

High risk for third- and fourth-degree perineal lacerations: Hamilton et al

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The article below summarizes a roundtable discussion of a study published in this issue of the Journal in light of its methodology, relevance to practice, and implications for future research. Article discussed:

Hamilton EF, Smith S, Yang L, et al. Third- and fourth-degree perineal lacerations: defining high-risk clinical clusters. *Am J Obstet Gynecol* 2011;204:309.e1-6.

The full discussion appears at www.AJOG.org, pages e1-2.

DISCUSSION QUESTIONS

- How would you classify this study design?
- What information do we have on the hospitals and the integrity of the database?
- How would you describe the analytic approach?
- What information is in the tables?
- What does the figure tell us?
- How might the information in this study be used?
- Do other methods exist for predicting outcomes?

In a new study, researchers used a novel statistical method to identify women who were most susceptible to 3rd- and 4th-degree perineal lacerations. First, they pinpointed independent risk factors. Then they determined which “toxic constellations” of risk factors most increased the likelihood of serious injury. While many existing studies examine individual risk factors, few group them, making this work especially noteworthy.

Prediction vs prevention

The question raised in this article, whether 3rd- and 4th-degree perineal lacerations could be predicted, was a good one. Clearly, these lacerations are associated with short-term morbidity, such as blood loss and pain, and long-term morbidity; specifically, pelvic floor dysfunction. Thus, predicting the occurrence of these lacerations is of importance in obstetrics.

However, individual predictive elements are not always useful in determining whether preventive measures, such as cesarean section, is advisable. In this study, for example, birthweight was included as a potential predictor. Unfortunately, birthweight is imprecisely estimated prior to delivery. Thus, it is unclear how this specific predictor could be used in actual practice. In contrast, almost every other predictor assessed in this study seemed very useful and appropriate. These included the use of episiotomy and vacuum delivery.

In observational studies, we often assess whether or not a given risk factor is independently associated with an outcome. Most commonly, we do this by us-

ing statistical techniques to control for factors that can confound the relationship between a contributing element and an outcome. An example is logistic regression, which is used for binary outcomes. This type of analysis typically generates an odds ratio, which provides a measure of effect. But while measures of effect indicate an association, the ability to predict a result is of greater interest to clinical practitioners. In truth, factors associated with an outcome are not always good predictors, since good predictors must be fairly prevalent in a population if they are to be useful.

Statistical forecasting

As mentioned, prediction and prevention are at the core of everyday clinical medicine, and many methods are available to help researchers most accurately predict patient outcomes. Hamilton and colleagues described a method seldom seen in the obstetric literature: classification and regression trees (CART) analysis, which is also known as recursive partitioning. CART takes individual risk factors, determines the one that best separates patients with or without the problem of interest, and divides the dataset on that basis. The process is carried out repeatedly, identifying the next most discriminating factor in turn. It continues until no variables with discriminating ability are left.

When embarking on the analysis, no assumptions are made about cut-points for continuous variables—CART finds them and splits each variable accordingly. At the end of the CART analysis, you end up with groupings of patients, and you can assess the risk for a given outcome for each of these groups.

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See related article, page 309

Other methods of clinical prediction are available to researchers, each with pros and cons. A more standard approach to estimating patient outcomes—or at least, a technique commonly seen in the literature—is the multivariate model. This has been used in a variety of settings in obstetrics. Unlike CART, multivariate lo-

gistic regression analysis separates out the individual effect of relevant variables. Predictive nomograms have been used with some success in predicting outcomes from vaginal birth after cesarean section. In addition, the use of artificial intelligence, such as neural networks, has been employed in predictive efforts.

Modes of clinical prediction, as well as their advantages and disadvantages were beautifully reviewed in an article by Grobman and Stamilio. Readers interested in more detailed descriptions will find that to be an excellent reference. ■

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