

# New study reveals surprising truths behind the top three VBAC calculators

## ***VBAC calculators have been embraced with open arms by some providers, whereas others reject them altogether. Who's right?***

Trying to predict who will have a VBAC is tricky. We know some individual factors, such as having a prior vaginal delivery, are associated with higher or lower VBAC rates. By combining various factors, VBAC calculators generate a percentage that represents the best guess for an individual's odds of having a vaginal birth after cesarean.

But VBAC calculators, also called VBAC success calculators, are not always accurate and can create emotional baggage. Lower VBAC odds can result in disappointment, a loss of confidence, and pressure from a provider to have a repeat, possibly unneeded, cesarean. After all, no one can tell the future. The only way that any of us will know how any individual labor will play out is to observe it happen.

On the other hand, VBAC calculators may be a valuable tool in helping patients make the best decision they can about how to plan to give birth, and ACOG's latest VBAC guidelines encourage obstetricians to use the calculators. How accurate are VBAC calculators? And how much should clinicians rely upon them to help advise pregnant parents?

### **The first study of its kind**

Harris (2019) examines the accuracy of VBAC calculators and gives us some insight into when VBAC calculators are most accurate and when they are not. This retrospective study of all labor after cesareans (LACs) that occurred from 2013–2016 at Duke University in the United States was the first of its kind. [1] It sought to measure how the actual VBAC rate among 404 planned VBACs compared to predicted odds. Predicted odds were generated by the three most commonly used VBAC calculators: Grobman 2007, Grobman 2009, and Metz 2013.

### **Key differences between the calculators**

Each of these three calculators approaches the prediction process with distinctly different data sets. The Grobman 2007 calculator relies on information that the provider collects at the first prenatal appointment—things like age,

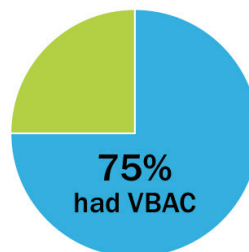
<b>VAGINAL BIRTH AFTER CESAREAN</b>	
Height & weight optional; enter them to automatically calculate BMI	
Maternal age	18 ↓ years
Height (range 54-80 in.)	<input type="text"/> in
Weight (range 80-310 lb.)	<input type="text"/> lb
Body mass index (BMI, range 15-75)	25 ↓ kg/m <sup>2</sup>
African-American?	no ↓
Hispanic?	no ↓
Any previous vaginal delivery?	no ↓
Any vaginal delivery since last cesarean?	no ↓
Indication for prior cesarean of arrest of dilation or descent?	no ↓
<input type="button" value="Calculate"/>	

*Grobman 2007 VBAC Calculator*

body mass index, race and ethnicity (specifically Black or Latinx), previous vaginal delivery, and history of descent or dilation arrest.

The 2009 version builds upon the 2007 version, adding data that providers collect upon hospital admission for labor including gestational age at delivery, presence of hypertensive disease of pregnancy, effacement, dilation, station, and labor induction.

Metz 2013 combines historical information (history of vaginal delivery and reason for prior cesarean) with information providers collect upon hospital admission for labor (Bishop score), and combines those factors with BMI and maternal age.

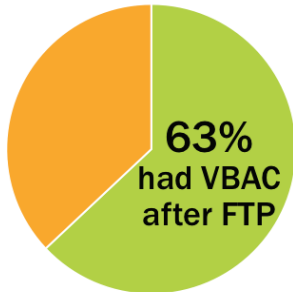


### **Spontaneous labor with a history of vaginal delivery**

In the Harris study, 75% of those who planned a VBAC had one, which is consistent with the overall 60 to 80% reported VBAC rate. As we have seen in other studies, those who arrive at the hospital in spontaneous labor

had significantly higher VBAC rates than those who were induced: 79% vs. 66%. Additionally, over half who had a VBAC in this study had had a prior vaginal delivery, and over one-third had had a prior VBAC. Among the 191 that had a prior vaginal delivery, 86% had a VBAC this time,

and 14% had a CBAC (cesarean birth after cesarean) this time. (Note that I used the term “cesarean birth after cesarean” rather than “failed trial of labor” or “failed VBAC.” I’m trying to insert more sensitive language into the conversation. You can read more here.



### **VBAC after cesarean for labor arrest**

About one-third of primary cesareans in the United States are due to labor arrest, which providers often refer to as “failure to progress.” [2] 34% of the women in this study had a history of diagnosis of

descent or dilation arrest, which accurately reflects failure to progress (FTP) rates in the United States.

The Harris study also reported that among those who had a VBAC, 29% had a history of labor arrest. Of those who had a cesarean birth in the study, 53% of them had a history of labor arrest. So you might think having a history of FTP means one is less likely to have a VBAC. However, 63% of the 137 women in the study with a history of labor arrest had a VBAC, and only 37% had another cesarean.

