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Commentary

Challenging the Use of Race in the Vaginal Birth after Cesarean Section Calculator

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Within obstetrics and gynecology, vast racial disparities persist in maternal mortality and morbidity in the United States. Nationally, black women remain three to four times more likely to die from pregnancy-related causes than white women and are more than twice as likely to experience severe maternal morbidity (Centers for Disease Control and Prevention, 2018). Intervening to mitigate these inequities remains an urgent responsibility of this field, in line with the aim of providing high-quality, equitable care for all women. To this end, we must scrutinize clinical tools through the lens of health disparities and ask if these tools improve or exacerbate them. One such tool is the Vaginal Birth After Cesarean (VBAC) calculator, which estimates success rates for vaginal birth among women with a previous cesarean delivery and uses race/ethnicity as a correction factor.

To feasibly achieve a safe vaginal birth after a prior cesarean delivery, eligible women are offered a trial of labor after cesarean section (TOLAC). Ineligible women include those with more than two prior cesarean deliveries, prior classical incisions, or prior uterine surgery in which the myometrium was compromised. The desirable maternal health benefits of successful VBAC compared to repeat cesarean delivery are well-established: avoidance of surgery and surgical complications, lower risk of postpartum hemorrhage and infection, faster recovery time, and lower risk of complications during subsequent pregnancies (Curtin, Gregory, Korst, & Uddin, 2015). As African American and Hispanic women continue to have higher rates of cesarean deliveries nationally than white women (Martin, Hamilton, Osterman, Driscoll, & Drake, 2018), decreasing the number of unnecessary cesarean sections is important to reducing racial inequities in maternal health outcomes. The VBAC calculator, endorsed by the National Institute of Child Health and Human Development, was created to help providers individualize risk assessment for VBAC by accounting for women's specific risk factors (age, body mass index [BMI], prior delivery course, and race/ethnicity). It has the added benefit of using variables discernible during a prenatal visit rather than relying on intrapartum data, which may delay counseling.

The VBAC calculator has two race-based correction factors, one for African American women and another for Hispanic women. These correction factors "subtract" from the overall likelihood of successful VBAC, so that women identified as African American or Hispanic are systematically assigned a lower chance of successful VBAC than white women.[1] In effect, women of identical age and BMI will be predicted to have significantly different chances of successful VBAC based solely on their race/ethnicity (Table 1). For example, a 30-year-old woman with a BMI of 35 and one prior cesarean for arrest of labor is assigned a 46% chance of successful VBAC if she is identified as white and a 31% chance if she is identified as African American or Hispanic. Evidence suggests providers are influenced by concerns over liability and perceived risk when counseling patients about a trial of labor after cesarean section (Cox, 2011; Yang, Mello, Subramanian, & Studdert, 2009); they may thus be less likely to offer a trial of labor to women with low VBAC scores. Given the demonstrated benefits of VBAC, if the algorithm dissuades clinicians from offering a trial of labor to these groups of women, then race-based correction in the VBAC calculator may exacerbate racial disparities.

These factors were initially included in the model, validated by Grobman et al. in (2007), based on observational data that demonstrated being white was associated with greater chance of

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[1] Predicted probability of successful VBAC = exp (w)/[1 + exp(w)] where w = 3.766–0.039(age) – 0.060(prepregnancy body mass index) – **0.671(African American race) – 0.680(Hispanic race)** + 0.888(any prior vaginal delivery) +1.003(vaginal delivery after prior cesarean) – 0.632(recurring indication for cesarean).

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successful VBAC among women who attempted trial of labor: "VBAC was significantly more likely among women who were younger, had a lower pre-pregnancy BMI, and were of white race" (Grobman et al., 2007). Their group cited a large prospective observational study examining factors associated with VBAC success that concluded, "Women who achieved successful VBAC were more likely to be Caucasian, married, privately insured, tobacco users, and to have BMI less than 30 when compared with those failing a trial of labor" (Landon et al., 2005).

Many factors identified in this study—race, insurance type, and marital status—likely relate to women's outcomes through associated social advantage or disadvantage. Yet among these factors, only race was incorporated into the final predictive model; the others were excluded. Whereas the other variables in the calculator have clear biological connections to labor mechanisms (age, BMI, prior labor course), no mechanism supporting the inclusion of race/ethnicity was offered. Moreover, using incidence data to justify race-based correction is a circular argument: since the observational data reflected a snapshot in time, it is unsurprising that it revealed racial and ethnic disparities that are known to exist. But if we systematize these existing disparities by building race/ethnicity subtraction factors into a predictive tool, we risk ensuring that these trends will simply continue.

