

An Evaluation of Rooming-in Among Substance-exposed Newborns in British Columbia

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Abstract

Objective: Rooming-in, the practice of caring for mother and newborn together in the same room immediately from birth, is preferred for the general postpartum population but is not yet standard practice of care for newborns of substance-using women. Such newborns are usually separated from their mothers and admitted to a neonatal intensive care unit and treated for substance withdrawal if necessary. We compared clinical and psychosocial outcomes associated with traditional standard care models versus an interdisciplinary rooming-in model of care for substance-exposed newborns.

Methods: We conducted a retrospective comparative review of a cohort of substance-exposed newborns. Data were extracted from the British Columbia Perinatal Health Program database to populate the standard care and rooming-in groups. The main study outcomes were neonatal admission to NICU, breastfeeding, presence of neonatal withdrawal, length of stay, and custody status at discharge.

Results: Rooming-in was associated with a significant decrease in admissions to NICU and a shorter NICU length of stay for term infants, increased likelihood of breastfeeding (either exclusively or in combination with formula) during the hospital stay, and increased odds of the baby being discharged home with the mother. There were no significant differences between groups with respect to the presence of neonatal substance withdrawal or breastfeeding status at discharge.

Conclusion: Rooming-in may facilitate a smooth transition to extrauterine life for substance-exposed newborns by decreasing NICU admissions and NICU length of stay for term infants, encouraging breastfeeding, and increasing maternal custody of infants at discharge. This review supports the finding that rooming-in is both safe and beneficial for substance-exposed babies.

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Résumé

Objectif : Bien que la cohabitation (soit la pratique d'offrir simultanément des soins à la mère et au nouveau-né dans la même pièce immédiatement à la suite de l'accouchement) soit privilégiée pour la population postpartum générale, elle ne constitue toujours pas la pratique standard pour ce qui est des soins offerts aux nouveau-nés issus de mères toxicomanes. Ces nouveau-nés sont habituellement séparés de leurs mères, admis à l'unité néonatale de soins intensifs et font l'objet d'un traitement visant les symptômes de sevrage, au besoin. Nous avons comparé les issues cliniques et psychosociales associées aux modèles soins standard traditionnels et au modèle interdisciplinaire de soins en cohabitation visant les nouveau-nés ayant été exposés à des substances psychoactives.

Méthodes : Nous avons mené une analyse comparative rétrospective portant sur une cohorte de nouveau-nés ayant été exposés à des substances psychoactives. Les données des groupes soins standard et soins en cohabitation ont été extraites de la base de données du *British Columbia Perinatal Health Program*. Les principaux critères d'évaluation de l'étude étaient l'admission néonatale à l'UNSI, l'allaitement, la présence d'un sevrage néonatal, la durée de l'hospitalisation et le statut quant à la garde au moment de l'obtention du congé de l'hôpital.

Résultats : La cohabitation était associée à une baisse considérable du nombre d'admissions à l'UNSI et à une durée de séjour moindre à l'UNSI pour ce qui est des enfants nés à terme, à une probabilité accrue d'allaitement (que ce soit de façon exclusive ou conjointement avec une préparation lactée) au cours de l'hospitalisation, ainsi qu'à une probabilité accrue de voir le nouveau-né retourner à la maison en compagnie de sa mère. Aucune différence significative n'a été constatée entre les groupes en ce qui a trait à la présence de symptômes néonataux de sevrage ou au statut quant à l'allaitement au moment de l'obtention du congé de l'hôpital.

Conclusion : La cohabitation peut faciliter la mise en œuvre d'une transition en douceur vers la vie extra-utérine pour les nouveau-nés ayant été exposés à des substances psychoactives, et ce, en diminuant le nombre d'admissions à l'UNSI et en écourtant la durée du séjour à l'UNSI pour ce qui est des enfants nés à terme, en favorisant l'allaitement, ainsi qu'en augmentant la probabilité que la mère obtienne la garde du nouveau-né au moment de l'obtention du congé de l'hôpital. Cette analyse soutient la constatation selon laquelle la cohabitation s'avère sûre et bénéfique pour les nouveau-nés ayant été exposés à des substances psychoactives.