### **Diving deeper into the labor arrest diagnosis**

When one checks the labor arrest box in the Grobman VBAC calculators, it negatively impacts predicted VBAC odds. But there’s a twist: research shows that just because someone had a cesarean for FTP doesn’t mean that they actually met the criteria for the diagnosis. One study reported that half of those who had a cesarean for FTP after labor induction were not even 6 centimeters. [3]

In an effort to reduce the number of primary cesareans, ACOG released new labor arrest definitions in 2014. [2] Labor arrest in the first stage now has specific parameters. Labor arrest means that one must be at least six centimeters with their waters broken for at least 4 hours with “adequate contractions,” or at least 6 hours with “inadequate contractions and no cervical change.”

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During the second stage, first-time parents should push for at least three hours, and all others for at least two

hours before providers make the diagnosis of labor arrest. Further, ACOG is clear that there are no hard stops here as “longer durations may be appropriate on an individualized basis.”

There are plenty of women who received their FTP diagnosis before six centimeters or because they didn’t dilate a centimeter per hour. This diagnosis of FTP is not the current expected professional standard and not evidenced-based, and yet it persists. So, for providers who have a client with a history of labor arrest, it is prudent to review their records and compare what actually happened with ACOG’s current definitions. You may find that they did not meet the criteria for labor arrest, and thus, that box in the Grobman VBAC calculators should remain unchecked.

### **What worked well... with caveats**

Harris found that the Grobman 2007 and Metz calculators are accurate when they predict VBAC odds of greater than 60% in the specific population and location they studied. Harris’ study asserts, “probabilities in this range can be communicated confidently to patients and their care providers to inform decisions.” It looks like these calculators can predict VBAC accurately, even if they cannot do the opposite and predict repeat cesarean risk accurately. (More on that later.) This may encourage more birthing people to aptly plan a VBAC rather than opt for a repeat elective cesarean section.

Although Harris demonstrates that the Grobman 2007 and Metz calculators showed who has a good chance to have a VBAC, Harris explicitly states that these results are accurate only to their population. They recommend that “other institutions study the models’ calibrations in their population to choose the most accurate model for their patient population.” So, before providers can be assured these VBAC calculators will work in their community, they have to test each of them to determine which are most accurate for the specific population they serve. Harris outlines the ways in which they tested the calculators, what statistical methods they used, and who they included. Providers are encouraged to replicate this study before they assume any of the three calculators will work for their patient population.

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## The impact of racism on VBAC odds

If you serve communities of color, know that the Grobman 2007 calculator deducts points if your client is Black or Latinx. This deduction for race and ethnicity may give birthing people of color an inaccurate perception of their VBAC odds.

This deduction originates from the Grobman 2007 study, which reported the odds of Black and Latinx people having a VBAC is half that of white people. [4] However, these lower odds are less a reflection of one's innate ability to birth and more of a reflection of how institutionalized racism and implicit bias impacts the delivery of healthcare in the United States. As Congresswoman Shirley Chisholm said, "Racism is so universal in this country, so widespread, and deep-seated, that it is invisible because it is so normal." [5]

We see that in the case of Serena Williams, [6] who had to advocate for testing that could save her life when she experienced shortness of breath after her cesarean and Lisa Keyser, [7] whose reports of post-partum pain after her cesarean were dismissed. On a larger scale, we see it in the collective experiences of Black women as reported by a 2004 study, "The lifelong accumulated experiences of racial discrimination by African American women constitute an independent risk factor for preterm delivery." [8]

When Black people receive care from providers who look like them and where they are seen, heard, and respected, they have better health outcomes and fewer complications. We see that very clearly in practices like Jennie Joseph's. [9] Since ACOG itself found that African American and Hispanic physicians are underrepresented in US obstetrics, I suspect that the clinicians in the Grobman 2007 study were primarily white and that could contribute to the reported lower VBAC rates among Black and Latinx communities. [10]

I wonder how many providers who use VBAC calculators regularly are aware of the lower VBAC odds that the Grobman VBAC calculators generate based on race and ethnicity, and that these lower odds stem from implicit bias. All involved with maternity care need to understand this dynamic, so they can put generated VBAC odds into perspective for their clients of color. Parents of color must know this truth, so they can consider the Grobman VBAC calculator odds with a sizeable grain of salt.

## VBAC calculators and people of size

The Grobman VBAC calculators also subtract points for those with higher BMIs. Again, this is based on the Grob-

man 2007 study, which found that as BMI increases, the rates of VBACs decrease. But the thing to keep in mind here is that provider preference on whether to support or even offer VBACs to people of higher BMIs can impact who plans a VBAC. Prediction models are designed based on statistics of VBAC rates for people with high BMIs, which may be low due to provider preference.