In 2006, one study examining racial disparities in VBAC success offered "ethnic variation in pelvic architecture" as a factor, citing non-white women as having more "non-gynecoid" pelvic anatomy: "the pelvic architectural differences are significant in so far as the non-gynecoid pelvis is more often associated with malpresentation and dystocia requiring cesarean delivery than in women with gynecoid pelves" (Hollard et al., 2006). Claims of pelvic anatomic difference have also been referenced to help explain racial disparities in pelvic floor dysfunction, pelvic organ prolapse, and urinary incontinence (Hoyte, Foster, Jakab, & Weidner, 2005; Howard, Delancey, Tunn, & Ashton-Miller, 2000; Kim, Harvey & Johnston, 2005). It is important to interrogate these claims and differentiate robust scientific analysis from conventional wisdom, which is often inherited from a long history of racialized science.

For African American and Hispanic women, notions of racial/ethnic differences in pelvic anatomy and suitability for vaginal birth have historically racist antecedents. The most influential description of pelvic anatomic difference stems from the Caldwell-Moloy classification, which was proposed in 1933 and survives to this day in textbooks like *Williams Obstetrics* (Cunningham et al., 2014). This typology reduced a large breadth of anatomic variation into four subtypes of pelvic shape that were infused with racialized notions of adequacy and normalcy. The "gynecoid" pelvis, for instance, was found mostly in white women and described as ideally suited for childbirth. By contrast, the "anthropoid" pelvis was noted to be narrower, more common in non-white women, and less suited for childbirth. The anthropoid pelvis was first described as a "degraded or animalized arrangement seen in the lower races" (Turner, 1886 in Caldwell & Moloy, 1933:498). The parallel between the words "anthropoid" and "animal" was thus not incidental; it reflected intentions to debase black women as anatomically deficient for the vital human act of giving birth (Walrath, 2003).

Table 1
Probability of Vaginal Birth after Cesarean Success*

Race	BMI (kg/m^2)			
	25	30	35	40
White	61%	54%	46%	39%
Black	45%	37%	31%	25%
Hispanic	44%	37%	31%	25%

* As predicted by the current Grobman et al. (2007) calculator for a 30-year-old G2P1, no vaginal delivery, and one previous cesarean delivery due to failure to progress in labor.

Caldwell and Moloy's motivation was rooted in their historical context, when white hegemony craved scientific support to validate a deeply racist social hierarchy relying on the assumption of black inferiority. For their classification, Caldwell and Moloy used the Hamann-Todd collection of skeletons to obtain pelvic measurements. More recently, 40 black and 40 white skeletons from the same collection were used to demonstrate differences in pelvic floor area between African American and European American women (Baragi, Caspari, & Ashton-Miller, 2002). Yet the validity of extrapolating from anthropometric measurements collected in the 1920s is questionable. Specimen collectors had to first assign rigid categories of "black" and "white" to the skeletons before making their measurements. Todd even relied on predominant racialized conceptions of anatomy to confirm these assignments—for example, he remarked that "the narrow pelvis is so distinctively a Negro character and our average is so much less than those of other American Negro samples that it may well serve as an indication of relatively pure Negro material" (Todd & Lindala, 1928). Once again, the logic quickly becomes circuitous: to detect anatomic difference between races, the collectors first relied on anatomic difference to confirm race.

Similarly, comparative pelvic measurements have been used to create a narrative of indigenous Mexican women's inferior reproductive ability. Skeletal measurements were used to describe the pelvis of indigenous women as "downward" and "backward," shapes considered "primitive" when compared to the European ideal (Flores y Troncoso, 1888 in O'Brien, 2012:22). Considered ill-suited for natural childbirth, indigenous women received higher rates of interventions during deliveries to compensate for their "faulty" anatomy. In the early 1900s, Mexican doctors increasingly insisted on cesarean sections over vaginal delivery for indigenous women with signs of "pelvic deficiency," though the operation often resulted in serious complications or death. Inferior pelvic anatomy was seen as a biological shortcoming that rendered them inadequate to further Mexico's bloodline. In time, this reasoning justified the eugenics movement through forced sterilization of indigenous Mexican women (O'Brien, 2012).

These two examples demonstrate that assumptions of pelvic difference in black and Hispanic women have been historically rooted in deeply racist enterprises. While the VBAC calculator brought race and ethnicity into the conversation about differential birth outcomes, the pathologizing of race reflected in the calculator is a concerning echo of this older history that portrayed African American and Hispanic women as innately defective child bearers. Given these disturbing legacies, we should reconsider incorporating ideas of racial difference in suitability for vaginal delivery into modern-day clinical decision making.