INTRODUCTION

While it is acknowledged that prenatal drug use is a serious concern in Canada, only limited prevalence estimates are available for Canadian populations.¹ Recently, however, the Canadian Maternity Experiences Survey noted a 6.7% and a 1% prevalence, respectively, of street drug use in women in the three months preceding pregnancy and during pregnancy.² Substance-exposed newborns commonly experience drug withdrawal, known as neonatal abstinence syndrome,^{3,4} and may display jitteriness, inconsolable and high-pitched crying, weight loss, vomiting, diarrhea, poor sucking, and even convulsions.⁵⁻⁷ Standard care for substance-exposed newborns means immediate separation from their mother and transfer to a higher-care nursery or neonatal intensive care unit. Such separation is generally based on two assumptions: (1) that the mothers involved are incapable of being “good” mothers, and (2) that the management of withdrawal for these babies is safer when they are not in the care of their mothers.

Separation of mother–infant dyads in the early postpartum period is detrimental to the development of mother–infant bonding and attachment.⁸ It is predictive of infant abandonment, abuse, and neglect in the non-addicted population,⁹⁻¹² and is even more likely to be so for high-risk populations.⁹ We know that this early period is critical and influential; the health benefits of immediate contact from birth seem to be life-long,¹¹ and substance-exposed infants are the most at-risk for poor attachment and abandonment.¹³ In addition, an early and immediate separation of mother and infant limits the likelihood of breastfeeding,^{11,14} which is encouraged and considered safe for infants of mothers maintained on methadone treatments.¹⁵ However, rooming-in, now standard in maternity settings, is not usually offered to substance-using women, in spite of the known consequences of early separation.⁵ Findings from our previous evaluation of the effect of rooming-in⁵ suggested that this unique model of care may ease opioid-exposed newborns’ transition to extrauterine life and promote more effective mothering. The current retrospective review was designed to extend this earlier evaluation to a more expansive review of all substance-exposed newborns who received either standard or rooming-in models of care in the province of British Columbia during the study period. To our knowledge, this investigation is the most comprehensive evaluation of rooming-in for substance-exposed newborns to date.

METHODS

We conducted a retrospective review of all newborns born to women who were identified by hospital administrative

data as having used substances during their pregnancy and having delivered in British Columbia between October 1, 2003, and December 31, 2006. Newborns and their mothers were categorized into two groups based on whether they were delivered at BC Women’s Hospital (rooming-in group) or elsewhere in British Columbia (standard care group). The data examined for these two groups included all demographic and clinical variables. The data were provided by the BC Perinatal Database Registry, an administrative database that captures maternal and newborn health variables for all births in British Columbia and is administered by the British Columbia Perinatal Health Program. Only hospitals with neonatal intensive care units (i.e., a Level II or Level III nursery) and only singleton infants were included in the analysis.

The main study outcomes were newborn admission to a higher level of care nursery, breastfeeding during hospital stay and at discharge, presence of neonatal substance withdrawal, newborn total length of stay (including NICU days if applicable), mother’s length of stay, and custody status at discharge.

Substance-using mothers were identified by examining two data sources: (1) the British Columbia Perinatal Health Program “substance use” flag, which is separate from “drugs (over the counter),” “alcohol,” or “smoking” social history risk flags; and (2) the Canadian Institute for Health Information Discharge Abstract Database ICD 10CA, “maternal use of drugs affecting pregnancy” and “identification of specific drug.” If either of these fields indicated substance use affecting pregnancy, the case was included in our analysis.

The rooming-in group received care at Fir (Families in Recovery) Square, a combined care unit within BC Women’s Hospital, a major prenatal care provider and the major tertiary care centre in British Columbia for women and newborns. Fir Square, the first unit of its kind in Canada, provides care, detoxification, and stabilization for pregnant and postpartum women with problematic substance use. Mothers and their babies are cared for together in the same room, and routine care includes comprehensive education and hands-on instruction for mothers on how to care for their babies and how to identify signs of withdrawal. Fir Square is the referral centre for British Columbia and, as such, cares for particularly high-risk patients.

The standard care group received care elsewhere in British Columbia from hospitals that did not practise the same extensive prenatal and postnatal care. The nursing staff working on the maternity unit of each of these hospitals were contacted to confirm that they did not offer rooming-in to mothers with substance abuse during the

study period. The mother–infant dyads in the standard care group came from the following 12 hospitals in British Columbia: Royal Columbian, Victoria General, Surrey Memorial, Matsqui-Sumas-Abbotsford General, Burnaby General, St. Paul's, Richmond General, Lion's Gate, Royal Inland, Kelowna General, Nanaimo Regional General, and Prince George Regional.

