

9.1 Epidural analgesia and C-section rates (with thanks to Susan Lee).

The effect of epidural analgesia on the progress of labor has generated considerable controversy. Previous observational studies have found that women who receive epidurals for labor analgesia have longer labors and higher rates of caesarean sections than women that do not receive epidurals.

Zhang et al. {Zhang, 2001 #1596} took advantage of a policy change in 1993 within the US Department of Defense requiring the availability of on-demand labor epidural analgesia in military centers to study this concern at the Tripler Army Medical Center. Prior to this policy change, epidural rates for labor analgesia were < 1%. After implementation of the new policy, the epidural rate climbed to > 70% within one year, levelling off at ~70% by 1995. They found no difference in C-section delivery rates in women with delivery in the year prior to policy change (1993) compared with delivery in 1995-6 (after the policy change), as shown in figure 1.

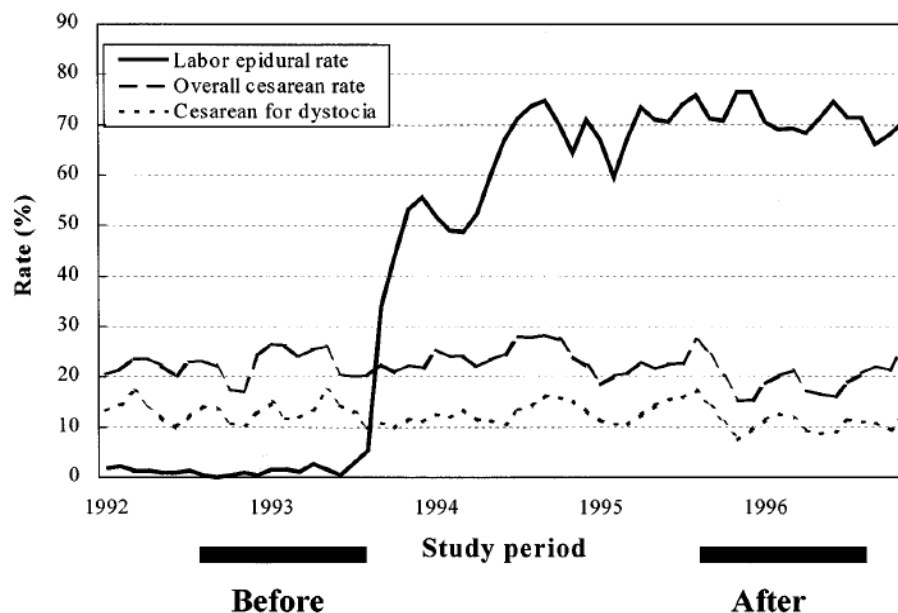


Fig 1. Epidural analgesia use during labor and cesarean delivery rates both overall and for dystocia among nulliparous women, 1992-1996.

Reprinted from *Am J Obstet Gynecol*, 185(1). Zhang J, Yancey MK, Klebanoff MA, Schwarz J, Schweitzer D. Does epidural analgesia prolong labor and increase risk of cesarean delivery? A natural experiment., Pages 128-34 Copyright (2001), with permission from Elsevier

a) We can think of this study as using an instrumental variable to study the effect of a treatment on an outcome. What are the treatment, the instrumental variable and the outcome variable for this study?

Answer: Treatment: Epidural analgesia; Instrumental variable: time period; Outcome: C-Section

b) In order for an instrumental variable to be used to estimate the effect of a treatment, what assumption is required about its relation to the outcome?

Answer: The instrument cannot cause the outcome except through its effect on the treatment (conditional on other measured covariates).

c) Suppose a nearby hospital with 5,000 deliveries a year has had a stable epidural rate of 50% for the last 5 years. Why not take advantage of its large sample size and estimate the effect of epidural analgesia on C-section rates by comparing C-section rates among all the women that did vs. did not receive epidural analgesia for labor at this other site?

Answer: We would have to worry about confounding by indication. The women who get epidurals may be different from those who do not in a way that affects outcome. For example, a long or difficult labor may be associated with getting an epidural and also with getting a C-section.