Does Distance Matter? Increased Induction Rates for Rural Women Who Have to Travel for Intrapartum Care

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Abstract

Objectives: Although there has been a devolution of local rural maternity services across Canada in the past 10 years in favour of regional centralization, little is known about the health outcomes of women who must travel for care. The objective of this study was to compare intervention rates and outcomes between women who live adjacent to maternity service with specialist (surgical) services and women who have to travel for this care.

Methods: The BC Perinatal Database Registry provided data for maternal and newborn outcomes by delivery hospital for 14 referral hospitals (selected across a range of 250–2500 annual deliveries) between 2000 and 2004. Three hospitals were selected for sub-analysis on the basis of almost complete capture of the satellite community population (greater than 90%) to avoid referral bias.

Results: Women from outside the hospital local health area (LHA) had an increased rate of induction of labour compared with women who lived within the hospital LHA. Sub-analysis by parity demonstrated that multiparous women had increased rates of induction for logistical reasons.

Conclusion: Rural parturient women who have to travel for care are 1.3 times more likely to undergo induction of labour than women who do not have to travel. Further research is required to determine why this is the case. If it is a strategy to mitigate stress incurred due to separation from home and community, either a clinical protocol to support geographic inductions or an alternative strategy to mitigate stress is needed.

Résumé

Objectifs : Bien que, au cours des 10 dernières années au Canada, nous ayons assisté à une dévolution des services de maternité ruraux locaux au profit d'une centralisation régionale, nous n'en savons que très peu au sujet des issues de santé que connaissent les femmes qui doivent se déplacer pour obtenir des soins. Cette étude avait pour objectif de comparer les taux d'intervention et les issues entre les femmes qui ont localement accès à un service de maternité offrant des soins spécialisés (chirurgicaux) et les femmes qui doivent se déplacer pour obtenir de tels soins.

Méthodes : Le *BC Perinatal Database Registry* nous a offert des données quant aux issues maternelles et néonatales par hôpital (où l'accouchement s'est déroulé), et ce, pour 14 hôpitaux de recours (sélectionnés en fonction d'une plage de 250–2 500 accouchements annuels) entre 2000 et 2004. Trois hôpitaux ont été sélectionnés en vue d'une sous-analyse, en raison d'une saisie pratiquement intégrale de la population de la communauté satellite (plus de 90 %), afin d'éviter les biais d'orientation.

Résultats : Les femmes provenant de l'extérieur de la circonscription sanitaire (CS) de l'hôpital présentaient une hausse du taux de déclenchement du travail, par comparaison avec les femmes vivant au sein de la CS de l'hôpital. Une sous-analyse par parité a démontré que les femmes multipares présentaient des taux accrus de déclenchement pour des raisons logistiques.

Conclusion : Les parturientes rurales qui doivent se déplacer pour obtenir des soins courent 1,3 fois plus de risques de subir un déclenchement du travail que les femmes qui n'ont pas à se déplacer. D'autres recherches s'avèrent requises pour déterminer les raisons de cet état de fait. S'il s'agit d'une stratégie visant à atténuer le stress attribuable au fait d'être séparée de son foyer et de sa communauté, l'élaboration d'un protocole clinique visant à soutenir les déclenchements géographiques ou d'une stratégie de rechange pour atténuer le stress s'avère requise.

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INTRODUCTION

The regionalization of health care has been strategically adopted throughout many jurisdictions in Canada as a response to the financial and organizational challenges of service delivery. The decentralization of management and planning is believed to improve efficiency through local governance and more equitable distribution of financial resources underscored by local accountability.[1] It has been acknowledged, however, that the administrative, cultural, and organizational shifts that have been precipitated by regionalization have not been subjected to comprehensive evaluation,[2] particularly within a rural setting.[3]

One consequence of regionalization in rural environments has been the devolution of local community care in favour of regional centres. This has been most notable in the area of maternity care; in British Columbia alone, 20 rural maternity services have closed since 2000.[4] Although the implications of these closures for maternal and newborn outcomes have not been documented in BC, we know from other jurisdictions that changing access to service can lead to increased neonatal morbidity and newborn days spent in intensive care nurseries[5] and increased perinatal mortality.[6]

We also have an emerging understanding of the social consequences for parturient women; these include increased out-of-pocket costs and social stress due to separation from family and community.[7,8]

This study was undertaken to compare intervention rates and pregnancy outcomes in parturient women who lived adjacent to maternity service with specialist (surgical) services with those of women who had to travel for care, in order to assess women's autonomy in decision-making and the implications for women and their families of closing maternity services for rural parturient women.