Statistical analyses were performed using SPSS version 17 (SPSS Inc., Chicago IL). Demographic and clinical variables were summarized using descriptive statistics. Hierarchical logistic regression models were used to examine the relationships between rooming-in versus standard care and the categorical neonatal outcomes (admission to NICU, breastfeeding, symptoms of withdrawal, custody), controlling for potential covariates when appropriate (e.g., gestational age and NICU admission). Differences in the continuous neonatal outcomes (length of stay in hospital, length of stay in NICU) between rooming-in and standard care groups were examined using ANOVA.

Ethics approval for the study was provided by the University of British Columbia Clinical Research Ethics Board, and the Children's and Women's Hospital and Health Centre Research Review Committee. Further ethics approval was provided by the British Columbia Perinatal Health Program to extract data to populate the two study groups.

RESULTS

All results reported are based on analyses of singleton infants with a full range of gestational ages. However, the same analyses were conducted restricting the sample to term infants. In most instances the results did not differ, but the results of both analyses are reported where they did. The characteristics of the 952 substance-exposed newborns populating the rooming-in group ($n = 355$) and the standard care group ($n = 597$) are presented in Table 1. Differences between groups with respect to maternal age, gravidity, and parity were not significant.

Controlling for gestational age at delivery, substance-exposed newborns who received the rooming-in model of care at Fir Square had decreased odds of being admitted to NICU relative to those who received standard care at other British Columbia hospitals with NICU access (OR 0.68; 95% CI 0.51 to 0.92, $P = 0.01$). This result persisted when the analysis was restricted to term infants (OR 0.47; 95% CI 0.324 to 0.67, $P < 0.001$). Details of all newborns and term newborns who were admitted to NICU are presented in Table 2.

Newborns in the rooming-in group also had increased odds of receiving breast milk (either exclusively or in combination with formula) during their hospital stay (OR 2.11; 95% CI 1.61 to 2.77, $P < 0.001$) (Table 3), but there was no difference

between groups in breastfeeding status at discharge, either exclusively or in combination with formula (OR 0.953; 95% CI 0.67 to 1.35, $P = 0.79$) (Table 4).

There was no significant difference between groups with respect to symptoms of neonatal withdrawal (OR 1.06; 95% CI 0.79 to 1.43, $P = 0.687$). The majority of infants in both groups did not exhibit symptoms of neonatal withdrawal, as indicated in Table 5.

Detailed information regarding length of stay for both newborns and mothers is presented in Table 6. On average, newborns in the rooming-in group were admitted to hospital for almost 21 days (± 20.50), and those in the standard care group remained in hospital for approximately 11 days on average (± 19.45). Both newborn length of stay ($F = 56.20$, $df = 1,944$, $P < 0.001$) and mother's length of stay ($F = 311.76$, $df = 1,950$, $P < 0.001$) were significantly higher in the rooming-in group, but there was no difference between groups with respect to total days spent in NICU ($F = 0.004$, $df = 1,950$, $P = 0.95$). On average, newborns in the rooming-in group spent nearly 12 days (± 10.33) together with their mothers during their hospital stay. When preterm infants were excluded from the length of stay analyses, the same trends were seen in all comparisons apart from the total amount of time spent in the NICU. The total number of NICU days was significantly shorter for rooming-in infants (mean 1.1 ± 3.1 days) than for standard care infants (mean 3.1 ± 8.3 days; $F = 13.68$, $df = 1,689$, $P < 0.001$).

Finally, the newborns in the rooming-in group also had increased odds of being discharged home with their mothers compared to being discharged to foster care or adoption (OR 1.63; 95% CI 1.22 to 2.19, $P = 0.001$). Details of discharge status are presented in Table 7.

DISCUSSION

Rooming-in of substance-exposed newborns was associated with a significant decrease in neonatal admissions to NICU, a shorter NICU length of stay for term infants, increased likelihood of breastfeeding (either exclusively or in combination with formula) during the hospital stay, greater lengths of stay for both newborns and mothers, and increased odds of newborns being discharged home with their mothers. There were no significant differences between groups with respect to neonatal withdrawal symptoms or breastfeeding status at discharge, although in both groups, the majority of newborns did not exhibit withdrawal symptoms and were not breastfed (with or without formula) at discharge.

