Automated alerts in obstetrics

We thank Drs Klumpner, Kountanis, and Tremper for their interest in and response to our article. Their recent report highlights several issues that merit continued attention by investigators seeking to improve patient outcomes using predictive analytics. First, their report is one of the few that provide temporal data on the performance characteristics of alerts. Such temporal data are not just needed to compare systems—they are an essential ingredient in the development of clinician workflows needed to respond to an alert. Second—and this is a deficiency shared by our model—the positive predictive value (PPV) of their alerts (5.1%), while clearly superior to that of a manually assigned score (3.3%), is still fairly low compared with what is now possible in nonlaboring adults, which is in the range of 10 to 20%. Finally, their report highlights an important challenge in obstetrics—small numbers. Although they tested their model in a population with a much higher baseline risk than ours (postpartum hemorrhage prevalence of 1.5% compared with 0.3% in our population), they only had 120 cases. Given that, in developed nations, most laboring women are healthy, low numbers will remain a continuing challenge.

Although we employed different methods, our reports are in fundamental agreement: improvements in the early detection of impending or ongoing obstetrical complications using only manually calculated scores are unlikely. Given the low numbers (ie, weak signals), it is unlikely that simple combinations of vital signs can achieve what constitutes a “triple aim” in predictive analytics: high sensitivity, high PPV, and plenty of lead time. Only models or systems that achieve these 3 aims can be used to answer a much more important question: does early detection lead to improved patient outcomes?

In vitro fertilization and placenta accreta spectrum in pregnancies with a history of cesarean delivery

TO THE EDITORS: The cesarean delivery (CD) rate in China has risen sharply during the past decade, from 28.8% in 2008 to 36.7% in 2018. As China relaxed its 1 child policy, the proportion of pregnant women with a previous CD has almost doubled, increasing from 9.8% in 2012 to 17.7% in 2016. The in vitro fertilization (IVF) pregnancies confer an increased risk of adverse obstetrical outcomes. The uterine scar secondary to CD is the main cause of the placenta accreta spectrum (PAS). To accurately evaluate the risk of PAS in IVF and non-IVF pregnant women with a previous CD is critical in allowing for proper counseling, preparation, and optimizing outcomes. We read with great interest the study entitled “In vitro fertilization as an independent risk factor for placenta accreta spectrum” by Salmanian et al. We agree with the association between IVF and the development of PAS in the absence of placenta previa (PP) and a previous CD. However, based on our multicenter, cross-sectional cohort from 14,734 pregnancies with a previous CD, we found that IVF was not an independent risk factor for PAS in pregnancies with a previous CD. After excluding incomplete data, twin or multiple pregnancies, major fetal abnormalities, and antepartum fetal death, 9634 singleton pregnancies were enrolled, of which 192 (1.99%) were IVF pregnancies and 520 (5.40%) were PAS. The frequency of IVF in the PAS group (1.73%) was similar to that in the non-PAS group (2.01%). Besides, the incidence of PAS was slightly lower in the IVF group (4.69%) than the non-IVF group (5.41%).

REFERENCES

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PP was the most important independent risk factor for PAS in this cohort (adjusted odds ratio, 394.45; 95% confidence interval, 157.95—985.09). Similar to Salmanian’s data, among women without concurrent PP, the incidence of PAS in the IVF group (2.26%) was higher than that in the non-IVF group (0.84%). However, among 15 patients with concurrent PP in the IVF pregnancy setting, 5 (33.33%) had PAS. In Salmanian’s cohort, all 5 patients with previous CDs, PP, and IVF in the index pregnancy had PAS (100%).

