



Collaborative Primary Maternity Care in Rural Environments

Symposium Proceedings

Empire Landmark Hotel, Vancouver BC
May 16, 2011

Co-hosted by the Centre for Rural Health Research
and Perinatal Services BC
Funded by the Canadian Institutes for Health Research



Collaborative Primary Maternity Care in Rural Environments: Towards a Sustainable Model of Care

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Executive Summary

The *Collaborative Primary Maternity Care in Rural Environments Symposium* on May 16, 2011 in Vancouver, BC, co-hosted by the Centre for Rural Health Research and Perinatal Services BC, was organized with the following objectives:

1. To create a forum for discussion and brainstorming interdisciplinary, collaborative solutions between disciplines and decision makers to best meet the needs of rural women and babies;
2. To develop and apply the idea of a “virtual birthing suite” on a provincial level;
3. To explore and document any perceived or actual barriers to interdisciplinary practice in order to develop solutions and suggest alternatives.

Presentations and the participants’ discussions highlighted current challenges and solutions for primary maternity care in rural communities, which the Centre for Rural Health Research compiled and thematically organized. A complete list of “Opportunities for Action” can be found on page 26 of these proceedings.

Participants at the meeting consisted of rural primary maternity care providers from throughout the province, as well as representatives from Perinatal Services BC, the BC Ministry of Health Services, the University of British Columbia, the Midwives’ Association of BC, the College of Midwives of BC, and the BC regional health authorities (see Appendix A for full list).

The presentations at the outset of the symposium began with a welcome and introductions led by co-hosts Dr. Stefan Grzybowski and Dr. Jude Kornelsen, co-directors of the Centre for Rural Health Research, and Alex Sheiber of the BC Ministry of Health Services.

Research presentations from Drs. Grzybowski and Kornelsen outlined the context of rural maternity care in British Columbia and the challenges facing birthing families, care providers, administrators, and policy makers. Significant findings from the presentations are summarized below:

Introduction, Background, and Context

- Birthing women and care providers incur significant social, financial, and physiological stress when accessing maternity care away from their home community.
- Care providers experience significant stress supporting maternity care in low-volume, geographically isolated rural health service environments, with limited access to locum support and continuing medical education opportunities.
- Although there has been a significant decline in the number of rural communities offering local maternity care in BC over the last 10 years, the data show that as the level of (surgical) service in a community increases, so does the number of women who can give birth locally.
- Study of maternal-newborn outcomes in rural BC has found that distance from care impacts health, including rates of perinatal death, premature delivery, admission to NICU2, induction of labour, and psychological stress to the mother.
- GP Surgery plays a significant role in sustainable local maternity care for small rural communities. Through GP Surgery-led services, 75% of women can remain in the community to have babies. However, GP Surgeons experience significant professional and regulatory challenges.

Planning Sustainable Rural Maternity Services

- In response to the lack of existing policy planning tools for rural maternity services, the Centre for Rural Health Research developed a three-stage planning model, building on the Rural Birth Index (RBI).
- The RBI is a mathematical model that weights key community characteristics (population, isolation, and social vulnerability) and calculates a score for maternity service level needs, ranging from no local

maternity services to local access to services provided by a specialist. (See *Appendix B*.)

- The RBI model “flags” under- and over-served communities, allowing planners to review services in communities that may have an unsuitable level of service. Communities with an inappropriate level of service will experience poorer perinatal outcomes.

Models of Rural Interprofessional Collaboration

- Rural primary maternity care providers in the province face specific funding, regulatory, and lifestyle challenges. These challenges are felt acutely by rural midwives and impede the growth of interprofessional teams.
- Potential solutions for rural interprofessional teams hinge on the development of equitable, appropriate, and sustainable funding models that encourage collaboration between rural midwives and physicians.

Monitoring System Outcomes

- There have been improvements in rural data reporting by Perinatal Services BC through the “rural spreadsheets.”
- Future outcomes reporting would be served by the utilization of the three-stage planning model, building on the Rural Birth Index (RBI).