During 2004–2005, 2806 women from rural BC communities gave birth in referral centres, representing 7.1% of all BC deliveries.[9] Most did so because of a lack of available services in their home community. Women who must leave their community to give birth because of lack of services are often advised to do so at 36 weeks' gestation to avoid a precipitous delivery either in their community or en route to the referral centre. As only 50% of women give birth within one week of their due date,[10] this protocol requires women to be relocated from their homes and communities for extended periods of time and gives rise to a search for solutions to mitigate the social and physiological impact. One increasingly common solution appears to be the elective induction of labour, or "geographic induction."[11,12]

In Canada, between 3% and 23.5 % of parturient women undergo induction of labour.[13] Although Canadian data for calculating the rate of inductions that are not performed for medical or obstetrical indications ("social inductions") are limited,[14] international research indicates that there is significant variation in induction rates between hospitals and practitioners in the same jurisdictions, indicating that multiple, contextual variables affect the decision to induce labour. A study measuring social induction rates in upstate New York hospitals found a range of 11.8% to 55.5%.[15] A practice bulletin published by the American College of Obstetricians and Gynecologists notes that social induction may be performed because of the risks of rapid labour, for psychosocial reasons, or because of distance from hospital.[16] It is difficult to determine the prevalence of geographic induction (induction due to distance from a care facility) because of variable charting requirements and a lack of universal acceptance amongst care providers of the legitimacy of and criteria for induction of labour for geographic causes (J. Kornelsen and S. Moola, unpublished data 2006).

In the United States, Baxley notes that within a context of a 10-fold overall increase in induction of labour in the past 10 years, elective induction has increased 15-fold, much of the increase taking place in community rather than university hospitals. She identifies a rationale of "mutual convenience" for mother and care provider behind the increase, and points to the flexibility it affords women to make childcare and transportation arrangements.[11] The increased rates of elective inductions have also been documented in international jurisdictions where previously "aversion to the induction of labour" has been the norm.[17]

The safety of elective induction in a low-risk population is controversial; some studies suggest it leads to increased rates of Caesarean section,[12,18–20] while a small number of studies suggest no increased risk,[21–24] and one study suggests decreased rates in a nulliparous population.[25] Research to date points to significant differences in outcomes between primiparous and multiparous women, with primiparous patients experiencing an increased risk of CS compared with multiparous women who have had a previous vaginal delivery.[11,19,26–29] Regardless of outcomes, researchers have noted the potential advantages of a scheduled induction, including "avoiding journeys during labour either from distant places or in severe climatic conditions."[12]

Although the Society of Obstetricians and Gynaecologists of Canada's guidelines for induction of labour at term note that induction is sometimes performed for social or geographic reasons without a medical indication, they also point to the lack of well-designed studies evaluating induction, and they currently recommend that elective inductions be discouraged.[14] The present study compared the prevalence of induction of labour for parturient women inside and outside local referral hospital catchment areas and their attendant outcomes.

METHODS

This investigation was part of a larger multi-methods study examining the effect on referral centres of closures of small rural hospital maternity services. This part of the study specifically set out to examine differences between medical

ABBREVIATIONS

CS	Caesarean section
LHA	local health area

Table 1. Comparison of demographic variables for all women in versus out of LHA

	Total n = 3279	In LHA n = 2672	Out of LHA n = 607	*P*	Adjusted *P*
Parity nulliparous	1402 (42.8)	1131 (42.3)	271 (44.6)	NS	
Age at delivery	28.06	28.06	28.07	NS	NS
Age at delivery < 20 years	259 (7.9)	208 (7.8)	51 (8.4)	NS	NS
Age at delivery > 35 years	486 (14.8)	389 (14.6)	97 (16.0)	NS	NS
Lone parent	298 (9.1)	242 (9.1)	56 (9.2)	NS	NS
	Total n = 3173	In LHA n = 2602	Out of LHA n = 571	*P*	Adjusted *P*
Number of antenatal visits	8.88	8.92	8.71	NS	NS
	Total n = 2240	In LHA n = 1835	Out of LHA n = 405	*P*	Adjusted *P*
Pre-pregnancy weight	67.49	67.25	68.58	NS	NS