Despite an empirical association between race/ethnicity and VBAC success, the association is not supported by biological plausibility. The danger of including race in this manner within a clinical algorithm is in implicitly accepting these categories as natural rather than historical and socially constructed. More often, race is included as a proxy for other variables that reflect

Table 2
Variables Included in Validated Models for VBAC Risk Stratification*

United States (Grobman et al., 2007)	Canada (Chaillet et al., 2013)	Sweden (Fagerberg et al., 2015)
Maternal age	Maternal age	Maternal age
BMI	BMI	BMI
Prior vaginal delivery	Prior vaginal delivery	Prior vaginal delivery
Prior VBAC	Prior VBAC	Prior VBAC
Prior indication for cesarean	Prior indication for cesarean	Prior indication for cesarean
Maternal race		Maternal height
		Delivery unit's rate of ERCS
		Delivery unit's rate of unplanned cesarean section

Abbreviations: BMI, body mass index; ERCS, elective repeat cesarean section; VBAC, vaginal birth after cesarean delivery.

* Only the U.S. version includes maternal race as a risk factor.

the effect of *racism* on health: factors like income, educational level, or access to care. Indeed, many of these influences have been studied and shown to impact both VBAC counseling and success rates in the United States (Attanasio, Hardeman, Kozhimannil, & Kjerulff, 2017; King & Lahiri, 1994). If these factors comprise the true connection, then we have failed to acknowledge these critical upstream factors by conflating them with race. These impacts should be uncovered and addressed, rather than being hidden and legitimized by the algorithm. For example, personalized counseling that accounts for social circumstances such as transportation, support systems, distance from the hospital, time off from work, and arranging childcare may more accurately represent a woman's decision and ability to undergo a trial of labor.

Dissecting this evidence base requires highlighting another critical point: the racial categories used by the VBAC calculator are themselves nebulous. "African American" and "Hispanic" reflect society's construction of race/ethnicity rather than a biological truth; biological definitions of race have been repeatedly challenged by findings of greater genetic variation *within* rather than *between* groups based on skin color (Mallick et al., 2016). The category "Hispanic" is itself contested, since it is unclear which ancestries or ethnicities the term encompasses and excludes. The original studies used in developing the algorithm actually categorized women as Latina rather than Hispanic, so it is uncertain if the calculator today refers to a woman's country of origin, skin color, primary language, or another combination of factors. In operationalizing the calculator, patients and clinicians are forced to constrict their conceptions of race/ethnicity into binary categories of African American: yes/no; Hispanic: yes/no. The reality is more complex, as self-identified race or ethnicity often differs drastically from these discrete assignments (Hunt & Megyesi, 2008; Rebbeck & Sankar, 2005). For instance, how might a black Dominican woman be entered into the VBAC algorithm? If she "counts" as both African American and Hispanic, her probability of VBAC success would be significantly reduced by both subtraction factors. The online VBAC calculator does not even allow the user to identify a woman as both African American and Hispanic, suggesting the relevance of these factors may be less about the race/ethnicity itself than about signaling a woman's relative standing in society as non-white.

How might we thoughtfully challenge race-based assumptions in VBAC risk stratification? Precedent already exists for use of this model without race correction. After validating their original model in the United States, Dr. Grobman's group also validated the algorithm without race-based correction in Canada, stating, "we did not include women's ethnicity (being or not being of Hispanic or African-American origin) in the model because of potential differences in ethnic and socioeconomic backgrounds between populations in the United States and Canada" (Chaillet et al., 2013).

Similarly, Fagerberg's group in Sweden validated the Grobman et al. model in a study that included women from sub-Saharan Africa, Spain, South America, and Portugal along with Swedish natives and found ethnicity unrelated to successful VBAC (Fagerberg, Maršál, & Källén, 2015). Not only did Fagerberg's study claim the ethnicity factor was "insignificant" when applied to the Swedish population, but it also suggested the association may be through the mother's level of education or other maternal characteristics; ultimately, they included maternal height in their final model instead of ethnicity. If the race/ethnicity factor was found irrelevant to predicting VBAC success within diverse populations of Canada and Sweden, it stands to reason that it may also be irrelevant in the U.S. context (Table 2).

These examples suggest the VBAC model can be used effectively without race-based correction. While it is critical to acknowledge racial inequities in maternal outcomes, the lack of biological plausibility for race-based correction factors and their potential to worsen existing disparities creates a setting of reasonable doubt surrounding their inclusion in the VBAC calculator. Now, more than a decade after the model was initially developed, the potential unintended consequences of the algorithm merit close consideration. In doing so, we can ensure that our clinical standards are elevated to the aspirational goal of remedying unjust disparities rather than tacitly perpetuating them. As a step toward this goal, we strongly urge obstetrics practices to no longer include race-based correction in VBAC risk-stratification.

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