In addition, previous cesarean uterine incision types may interfere with the location of placenta attachment, so we analyzed the frequency of PAS based on the presence of PP and previous cesarean uterine incision types in patients with or without IVF pregnancy (Table). A total of 8928 with only 1 previous CD were enrolled. We found that among pregnancies with concurrent PP, although the difference was not significant, the previous transverse cesarean uterine incision had a lower incidence of PAS both in the IVF (52.53 vs 66.67%; P = .173) and the non-IVF group (33.33 vs 52.53%; P = .187). Unfortunately, the detailed placenta attachment data were incomplete and the IVF group sample was small in our cohort. Despite these limitations, our data suggest that IVF was not an independent risk factor in pregnancies with a previous CD, particularly in pregnancies with a previous transverse cesarean uterine incision. Our findings may be helpful in clinical counseling and delivery preparation in patients with a similar situation. Besides, further study in a larger population with a previous CD is necessary to evaluate the connection between IVF and the development of PAS, considering PP, the previous cesarean uterine incision types, and the location of placenta attachment, which may help further to understand the mechanism for the pathogenesis of PAS.

ACKNOWLEDGMENTS
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REFERENCES

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**TABLE**

Frequency of PAS in IVF and non-IVF pregnancies with 1 previous CD, based on previous CD transverse incision and presence of placenta previa (N = 8928)

<table>
<thead>
<tr>
<th>Previous CD transverse incision</th>
<th>Placenta previa</th>
<th>Total number</th>
<th>PAS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient with IVF pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>7</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>157</td>
<td>4 (2.55)</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>2</td>
<td>1 (50.00)</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>12</td>
<td>4 (33.33)</td>
</tr>
<tr>
<td>Patient without IVF pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>462</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>7650</td>
<td>59 (0.77)</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>24</td>
<td>16 (66.67)</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>613</td>
<td>332 (52.53)</td>
</tr>
</tbody>
</table>

Data are expressed as number (percentage).

CD, cesarean delivery; IVF, in vitro fertilization; PAS, placenta accreta spectrum.

a,b,c,d Two groups were compared separately; e P < .05.

The risk of placenta accreta spectrum in women with in vitro fertilization in different populations

We would like to thank Du et al for their interest in our manuscript entitled “In vitro fertilization as an independent risk factor for placenta accreta spectrum.” Their communication outlines results from their program suggesting that in vitro fertilization (IVF) is not an independent risk factor for placenta accreta spectrum (PAS) in that subgroup of women with a previous cesarean delivery (CD). Given the differences in population demographics, practice patterns, history of CD, diagnosis of PAS, methodology of IVF, sample size, and data analysis, this may well be correct for their environment and population, but not representative of any different population.

In our cohort, in the specific subgroup of women with a history of CD (n=5464), PAS was diagnosed in 213 patients (3.8%) regardless of the presence of placenta previa or IVF compared with 5.4% stated in Dr Du’s letter. The IVF rate in this subgroup of patients was also lower in our population (n=57 [1%] vs n=192 [2%]). Furthermore, in our cohort, 2751 (50%) had had at least 2 previous CDs, which we believe significantly distinguishes our patient sample from the 706 (7%) with at least 2 previous CDs mentioned in Dr Du’s letter. Considering the significant role of CD as a major risk factor for PAS, as reflected in our cohort (Table 3 of the original article),1 this represents a major confounder and essentially negates any attempted direct comparison.

Regarding the type of hysterotomy made at the time of CD (in women with only 1 previous CD), Du et al report a lower risk of PAS in women with a history of a transverse lower uterine incision. They have not provided an appropriately adjusted odds ratio, and thus, it is not clear if they have sufficient power to make such a conclusion. We look forward to seeing this study in print with a full description of the methods and materials.

In conclusion, we agree that further investigation in larger studies will help to clarify the role of IVF as an independent risk factor for PAS. The data presented by Du et al may well be valid for their population, a group of patients that seem to be fundamentally different than ours. Until such time, as we have adequate data with a large enough sample size to allow generic counseling, we suggest that individual patient counseling should be based on the best available evidence from patients with the same demographic and historical background.

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Categorization of cerebral palsy cases: a different perspective

TO THE EDITORS: Nakao et al1 rigorously categorized electronic fetal monitoring (EFM) for 1069 cases of severe cerebral palsy (CP). However, our interpretation of their data is somewhat different than the authors. They concluded that, on admission, approximately 30% of cases were already damaged. Accurately identifying such cases would suggest that better strategies for antepartum assessment and action are needed. Some cases of CP certainly have genetic origin and are not preventable, but other cases of CP might have benefited from earlier intervention. We believe that using our