LETTERS

Methodological Challenges in a Manitoba Study of Provider Type and Perinatal Outcomes Using Hospital Discharge Data

To the Editor,

A recent article evaluates outcomes of midwifery care in Manitoba, stating that "midwife-attended births were associated with lower odds of interventions such as episiotomy, epidural use, neonatal resuscitation, neonatal intensive care unit admission, instrumental vaginal delivery, and cesarean delivery" (1). We wish to draw the attention of readers to some critical methodological issues in their study design and analysis.

Exposure data for this study were taken from the Discharge Abstract Database (DAD). The authors used the variable "Most Responsible Provider" to identify the provider type most closely associated with the patient's care at birth. The column headings should reflect this designation rather than "midwife attended," "GP attended," or "OB/GYN attended" birth (Table 1). Use of "Most Responsible Provider" from the DAD introduces systematic bias in that women cared for in the antepartum period and admitted under midwifery or GP care who subsequently experienced intrapartum complications and referral to an OB/GYN would be designated as having an OB/GYN as the most responsible provider, even though they were admitted as a midwifery/GP patient. Only women who did not require consultation and/or transfer of care to an OB/GYN would be classified as having a midwife or GP as the most responsible provider, biasing results favoring midwifery and GP care. This explains the very low cesarean delivery rate for midwife attended births (1.7%) which is much lower than what Janssen et al. reported in their study (7.2% for planned, midwife attended home births, and 10.5% for planned, midwife attended hospital births), also set in a Canadian context (2). The bias would not be present in the other direction, i.e., misclassification of midwives as the most responsible provider rather than OB/GYNs. The adjusted odds ratios for selected interventions and outcomes compare midwife versus OB/GYN and GP versus OB/GYN but do not include midwife versus GP (Table 2). Assuming midwives did not refer to GPs, this last comparison could have provided the most unbiased information.

Secondly, when the authors cite a statistically significant reduction in odds of cesarean (CS) delivery (aOR 0.13, 95% CI: 0.10, 0.16) for midwife compared with OB/GYN attended births, they need to be clear about the interpretation of this statistic. This is a measure of the odds of women with the most responsible provider designated as midwife having a CS, compared with those with the most responsible provider designated as an OB/GYN. In addition, variability in coding practices between facilities, as mentioned in the paper, and between individual practitioners, with respect to the most responsible provider, may have introduced bias.

Furthermore, the authors note "inadequate tracking of data in the early years of implementation of midwifery" as a significant limitation of the study. The degree to which this may have confounded results could have been assessed and potentially corrected by adjusting for birth year.

In addition, the authors have not addressed the lack of independence of repeat births to mothers in the study sample. As infants are nested within families, inclusion of a random effects variable which would vary for membership in each "family," would allow for controlling for clustering of outcomes within families (3).

While the authors are to be commended for their evaluation of midwifery care in Manitoba, the limitations of the data underscore the need for a perinatal registry that can accurately identify the care provider type during the antepartum period and at the onset of the intrapartum period.

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REPLY

Thank you for your feedback on our paper (1). This initial pilot study is only the first installment from a larger research program, which will provide a more comprehensive account of antenatal, intrapartum, and postpartum outcomes in Manitoba, and further explore the role of the provider.

In our paper, we clearly articulated the limitations of our study in relation to the questions that you raised. We are aware that the way "Most Responsible Provider" is defined in the Discharge Abstract Database does not capture the antepartum period in a women's pregnancy. It is the assumption based on the definition in the Discharge Abstract Database that the provider who cared for the patient during the majority of the visit, regardless of transfer will be designated as "Most Responsible Provider." We made it clear in our pilot study that our intent was only to look at outcomes around the time of birth so we could gain an understanding of how outcomes were being attributed to provider types in Manitoba. As mentioned in the paper, we will consider prenatal, postpartum, and prehospital transfers in our current, ongoing study. In our on-going study, based on our experiences with the Manitoba perinatal data, we are assigning the most responsible provider to outcomes based on who provided the majority of care throughout each phase of pregnancy (antepartum, intrapartum, and postpartum care), as well as considering a "mix of providers."

We chose to compare both midwives and general practice provider types to obstetrician/gynecologists because we thought this would be the comparison that was of most interest as obstetricians attend the majority of the births in this province. We did not further explore the comparison of midwives to general practice physicians because this was not in the parameters of our research question. Furthermore, in the Health Authority we studied, midwives would neither consult nor transfer to general practice physicians for cesarean sections.

The lack of independence of repeat births to mothers in the study sample was also addressed in our study. Fewer than 35 percent of the mothers in our data had more than one child in our analytic cohort. At the outset of our study, we considered the use of a random effects model to account for these 35 percent of births; however, a random effects model would have been less applicable to our research question of interest. Our research focused on identifying the population-average effects of provider type on a selection of birth outcomes, while a random effects model would have yielded the individual-level effects of each provider type on birth outcomes (2). We ran an additional analysis where we randomly selected one child from her pool of offspring when a mother had more than one child, and used that birth in our analyses. This eliminated concerns vis-à-vis nesting, ensuring that all births in our analytic cohort were independent, while allowing us to address our research question identifying the population-average effects of the provider type. These results from these regression models with one birth randomly selected per mother were statistically no different from the findings in the paper.

Thank you for highlighting that controlling for birth year may help to control for potential confounding due to improvements in midwifery data quality over time. After receiving this letter to the editor, we subsequently ran the regression models from the paper with the birth year covariate included and while birth year was statistically significant in most models, the odds ratios were very close to one and would not be considered clinically relevant. Including birth year in the regression models did not change the overall conclusions of the paper.

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