Table 2. High risk comparison in versus out of LHA

	Total n = 3279	In LHA n = 2672	Out of LHA n = 607	*P*
Induction high risk	208 (6.3)	165 (6.2)	43 (7.1)	NS
Fetal compromise	33 (1.0)	26 (1.0)	7 (1.2)	NS
Fetal demise	7 (0.2)	6 (0.2)	1 (0.2)	NS
Maternal condition	168 (5.1)	133 (5.0)	35 (5.8)	NS
CS high risk	545 (16.6)	451 (16.9)	94 (15.5)	NS
Breech	81 (2.5)	67 (2.5)	14 (2.3)	NS
Fetal compromise	80 (2.4)	65 (2.4)	15 (2.5)	NS
Repeat	233 (7.1)	197 (7.4)	36 (5.9)	NS
Placenta previa	13 (0.4)	13 (0.5)	0 (0.0)	NS
Malpresentation	127 (3.9)	100 (3.7)	27 (4.4)	NS
Active herpes	11 (0.3)	9 (0.3)	2 (0.3)	NS
Diabetes diag code	97 (3.0)	81 (3.0)	16 (2.6)	NS
Diabetes risk code	102 (3.1)	84 (3.1)	18 (3.0)	NS
Hypertension	167 (5.1)	140 (5.2)	27 (4.4)	NS
T-ACE score	3 (0.1)	1 (0.0)	2 (0.3)	NS

interventions provided for women in a referral hospital's local health area and interventions provided for women outside the LHA, with a focus on the prevalence of geographic induction. Local health areas are organizational designations and are based on census data mapping. They typically follow political and natural boundaries but do not reflect natural geographic catchment zones around rural hospitals.

A data request was submitted to the BC Perinatal Database Registry for maternal and newborn outcomes by delivery hospital for 14 referral hospitals. For the purposes of this study, a referral hospital was a hospital offering services to outlying communities with surgical obstetrical care onsite undertaken by an obstetrician or general surgeon and receiving a significant inflow of women from rural communities. The sample was selected across a range of 250–2500 annual deliveries. Hospital study sites included Kelowna General Hospital, Royal Inland Hospital (Kamloops), St. Joseph's Hospital (Courtenay), Campbell River Hospital, MSA General (Abbotsford), Kootenay Lake Hospital (Nelson), Fort St. John Hospital, Prince George Regional Hospital, Fernie District Hospital, East Kootenay Hospital (Cranbrook), West Coast General Hospital (Port Alberni), Prince Rupert Hospital, Mills Memorial Hospital (Terrace), and Kootenay Boundary Hospital (Trail).

Table 3. Comparison of maternal interventions for all women in LHA versus out of LHA

	Total n = 3279	In LHA n = 2672	Out LHA n = 607	*P*
Received epidural	350 (10.7)	286 (10.7)	64 (10.5)	NS
Labour augmented	1020 (31.1)	821 (30.7)	199 (32.8)	NS
Spontaneous vaginal delivery	2200 (67.1)	1782 (66.7)	418 (68.9)	NS
Caesarean section	789 (24.3)	659 (24.7)	139 (22.9)	NS
Emergency	508 (15.5)	422 (15.8)	86 (14.2)	NS
Elective	290 (8.8)	237 (8.9)	53 (8.7)	NS
Assisted vaginal delivery	281 (8.6)	231 (8.6)	50 (8.2)	NS
Induction	738 (22.5)	573 (21.4)	165 (27.1)	0.002
Post term	356 (10.9)	292 (10.9)	64 (10.5)	NS
PROM	87 (2.6)	71 (2.7)	16 (2.6)	NS
Logistics	9 (0.3)	3 (0.1)	6 (1.0)	0.002
Fetal compromise	40 (1.2)	32 (1.1)	8 (1.3)	NS
Maternal condition	168 (5.1)	133 (5.0)	35 (5.8)	NS
Other/unknown	78 (2.4)	42 (1.6)	36 (5.9)	< 0.001
Postpartum hemorrhage	126 (3.8)	103 (3.9)	23 (3.8)	NS
Mean postpartum length of stay	54.6	54.9	53.3	NS

We selected three hospitals for sub-analysis (West Coast General Hospital, Kootenay Lake Hospital, and Campbell River Hospital) on the basis of almost complete capture of the satellite community population (greater than 90%) to avoid referral bias.