In the final session of the day, participants reflected on the context of primary maternity care in the province; highlighted existing challenges to appropriate, sustainable collaborative care; and discussed opportunities for action. An expansive list of challenges and potential solutions is included on p. 26 in the “Opportunities for Action” section of these proceedings.

Agenda

Interdisciplinary Primary Care in Rural Environments: Towards a Sustainable Model of Care

May 16, 2011

Empire Landmark Hotel, Vancouver, BC

A Symposium funded by the Canadian Institutes of Health Research

Symposium Objectives:

1. To create a forum for discussion and brainstorming interdisciplinary, collaborative solutions between disciplines and decision makers to best meet the needs of rural women and babies;
2. Developing and applying the idea of the “virtual birthing suite” on a provincial level;
3. Exploring and documenting any perceived or actual barriers to interdisciplinary practice in order to develop solutions and suggest alternatives.

Monday, May 16, 2011

7:30am - 8:30am	Breakfast
8:30am - 9:15am	Introduction, Background, and Context Dr. Stefan Grzybowski , Co-Director, Centre for Rural Health Research and Professor, University of British Columbia Department of Family Practice Dr. Jude Kornelsen , Co-Director, Centre for Rural Health Research and Assistant Professor, University of British Columbia Department of Family Practice
9:15am - 10:00am	Introduction to Potential Models of Interprofessional Collaboration in Rural Communities
10:00am - 10:30am	How Interprofessional Collaboration Works in a Rural Context
10:30am - 10:45am	Break
10:45am - 12:00pm	Break-out Group Discussion: Interprofessional Collaboration Based on Different Levels of Service
12:00pm - 1:00pm	Lunch and Networking
1:00pm - 1:30pm	How to Organize the “Virtual Birthing Suite” at the Provincial Level
1:30pm - 2:30pm	Small Group Discussion: Applications of the “Virtual Birthing Suite” to Four Service Delivery Levels
2:30pm - 3:00pm	Small Group Report: Highlights of Discussion to the Whole Group
3:00pm - 3:15pm	Break
3:15pm - 4:00pm	Draft a Collaborative Plan for Sustainable Interprofessional Primary Maternity Care in Rural Communities
4:00pm - 5:00pm	Draft of Rural Interprofessional Primary Maternity Care Plan and Discussion of Follow-up Tasks. Discuss Date for Follow-up Teleconference Call Between Interest Groups

Foreword

Underscoring current challenges in health services planning are the difficulties of involving and integrating all stakeholders in the “solutions” discussion. The *Collaborative Primary Maternity Care in Rural Environments* symposium had a range of professional representation from the key disciplines involved in providing rural maternity services alongside planners with responsibility for establishing and sustaining rural maternity services. Getting people around the table, however, is only the first step. The discussion must be marked by an openness to considering alternative perspectives and letting go of constricting professional and governmental interests.

During the course of the day, areas of interprofessional disagreement were brought to the table and openly discussed. Some areas of discussion had solutions; others became mired in the larger context of rural health services planning. Payment models, for example, were identified as being a significant barrier to interprofessional collaboration between midwives and physicians. It became clear that changes to funding models would underlie significant change in practice. The group recognized, however, that these ideas were encumbered by a system of *a priori* funding agreements that provided significant barriers to change. This recognition, however, did not deter discussion of alternative models. Suggested solutions recognized the need for innovation and working around structures that are unlikely to change — like the relative value fee guide. Ways of augmenting these existing agreements to make physicians’ remuneration comparable to midwives — thus facilitating collaborative practice — were on the table. Whether or not agreement is achieved, there was value in opening the discussion.

The timing of this meeting is significant. It reflects the evolving landscape of rural health services including service crises in rural communities in not only maternity care but also emergency services and full service family practice. It is also a response to the growing pressure for midwifery services province-wide. Further, the timing of the meeting reflects changes in provincial politics and the new priorities that often accompany such changes, in this instance a focus on a “Family First Initiative.”

The implicit goal of the symposium was “to create a forum for discussion and brainstorming interprofessional collaborative solutions between disciplines and decision-makers to best meet the needs of rural women and babies.” Highlighting the needs of rural women or, as one decision-maker says, “Putting moms and babes at the top of the org chart,” grounded the day in a common approach. Foundational to this was the integrated knowledge translation approach defined by involving policy makers and planners in initial dialogue between and among practitioners.

