Letters

RESEARCH LETTER

Association of Newborn Apgar Score With Maternal Admission to the Intensive Care Unit

The newborn Apgar score efficiently evaluates an infant's condition at birth and the need for immediate attention.[1] The risk of neonatal or infant death is greatest at a low 5-minute Apgar score of 0 to 3 and moderate at an intermediate score of 4 to 6 compared with a normal Apgar score of 7 to 10.[1-3]

The risk of neonatal and maternal mortality is highest when both the mother and infant are admitted to an intensive care unit (ICU) after delivery.[4] Because the newborn 5-minute Apgar score is routinely collected, we assessed its association with maternal admission to the ICU.

Methods | We included 712 715 singleton obstetrical live births in Ontario, Canada, from April 1, 2006, to March 3, 2012, after excluding 99 735 births (12.3%) with missing or ineligible data. We explored whether a low, intermediate, or normal newborn Apgar score at 5 minutes is associated with maternal postpartum admission to the ICU. The study was approved by the Sunnybrook Health Sciences Centre research ethics board, and all data were deidentified.

Modified Poisson regression analysis was used to generate unadjusted and adjusted relative risks, controlling for maternal age, parity, income quintile, prepregnancy diabetes mellitus, obesity, drug dependence or tobacco use, and newborn sex. Results were stratified by preterm (24-36 weeks) vs term (≥37 weeks) delivery, the hypertensive disorders of pregnancy (gestational hypertension or preeclampsia), and findings above vs below the median time interval between delivery and ICU admission. We secondarily evaluated ICU admission with concomitant mechanical ventilation, which is an indicator of greater ICU severity (Damon Scales, MD, PhD, FRCPC; written communication; June 26, 2015). Data were analyzed from April 1, 2006, to March 3, 2012.

Results | Among mothers whose newborn had a normal 5-minute Apgar score, the rate of maternal ICU admission was 1.7 per 1000; the rate rose to 13.0 per 1000 with an intermediate Apgar score, and to 18.8 per 1000 with a low 5-minute Apgar score (**Figure**). The rates of ICU admission were high in women with preterm delivery or hypertensive disorders of pregnancy, but the adjusted relative risks were more pronounced for term births or in the absence of hypertensive disorders of pregnancy. The adjusted relative risks were also higher among women admitted to the ICU within 4 hours of delivery, especially for women also requiring mechanical ventilation (Figure).

Discussion | A low 5-minute, newborn Apgar score reflects a higher risk of maternal ICU admission with and without mechanical ventilation. Existing clinical models of severe, acute maternal morbidity have moderate discrimination for predicting maternal end-organ injury or death within 30 days postpartum (C statistic, 0.66; 95% CI, 0.65-0.67).[5] In high-resource settings, maternal admission to the ICU is a reasonable proxy for severe, acute maternal morbidity.[4] A logical step is to evaluate whether the newborn Apgar score improves the discriminative performance of predictive models for severe, acute maternal morbidity, within a few hours of delivery and during the conventional 42-day postpartum period,[4] and within high- and low-resource settings.

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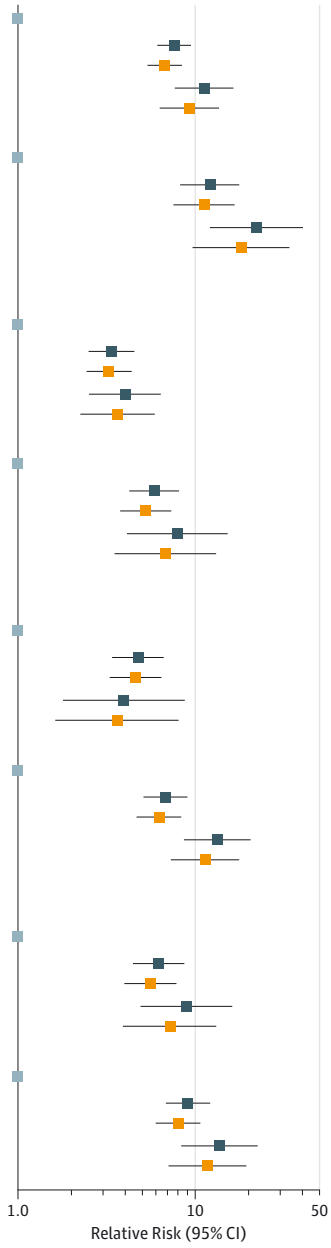
Figure. Relative Risk for Postpartum Maternal Admission to the Intensive Care Unit (ICU) Associated With the Newborn's 5-Minute Apgar Score

Source	No. /Total No.	Rate per 1000	
ICU			
Normal Apgar	1142/704 103	1.6	1 [Reference]
Intermediate Apgar	88/7126	12.3	
Low Apgar	27/1486	18.2	
ICU with mechanical ventilation			
Normal Apgar	236/704 103	0.3	1 [Reference]
Intermediate Apgar	29/7126	4.1	
Low Apgar	11/1486	7.4	
ICU: timing of delivery			
Preterm			
Normal Apgar	334/41 248	8.1	1 [Reference]
Intermediate Apgar	50/1826	27.4	
Low Apgar	18/554	32.5	
Term			
Normal Apgar	808/662 855	1.2	1 [Reference]
Intermediate Apgar	38/5300	7.2	
Low Apgar	9/932	9.7	
ICU: hypertensive disorders of pregnancy			
Present			
Normal Apgar	353/34 001	10.4	1 [Reference]
Intermediate Apgar	37/749	49.4	
Low Apgar	6/146	41.1	
Absent			
Normal Apgar	789/670 102	1.2	1 [Reference]
Intermediate Apgar	51/6377	8.5	
Low Apgar	21/1340	15.7	
ICU: interval between delivery and ICU admission			
≥4 h			
Normal Apgar	590/703 551	0.8	1 [Reference]
Intermediate Apgar	37/7075	5.2	
Low Apgar	11/1470	7.5	
<4 h			
Normal Apgar	552/704 103	0.8	1 [Reference]
Intermediate Apgar	51/7126	7.2	
Low Apgar	16/1486	10.8	



Crude (dark blue squares) and adjusted (orange squares) indicate relative risks for any maternal admission to the ICU, ICU admission with mechanical ventilation, and any maternal admission to the ICU stratified by timing of delivery, the hypertensive disorders of pregnancy, and time interval between the delivery and ICU admission. Relative risks (on a log scale) were adjusted for age, parity, income, prepregnancy diagnosis of diabetes mellitus, obesity, drug or tobacco use, and newborn sex. A low 5-minute Apgar score was defined as a score of 0 to 3; intermediate, 4 to 6; and normal (light blue squares), 7 to 10.

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Electronic Cigarette Use and Respiratory Symptoms in Chinese Adolescents in Hong Kong

Electronic cigarettes (e-cigarettes) are increasingly used, but their health effects remain unclear. The primary ingredients of e-cigarette liquid, propylene glycol and flavoring chemicals (eg, diacetyl or diketone), are respiratory irritants and harmful to the lungs.[1] Well-documented respiratory toxicants, such as particulate matters, volatile organic compounds, and metals, were found in e-cigarette aerosol, although in lower concentrations than conventional cigarettes.[2]

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