The BC Perinatal Database Registry systematically collects data from all hospitals in the province and cross-references maternal residence by LHA with hospital of delivery annually. This allows the tracking of migration patterns of women from their home LHA to their place of delivery. Complete hospital data capture has been reported since 2000. Women were included in our study if they had given birth in the referral centres between 2000 and 2004. Analysis was done using SPSS for Windows version 15.0, (SPSS Inc., Chicago IL). When comparing women from within their home LHA with those from outside, the chi-square test was used for categorical variables and the Student *t* test was used for continuous variables.

Ethical approval for this research was given by the Behavioural Ethics Review Committee, University of British Columbia, and by the ethics review committee for each hospital in the study.

RESULTS

The findings discussed reflect data from the three hospitals selected for sub-analysis: West Coast General Hospital, Kootenay Lake Hospital, and Campbell River Hospital. Within these sites, the proportion of hospital admissions that came from outside the referral hospital LHA varied from 6% to 34%.[4] Of the 3279 women who delivered at one of the three study hospitals in 2003–2005 and who met our inclusion criteria, 2672 (81%) were residents of the hospital LHA. There were no significant differences in the demographic characteristics or risk status between women from inside and outside the LHA (Tables 1 and 2). The only significant difference in interventions was in the increased rates of induction of labour in women who had to travel for care (Table 3). Although women from outside the referral hospital LHA were only 1.3 times more likely to have labour induced than women giving birth within their LHA, women from outside the LHA were 10 times more likely to have an induction for logistic reasons and 3.7 times more likely to have an induction for other or unknown reasons. Subanalysis of reasons for induction by parity demonstrated that multiparous women from outside the LHA were 3.4 times more likely to be induced for other or unknown reasons. Nulliparous women who gave birth outside their LHA were 4.9 times more likely to be induced for other or unknown reasons than were nulliparous women from within the LHA. There were no clinically significant differences in newborn outcomes between the women who delivered within and outside their LHA (Table 4).

Table 4. Comparisons of reasons for induction for multiparous and nulliparous women in LHA versus out of LHA

Multiparous Women	Total n = 1877	In LHA n = 1541	Out of LHA n = 336	*P*
Induction (all)	387 (20.6)	299 (19.4)	88 (26.2)	0.005
Post term	176 (9.4)	149 (9.7)	27 (8.0)	NS
PROM	42 (2.2)	35 (2.3)	7 (2.1)	NS
Logistics	8 (0.4)	3 (0.2)	5 (1.5)	0.001
Fetal compromise	21 (1.1)	17 (1.1)	4 (1.2)	NS
Maternal condition	84 (4.5)	63 (4.1)	21 (6.3)	NS
Other/unknown	56 (3.0)	32 (2.0)	24 (7.1)	< 0.001
Nulliparous Women	**Total n = 1402**	**In LHA n = 1131**	**Out of LHA n = 271**	***P***
Induction (all)	351 (25.0)	274 (24.2)	77 (28.4)	NS
Post term	180 (12.8)	143 (12.6)	37 (13.6)	NS
PROM	45 (3.2)	36 (3.2)	9 (3.3)	NS
Logistics	1 (0.1)	0 (0)	1 (0.4)	NS
Fetal compromise	19 (1.3)	15 (1.3)	4 (1.5)	NS
Maternal condition	84 (6.0)	70 (6.2)	14 (5.2)	NS
Other/unknown	22 (1.6)	10 (0.9)	12 (4.4)	< 0.001

DISCUSSION

Although the findings of this study are specific to induction of labour, they are significant because they point to an emerging trend in rural health services delivery that reflects challenges to organization of the system. Even within a relatively small population, the findings of this study demonstrate increased logistical induction rates for multiparous women from rural areas who travel for maternity care. Although of marginal clinical significance because of the small number of cases, the increase in reported logistical inductions likely represents the tip of the iceberg due to under-reporting. We suspect that differences in the "other" category, which are of much greater clinical significance, are likely related to the same phenomenon. Interestingly, the increase in logistic inductions likely represents a patient-initiated phenomenon, because we have previously found that some parturient women are requesting induction of labour when they reach term in order to expedite travel back to their home communities.[30]

This raises the question of the level of autonomy in decision-making afforded to women who must leave their communities to give birth, particularly if they have other children at home. Within the context of decision-making in health care, we have come to give priority to patient autonomy, because when informed of the risks and benefits of treatment options, patients have the most cogent understand of the course of care that is best for them.[31–33] An autonomous choice, however, bears weight only if the decision is informed by an array of reasonable alternatives. Increasing attention has been paid to the contextual or situational nature of decision-making, illustrated through the concept of "relational autonomy," which strives to emphasize that decision-making is contingent on inter-related influences and connections and that decisions are socially shaped from within this context.[34]

