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Increase in Incidence of Neonatal Abstinence Syndrome Among In-Hospital Birth in the United States

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In Reply We appreciate Ramphul et al sharing estimates of the 2012 rate of in-hospital births with a neonatal abstinence syndrome (NAS) diagnosis. In our study[1] of 2016 national incidence and cost estimates for in-hospital births with a NAS diagnosis, we did not make direct comparisons with earlier estimates[2] owing to the 2015 transition from the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* to *International Statistical Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)* and because earlier studies may not have limited the sample to in-hospital births.

The Healthcare Cost and Utilization Project (HCUP) Kids' Inpatient Database (KID) consists of deidentified administrative hospital discharge data. Limiting the sample to in-hospital births means only births at originating hospitals are counted and those with any indication of birth outside the hospital or transfer from another hospital are excluded. Alternate estimates that do not limit the numerator to in-hospital births will be higher, with the possibility of double counting infants with transfers who need a higher level of care.[3] For example, without limiting our analysis to in-hospital births, the 2016 incidence rate of NAS would have been 8.6 per 1000 hospital births, a 28% increase over the 6.7 per 1000 in-hospital births we found in our analysis.

The HCUP has developed recommendations for reporting trends across years that include both *ICD-9-CM* and *ICD-10-CM* codes,[4] including analyzing data by discharge quarter to identify discontinuities that may have occurred owing to the transition. For example, trend analysis of opioid-related inpatient stays using the HCUP State Inpatient Databases shows an increase related to the *ICD-10-CM* switch.[5] The KID is released every 3 years, with

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exception of 2015 owing to the *ICD-10-CM* transition, making it difficult to ascertain whether the increase from the 2012 rate may be owing to the classification change. Additional research might explore such trends using HCUP databases released annually, such as the National Inpatient Sample. Our finding of 6.7 per 1000 in-hospital births with a NAS diagnosis in 2016, with total costs of $572.7 million, represents a conservative estimate but one that demonstrates immediate effects of the opioid crisis on maternal and infant health.

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