The finding that newborns in the rooming-in group were half as likely to be admitted to NICU is consistent with our preliminary study⁵ and supports the finding that mother–infant contact is beneficial for other at-risk

Table 1. Characteristics of women and their newborns in each study group

Characteristic	Rooming-in group (n = 355)	Standard care group (n = 597)	Significance
Mean maternal age, years (SD)	27.49 (6.23)	26.13 (6.13)	F = 10.986, df = 1,950, P = 0.001
Mean gravidity (SD)	3.84 (2.46)	3.32 (2.21)	F = 11.202, df = 1,950, P = 0.001
Parity			
Primiparous, n (%)	121 (34.1)	222 (37.2)	$\chi^2 = 0.929$, df = 1, P = 0.335
Multiparous, n (%)	234 (65.9)	375 (62.8)	
Mean gestational age at delivery, weeks (SD)	37.39 (4.32)	37.64 (2.61)*	F = 1.228, df = 1,937, P = 0.268
Mean birth weight, grams (SD)	2934 (681)	2971 (643)†	F = 0.723, df = 1,948, P = 0.395

*n = 584
†n = 595

Table 2. Admissions to NICU

Characteristic	All infants			Term infants only		
	Rooming-in n (%)	Standard care n (%)	Significance	Rooming-in n (%)	Standard care n (%)	Significance
NICU	138 (38.9)	231 (45.0)	OR 0.68;	60 (23.5)	142 (38.5)	OR 0.47
No NICU	217 (61.1)	282 (55.0)	P = 0.01*	195 (76.5)	227 (61.5)	P <0.001*

*Analyses were controlled for gestational age

Table 3. Babies receiving breast milk (either exclusively or in conjunction with formula) during hospital stay

Characteristic	Rooming-in group n = 353	Standard care group n = 579
Breast milk, n (%)	225 (63.7)	263 (45.4)
No breast milk, n (%)	128 (36.3)	316 (54.6)

Table 4. Breastfeeding (either exclusively or in conjunction with formula) at discharge (excluding unknowns)

Characteristic at discharge	Rooming-in group (n = 194)	Standard care group (n = 487)	Total (n = 681)
Breastfeeding, n (%)	66 (34.0)	171 (35.1)	237 (34.8)
Not breastfeeding, n (%)	128 (66.0)	316 (64.9)	444 (65.2)

Table 5. Presence of neonatal opiate withdrawal symptoms

Characteristic	Rooming-in group (n = 355)	Standard care group (n = 597)	Total (n = 952)
Presence of neonatal withdrawal, n (%)	97 (27.3)	156 (26.1)	253 (26.6)
Absence of neonatal withdrawal, n (%)	258 (72.7)	441 (73.9)	699 (73.4)

populations.¹¹ In addition, term infants from the rooming-in group admitted to the NICU had a shorter NICU lengths of stay than their standard care counterparts. Long stays in the NICU are disruptive to the infant's family and are likely to interfere with mother-infant bonding.¹⁶ As a result of such findings, policies in the United Kingdom have been changed: instead of assessing and treating infants with neonatal abstinence syndrome on the neonatal unit, they are cared for on the postnatal ward together with their mothers.¹⁷ Indeed, this has been standard of care on Fir Square since its inception over eight years ago.

The association between rooming-in and increased rates of breastfeeding during hospital stays supports our preliminary findings⁵ and those of other studies that found rooming-in promotes breastfeeding.^{11,14,18}

Table 6. Length of stay for all populations

Characteristic	Rooming-in group				Standard care group			
	n	Mean (SD)	95% CI	Range	n	Mean (SD)	95% CI	Range
All newborn LOS, days	355	20.7 (20.5)	18.6 to 22.8	0.3 to 307.3	591	10.7 (19.4)	9.1 to 12.3	0.04 to 328.7
Term newborn LOS, days	255	17.6 (11.3)	16.2 to 19.0	1.3 to 59.9	434	8.1 (12.6)	6.9 to 9.3	0.1 to 114.3
All newborn NICU days	355	5.0 (19.2)	3.0 to 7.0	0 to 307	597	5.0 (12.6)	4.0 to 6.0	0 to 177
Term newborn NICU days	255	1.1 (3.1)	0.7 to 1.5	0 to 29	436	3.1 (8.3)	2.3 to 3.9	0 to 67
Mother prenatal LOS, days	350	7.4 (14.8)	5.9 to 9.0	0.002 to 132.5	597	0.8 (3.7)	0.5 to 1.1	0.0 to 48.5
Mother postpartum LOS, days	355	14.0 (10.8)	12.9 to 15.1	0.1 to 59.4	597	3.0 (8.8)	2.3 to 3.7	0.0 to 155.4

