

## Letters

### Author response to “Pitfalls of analyzing perinatal outcomes by health care provider”

We appreciate and have carefully considered Dr. Jain’s response.<sup>1</sup>

We opted to reduce (not eliminate) bias caused by the unequal distribution of medical risk factors by type of most responsible provider (MRP) using a validated weighted risk score to group birthers into prenatal risk groups. Stratifying the analysis by the antepartum risk score rather than entering it into the model as a covariate largely mitigates the issue of the risk score predicting the outcomes.

In terms of the bias that might be introduced if the 41 individual factors that constitute the antepartum risk score are not present for 1 or more of the MRP groups, the individual indicators were present across all 3 MRP groups. The goal of our paper was not to compare midwives to physicians across all possible risk factors, and we have clearly stated the limitations in the paper, (i.e., more clients in the obstetrician group may have had more complex medical conditions, explaining differences in outcomes).

With respect to MRP assignment, MRP is a mandatory data field, is clearly defined in our paper and, in our view, is the best variable to use when describing outcomes of midwife-led care. We cited the study by Thiessen and colleagues<sup>2</sup> to show that there might be substantial overlap between the prenatal provider type and the MRP. Dr. Jain used the Thiessen study to infer that our study suffers from imprecision in the MRP assignment that “can easily account for the observed associations.”<sup>1</sup> The overall rate of discrepancy reported by Thiessen and colleagues<sup>2</sup> was 3% (11 of 315 cases, of which 10 were “attributable to transfers in care that occurred at birth”). Thiessen and colleagues<sup>2</sup> note that “factors that lead to misallocation of provider type in the administrative data may also be related to birth outcomes. However, given the low rate of misalignment, this is likely a minor concern.”

It is also important to look at the sample used by Thiessen and colleagues.<sup>2</sup> They included 315 low-risk childbearing people

who had cesarean deliveries, a population for whom transfer of care is common. Nearly 70% of our study cohort had vaginal births and, hence, would likely have a much lower rate of discrepancy between the MRP and prenatal provider because of lower overall rates of transfer. For these reasons, we do not believe that the hypothetical incorrect assignment Dr. Jain describes presents a “major potential error.”<sup>1</sup>

Given differences in the scopes of practice of obstetricians and midwives, and the health profiles and birth preferences of their clients, we agree that the comparison of midwives and obstetricians, especially for moderate- and high-risk birthers, must be interpreted carefully. For this reason, we opted to mostly report adjusted absolute differences.

In terms of Dr. Jain’s comment about inaccuracies in BC with coding the delivery provider in the British Columbia Perinatal Data Registry, we did not use delivery provider as the exposure, but solely to exclude births that were not delivered by a primary care provider. For example, we did not want to include clients of midwives or physicians who were delivered by a nurse or who had no attendant. Given how few births were excluded based on the delivery provider, we do not anticipate that the validity reported for this variable by Frosst and colleagues<sup>3</sup> affected our results.

The word limit prevented us from including etiological considerations and a description of different factors that may affect birth outcomes of midwifery or physician clients. We appreciate the etiological consideration Dr. Jain suggested and can also think of factors that might predispose midwifery clients to worse outcomes. For example, midwifery clients routinely decline tests or procedures suggested by health care providers (e.g., genetic and gestational diabetes testing, induction of labour), and midwives generally support or accept that decision.<sup>4</sup> In the current study, we reported that 20% of midwifery clients who had a home birth were moderate or high risk. These cases were included in the analysis.

Regarding the lack of biological plausibility, other research studies and reviews have found reduced perinatal mortality rates and

preterm birth rates for midwife-led continuity of care (MLCC) models, compared with medical-led or shared-care models (see citations in our paper and also the scoping review by Bradford and colleagues<sup>5</sup>). When the World Health Organization recommended MLCC in 2016, they wrote that they made this recommendation despite the fact that “the mechanism for the probable reduction in preterm birth and perinatal death is unclear.”<sup>6</sup> They explain, “MLCC models are complex interventions and it is unclear whether the pathway of influence producing these positive effects is the continuity of care, the midwifery philosophy of care or both.”<sup>6</sup>

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**Competing interests:** None declared.

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