One study revealed that only 30% of good VBAC candidates actually chose VBAC! [11] This dropped down to only 23% among those with a BMI of 30 or higher. What could account for this difference? The authors suggest, "Physicians may perceive that an intrapartum urgent cesarean would be more difficult in obese women, with an increased risk of intraoperative injury and perinatal morbidity."

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As a result, we have no idea if VBAC candidates with higher BMIs were even offered a VBAC or what that conversation looked like. It seems the physicians may be counseling higher BMI patients away from attempting VBACs. This leaves us with a challenge: studies looking at VBAC rates by BMI may be underreporting the true potential VBAC rate as VBAC is negatively influenced by provider preference about how to serve people with higher BMIs.

## Where else the VBAC calculators fall short

We also have to look at what else didn't work in Harris' study. Surprisingly, the authors flat out did not recommend the use of the Grobman 2009 calculator at their institution as its performance was "unacceptable."

The other two remaining calculators, Grobman 2007 and Metz, "underpredicted actual success when predictions were less than 60%." Harris even went so far as to say that predicted odds of 20% "may not be much different" than odds of 50%. That is so important for clinicians and parents to hear and understand. The researchers warn, "Therefore, it would not be beneficial and could potentially be harmful if these probabilities were used to make threshold decisions in this lower success range."

**"PREDICTED ODDS OF 20% 'MAY NOT BE MUCH DIFFERENT' THAN ODDS OF 50%."**

In other words, when two of the three calculators generated high VBAC odds, they were typically correct. But when those same calculators estimated low VBAC odds, they were inaccurate. This is key because often those with high VBAC odds get a boost of confidence, and those with low VBAC odds could get a surgery date. If this tool is going to be used, everyone involved needs to be aware of its strengths and limitations, especially as it relates to its decrease in accuracy as predicted VBAC odds drop. Providers know how to use tools that only have a positive predictive value; they do it all the time with lab work. Some labs are more accurate in assessing risk for a condition than they are at providing reassurance, or vice versa.

In an effort to be completely transparent, the authors assert, “We plan to modify the displayed result of the calculator to report that ‘this patient’s predicted probability is <60% and the model is not accurate in this range.’” Imagine if that showed up on the calculator!

We also need to acknowledge that there are a variety of external factors - completely out of the control of the birthing person - that can significantly impact VBAC odds. These include provider VBAC rates (reveals provider preference), hospital VBAC rates (reveals overall VBAC climate), how L&D nurses perceive VBAC (reasonable choice or dangerous decision), freedom of movement, access to tools like peanut balls, water birth, medically indicated induction, and more.

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If we really wanted to measure an individual patient’s VBAC odds, then we would have to include truly predictive information like the provider and/or hospital’s VBAC rate. The fact is if a provider isn’t supportive of VBAC, or a hospital bans VBAC, it is very unlikely a VBAC is going to happen no matter how good that VBAC candidate looks on paper.

## What you should take away from Harris’s study

Providers and healthcare facilities around the world use VBAC calculators, and ACOG recommends their use in their 2017 and 2019 guidelines. But any predictive model should be part of a larger informed consent dialog rather than the beginning and the end of the conversation.

While these models offer an opportunity for healthcare providers to counsel their patients on VBAC probabilities, it’s important to keep their limitations in mind—especially when serving Black or Latinx birthing people, people with BMIs greater than 30, and those with a prior cesarean for labor arrest. These calculators more accurately identify who will achieve VBAC than those who won’t. Additionally, these calculators tend to underpredict who will have a VBAC. That’s a critical piece of information when the calculator returns odds of less than 60%.

**“THESE CALCULATORS MORE ACCURATELY IDENTIFY WHO WILL ACHIEVE VBAC THAN THOSE WHO WON’T. ADDITIONALLY, THESE CALCULATORS TEND TO UNDERPREDICT WHO WILL HAVE A VBAC.”**

So what should you do if a VBAC calculator generates low VBAC odds? That is the time to talk about the strengths and weaknesses of the VBAC calculator along with specific factors that increase or decrease odds (such as being Black, Latinx, having an FTP cesarean, or a BMI greater than 30). Included in the conversation should be the overall risks and benefits of LAC and repeat cesarean to the birthing parent, their current pregnancy, and the parent’s intended family size (keeping the physical and emotional risks of placenta accreta in mind.) Better yet, discuss the validity of the calculators with patients before using them, so they clearly know how much credit to give their “score.”

Ultimately, the decision to plan a VBAC or not is in the hands of the birthing person, but the structures around them may vary greatly in whether they support or discourage VBACs. The prediction generated by a VBAC calculator is but one of many data points a pregnant person may consider when deciding how to have their baby.

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