LOS: length of stay

We expected both newborn and mother's length of stay to be higher in the rooming-in group; our program has the resources for extensive prenatal and postpartum care. Moreover, it seems this increased maternal length of stay may be an important feature of the rooming-in model. Indeed, Alexander and Korenbrot¹⁹ found that prenatal care including obstetric care and interdisciplinary support was the biggest source of benefit to at-risk populations and could decrease the risk of poor obstetrical outcomes. It seems plausible that this finding may also extend to the prenatal setting. In the current study, the Fir Square newborn length of stay was substantially greater than that found in our earlier study of a small cohort of women ($n = 32$).⁵ The length of stay reported in the current, much larger, study is considered a more accurate reflection of reality because length of stay is frequently prolonged due to inherent problems created by socioeconomic factors, especially the lack of suitable housing.⁴

Finally, while the majority of newborns in both groups were discharged with their mothers, newborns who roomed-in were more likely to remain in the custody of their mothers at discharge. Maternal retention of custody at discharge after rooming-in is in accordance with other studies that have found rooming-in to have a positive effect on mother-infant relations.^{5,10-12}

The secondary analysis of administrative data for research purposes presents a number of limitations. Failure of databases to capture such variables as morphine treatment specific to opiate-exposed dyads in a consistent manner means that the research questions are currently driven by the data. In our analysis we were unable to report instances of morphine treatment for neonatal opiate withdrawal because this variable

Table 7. Custody status at discharge (excluding transfer to another hospital or unknown status)

Status at discharge	Rooming-in group (n = 326)	Standard care group (n = 555)	Total (n = 881)
Home, n (%)	228 (69.9)*	326 (58.7)*	554 (62.9)
Foster care or adoption, n (%)	98 (30.1)	229 (41.3)	327 (37.1)

*OR = 1.63, $P = 0.001$

was not recorded. Similarly, while no significant difference was found in the presence of neonatal withdrawal symptoms, this variable is considered unreliable because the institutions vary in their reporting of less routine variables such as this.

A further limitation of our study is that we were unable to reliably report the type of illicit drugs used by pregnant women. This may have adversely affected the comparability of our groups. While the coding was available for the capture of this variable, in the majority of instances the field was incomplete or inconsistently used.

Overall, our findings indicate that this rooming-in model of care is both safe and beneficial for substance-exposed populations, because it may reduce NICU admissions, encourage breastfeeding, and support maternal custody of infants at discharge. Contrary to the current standard of care for this population, it does not seem justifiable to separate these newborns from their mothers simply because of the substance exposure, and to do so is not supported by this clinical evidence. Finally, given that this newborn population is

already high-risk for poor developmental outcomes, it seems even more important to promote the nurturing rooming-in environment immediately from birth.

Our findings have implications for the policy and practice of care of substance-using maternity populations and their newborns in British Columbia. There is direct relevance to British Columbia from a policy perspective; recently, the BC Ministry of Health Services created a framework to address how best to manage problematic substance use and addictions.²⁰ Moreover, British Columbia is developing a “comprehensive, integrated, evidence-based system of mental health and addictions services,” with a focus on “promoting health, preventing harm, treating dependency, and supporting the individual and family resiliency and self-care.”²⁰ Such characteristics are at the core of the interdisciplinary rooming-in model at Fir Square, which focuses on prenatal care and emphasizes harm reduction, as supported by Breitbart et al.²¹ However, within the BC Women’s catchment population there is sufficient demand to warrant a specific unit for providing care for substance-using mothers. This has resulted in longer lengths of stay and a high percentage of inpatient days at an “Alternative Level of Care” designation, indicating that the patient no longer requires acute care but the services or care the patient requires are not available in the community. This is a separate issue and beyond the scope of this study. It does, however, suggest that economic evaluation for providing the appropriate care for substance-using women is an important area for future study. Health service planning would benefit from cost comparisons between different care models, including supporting the mother–infant dyad using hospital resources, separation of mother–infant and inclusion of foster care, and mother–infant dyad support in the hospital and the community.

CONCLUSION

Our study has provided a foundation for future investigations to address whether rooming-in influences morphine administration for neonatal withdrawal. There are standard codes within provincial and national perinatal registries for identifying substance-using maternity patients and pharmacological interventions for neonatal withdrawal. Nevertheless, a provincial standard must be established to further define variables such as the definition of a substance-using woman. Application of consistent guidelines for identification and data abstraction within this population would lead to a better understanding of care requirements and outcomes for substance-using women and their newborns.

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