When this is applied to rural women's requests for geographic induction, it allows us to understand the conditions surrounding their requests, namely the social stress of being away from the home community, particularly for women who already have children to care for. In these instances, psychosocial stress results in the request for a clinical intervention that will reduce the length of stay. Ironically, multiparous women have the lowest likelihood of a complicated delivery but experience greater stress than nulliparous women because of either logistical challenges involved in planning for the care of other children or the decision to remain at home until the onset of labour and the consequences of a precipitous delivery en route to the hospital.[30] The findings of this study suggest that a clinical protocol for induction for logistical reasons is not associated with adverse outcomes for the multiparous population and has the potential to reduce social stress. A positive clinical finding based on this research was the lack of a relationship between geographic induction and an increased rate of CS. This is consistent for multiparous populations in other studies as well.[11,19,26–29]

Table 5. Comparison of newborn outcomes for all women in LHA versus out of LHA

	Total n = 3273	In LHA n = 2667	Out of LHA n = 606	*P*
Mean birth weight (g)	3533.70	3540.29	3504.68	NS
< 2500 g	76 (2.3)	64 (2.4)	12 (2.0)	NS
< 1500 g	11 (0.3)	10 (0.4)	1 (0.2)	NS
	Total n = 3272	In LHA n = 2667	Out of LHA n = 605	*P*
Apgar scores				
< 5 @ 5 mins	30 (0.9)	25 (0.9)	5 (0.8)	NS
< 7 @ 5 mins	49 (1.5)	42 (1.6)	7 (1.2)	NS
	Total n = 3257	In LHA n = 2650	Out of LHA n = 607	*P*
Prematurity				
< 37 weeks	166 (5.1)	134 (5.1)	32 (5.3)	NS
< 34 weeks	32 (1.0)	28 (1.1)	4 (0.7)	NS
< 32 weeks	24 (0.7)	21 (0.8)	3 (0.5)	NS
< 28 weeks	11 (0.3)	9 (0.3)	2 (0.3)	NS
	Total n = 3279	In LHA n = 2672	Out of LHA n = 607	*P*
Resuscitation				
Oxygen	875 (26.7)	709 (26.5)	166 (27.3)	NS

The limitations of this study include the use of LHAs as units of analysis for the comparison of outcomes. Grouping all women by LHA is imprecise, because women live at varying distances from the referral hospital, and the stress associated with access will vary according to this distance. That said, the three referral communities included for sub-analysis (Campbell River General Hospital, Kootenay Lake Hospital, and West Coast General Hospital) were chosen because of the significant distance travelled by women from the out-of-LHA group. Furthermore, the population size for this study was limited by the exclusion of the majority of sites where results could have potentially been confounded by referral bias. This is problematic, as much larger sample sizes are required to detect differences in serious adverse maternal and neonatal outcomes. A large-scale study (N > 60 000) to compare maternal and neonatal outcomes of deliveries within and outside communities with specialist (surgical) maternity care services is currently underway. This study will be adequately powered to detect significant differences in maternal and neonatal mortality and morbidity and shed additional light on the impact of geographic relocation for birth. Finally, although analysis of high-risk status was undertaken, the influence of additional potential confounders including smoking or First Nations status could not be accounted for.

There are both clinical and methodological implications of these findings. If requests for clinical interventions in the form of elective inductions are part of a patient-generated solution, a framework for recording and monitoring prevalence of requests and outcomes is necessary. Currently, it is likely that we are under-reporting requests for elective induction by rural women because of the possibility of stigma associated with care providers undertaking any obstetrical intervention that is not essential (J. Kornelsen and S. Moola, unpublished data 2006). This stigma is in part due to the lack of a decision-making framework to guide practitioners through patient requests.[35] More accurate data collection will enhance the development of evidence-based strategies for care and potentially remove some of the stress from the decision-making process for both women and providers.

CONCLUSION

Rural parturient women who have to travel for care are more likely to undergo induction of labour than women who do not have to travel. The methodological implications of this study include the need for more accurate catchment definitions to better describe rural health outcomes by place of residence. The current protocol of facilities-based reporting does not account for the health of a population by

geography because referral patterns and bias in referring to tertiary care facilities cannot be accounted for. Attending to the development of geographic catchments for health outcomes reporting will aid in monitoring the health implications of the trend towards increased rates of elective induction of rural parturient women.

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