

Impact Of 24 Hour In-House Neonatal / Pediatric Staff Coverage On Short Term Neonatal Outcomes In A Level 3 Perinatal Hospital

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ABSTRACT

Background and Objectives: 10% of newborns require positive pressure ventilation at birth, which in many cases, cannot be anticipated. The Neonatal Resuscitation Program (NRP) advocates for the presence at birth of a person skilled in neonatal resuscitation. Admission to the NICU may be required if prolonged resuscitation is needed. There is no literature on the impact of 24 hour in house availability of a pediatrician with experience in neonatology on the short-term outcomes of newborns with poor transition at birth. The goal of our study was to compare short-term outcomes of newborns over 36 weeks with a low apgar score (≤ 3 at 1 minute), following the adoption of a 24 hour in house coverage system by senior staff in a level 3 perinatal service.

Design / Methods: A retrospective chart review comparing two 12-month periods was conducted. During period 1 coverage was provided by residents with availability on call at home of a pediatrician or neonatologist. During period 2 coverage was provided in hospital by a pediatrician or neonatologist. The primary outcome was the proportion of

infants admitted to the NICU. The need for resuscitation maneuvers and the length of hospitalization were also compared.

Results: There were 71 and 60 newborns with an Apgar score ≤ 3 at 1 minute during periods 1 and 2 respectively. Gestational age, birth weight, Apgar at 1, 5 and 10 minutes, and sex were similar. During period 2, 95% of first responders were attending staff. The number of infants requiring chest compressions was significantly reduced during period 2 (from 20% to 1.7%, $p < 0.0001$). The proportion of infants admitted to the NICU (80% vs 61%, $p < 0.01$), and the median length of stay in hospital (61 vs 48 hours, $p = 0.03$) were significantly higher in period 1 than in period 2.

Conclusion(s): In-house pediatrician or neonatologist coverage in a level III perinatal center allows for better resuscitation in the delivery room, while avoiding unnecessary maneuvers. The number of admissions to the NICU, as well as duration of stay for newborns with low Apgar scores at birth was reduced.

OBJECTIVES

The need for resuscitation at birth cannot always be anticipated, and 76% of infants requiring positive pressure ventilation were not identified before birth. A person skilled in neonatal resuscitation should be present at all deliveries. The impact of an in house call system on newborns requiring resuscitation at birth is not known. We conducted a retrospective chart review to compare the short-term outcomes of newborns born at ≥ 36 weeks needing resuscitation within a new system of 24 hour in-house coverage by a pediatrician/neonatologist.

METHODS

Population: Newborns with an Apgar score ≤ 3 at 1 min of life born in our center (Maisonneuve-Rosemont Hospital, Montréal, Canada) were identified by retrospective chart review. Perinatal deaths were excluded.

Intervention: Two distinct 12 month periods were compared. During period 1, from January 1st 2013 to December 30th 2013, call coverage was provided by neonatologists and pediatricians at home. A junior resident provided in house coverage, responded to calls first, and contacted the staff at home as needed. During the second period from Jan-

uary 1st to December 31st 2015, the attending staff neonatologist or pediatrician remained in-hospital, along with the resident.

Outcomes: The proportion of infants admitted to the NICU (neonatal intensive care unit) during both periods was compared. The total duration of hospitalization was compared. The need for continuous positive airway pressure (CPAP), positive pressure ventilation (PPV) intubation and chest compressions was compared.

RESULTS

Table 1. Population characteristics during both periods

	Period 1 (At home call) n=71	Period 2 (In-house call) n=60	p-value
Gestational age (wks), median (IQR)	40 (39-41)	40 (39-40.5)	0.91 ²
Birthweight (g), median (IQR)	3470 (3080-3985)	3380 (3115-3795)	0.47 ²
Number female, (%)	39 (55)	25 (42)	0.13 ¹
Number born by c-section, (%)	38 (54)	22 (37)	0.0537 ¹
Apgar score 1 min, median (IQR)	2 (1-3)	2 (1-3)	0.63 ²
Apgar score 1 min, median (IQR)	6 (5-8)	6 (6-8)	0.49 ²
Apgar score 1 min, median (IQR)	9 (7-9)	9 (8-10)	0.11 ²

IQR: inter-quartile range
1: chi-squared test
2: Mann-Whitney test

Table 2. Comparison of outcomes between call systems

	Period 1 (At home call) n=71	Period 2 (In-house call) n=60	p-value
First response by staff (%)	38 (53)	57(95)	<0.001 ¹
Infants admitted to NICU (%)	57 (80)	36 (61)	0.0074 ¹
Infants requiring CPAP in DR (%)	22 (31)	40 (67)	<0.00011 ¹
Infants requiring intubation in DR (%)	18 (25.4)	13 (21.7)	0.621 ¹
Infants requiring PPV in DR (%)	62 (87)	51 (85)	0.7 ¹
Infants requiring chest compressions in DR (%)	14 (20)	1 (1.7)	0.0015 ¹
Duration of stay (hours), median (IQR)	61 (45-88)	48 (40-70)	0.0359 ²

NICU: Neonatal intensive care unit, CPAP: Continuous positive airway pressure, PPV: Positive pressure ventilation, DR: delivery room, IQR: inter-quartile range
1: chi-squared test
2: Mann-Whitney test

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CONCLUSION

This is the first study that looks at the short term outcomes of an in house call system by attending staff in a level III perinatal centre. The presence on-site of a staff neonatologist or pediatrician reduced the number of admissions to NICU and the length of hospital stay for term infants with low Apgar scores. Although more infants received CPAP in the delivery room, the number of infants needing intubation or positive pressure ventilation remained the same. We noted a marked reduction in the number of infants requiring chest compressions.

The reduction in unnecessary resuscitation maneuvers, as well as unnecessary admissions may lead to potential cost reductions. Furthermore, reduced NICU admissions will increase the number of infants who can cohabitate with their mothers, and may promote better breastfeeding and bonding.

Further studies are required to investigate the benefits of in-house call systems on the outcomes of preterm infants.

REFERENCES

1. Aziz K, Chadwick M, Baker M, Andrews W. Ante- and intra-partum factors that predict increased need for neonatal resuscitation. *Resuscitation*. 2008;79(3):444-452
2. Tourneux P, Pascard L, Daune P, Gondry J, Fontaine C. In a tertiary maternity hospital, when should a paediatrician be present in the delivery room? *J Matern Fetal Neonatal Med*. 2016;1-5.
3. Tu JH, Proffitt J, Meisop K, et al. Relationship of Hospital Staff Coverage and Delivery Room Resuscitation Practices to Birth Asphyxia. *Am J Perinatol*. 2017;34(3):259-263.
4. Resnick S, Jacques A, Patole S, Simmer K. Does after-hours in-house senior physician cover improve standard of care and outcomes in high-risk preterm neonates? A retrospective cohort study. *J Paediatr Child Health*. 2011;47(11):795-801.