infant outcomes for both groups in the results section titled “Perinatal Complications.” The researchers write that the frequency of stillbirth, infant death, and infant hypoxic-ischemic encephalopathy or brain injury due to lack of oxygen, were greater for patients who underwent vaginal delivery than those who underwent elective repeated cesarean delivery. However, they highlight that although there were more deaths after birth for the vaginal delivery group, there was not a great difference between the total number of fetal and infant deaths between the two groups. Therefore, the research team concluded that there is only a small increased risk of fetal death in vaginal delivery.

In their “Discussion” section, the authors recommend that physicians counsel women on the risk of uterine rupture specifically when discussing risks and benefits of delivery plans. They further explain that infant hypoxic-ischemic encephalopathy, a consequence of uterine rupture, only occurred in their study during a vaginal delivery, never during a repeat cesarean. Therefore, they recommend physicians also counsel on that risk, although is unclear if the risk is increased during vaginal delivery when there is no uterine rupture.

Landon and his co-authors emphasize that their study showed only a small increased risk of fetal death for women who undergo a vaginal delivery than those who undergo a repeat cesarean. Landon and his team explain that there is a common [conception](#)^[8] that vaginal deliveries are safer for the pregnant woman. Yet, they claim that their study showed that vaginal delivery may have a greater risk for infection. They also state that when labor was induced with oxytocin for a vaginal delivery, there was a greater risk for uterine rupture. Finally, they explain that even though their study did not detect a significant difference in mortality rates between the two groups of pregnant women, maternal death is rare and only occurred in seven of the cases studied. Therefore, they reveal that they were unable to conclusively determine an increased risk for either delivery method.

Landon and his team's article, "Maternal and Perinatal Outcomes," has been cited by over a thousand follow up studies regarding delivery methods and outcomes, uterine rupture, and suturing techniques in secondary pregnancies. Through the comparison of repeat cesarean section and vaginal deliveries, the team provided applicable data for development of new delivery guidelines. The authors showed that both delivery methods posed a relatively equal risk of complications and death. Because there was no substantially greater risk with either delivery method, the authors suggested it was unreasonable to continue encouraging elective surgeries for normal pregnancies. As of 2017, the American Congress of Obstetricians and Gynecologists recommends that most pregnant women attempt a vaginal birth after previous cesarean delivery. Researchers continue to evaluate the impact of previous cesarean section on delivery methods and outcomes.

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