The day ended with discussions of multiple opportunities for action including innovative approaches to funding, mechanisms for enhancing interprofessional collaboration, enhancing communication around patient care, supporting the integration of midwifery into rural and environments, and strategies to enhance recruitment and retention of rural health care providers. Perinatal Services BC, a co-host of the meeting, is a logical coordinator for many of these action items and a body through which accountability can be facilitated.

The symposium provided a rich set of recommendations for the General Practice Services Committee, Ministry of Health, the Regional Health Authorities, professional organizations (BCMA, MABC), and educators to consider as the next round of rural perinatal planning begins. Ultimately, all who participated in the meeting have a common responsibility in ensuring best services for women and families in British Columbia.

Jude Kornelsen and Stefan Grzybowski
Co-Directors, Centre for Rural Health Research

Working sessions

1. Introduction, Background, and Context

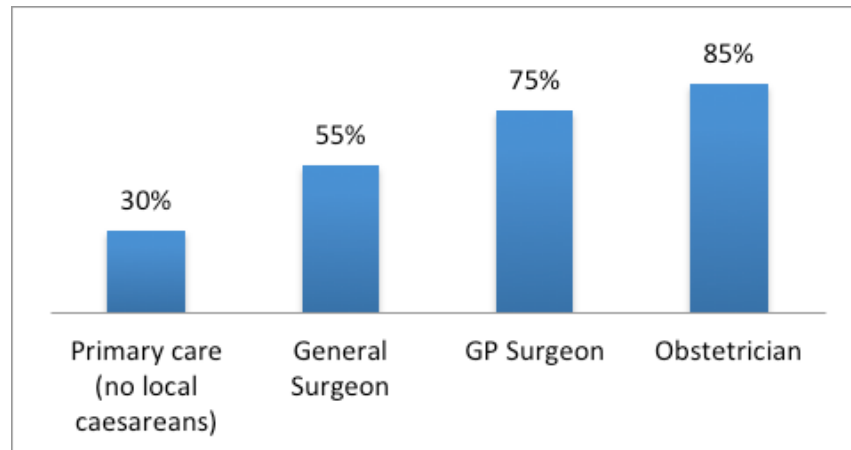
Drs. Grzybowski and Kornelsen welcomed the participants and asked Alex Sheiber (Ministry of Health Services) to provide a message from the ministry. Mr. Sheiber's introduction included the following observations:

- Improving access to maternity care is part of the new premier's Family First initiative.
- Sustainability in rural environments has been challenging due to a significant care provider shortage, care providers' unwillingness to work in remote areas, challenges of interprofessional teams, low patient volumes, and limited geographic access.
- Incentives for care providers to work in rural environments are insufficient in increasing the rural workforce, though they have made some difference (for instance, see the General Practice Services Committee, Maternity Care for BC [MC4BC] initiative).
- This primary care symposium builds on a number of different initiatives from years past, including the Multi-disciplinary Collaborative Primary Maternity Care Project (MCP²) and the Maternity Care Enhancement Project (MCEP).
- The Perinatal Services BC (PSBC) Maternity Care Project begun in 2011 includes an inventory of existing maternity services and seeks to learn the composition of interprofessional teams in the province and the qualities that make such teams succeed.
- This symposium will promote discussion leading to the development of a provincial action plan for primary maternity services in BC, with special attention to the unique challenges facing services in rural communities.

Drs. Kornelsen and Grzybowski then gave a presentation on the goals and context of the symposium. They outlined the context of rural maternity care in British Columbia, presenting data from their extensive program of research. Findings presented included descriptions of rural women's experiences of accessing maternity care:

- Rural birthing women's experiences are characterized by financial, social, cultural, and physiological stress. Aboriginal women experience this stress more acutely than their non-Aboriginal counterparts due to the importance of community to their birth experiences, kinship ties, and cultural needs.
- Dr. Kornelsen has interpreted women's needs in childbirth through an adaptation of Maslow's hierarchy of needs, whereby women need to have their primary physiological and safety needs met (access to services; security and predictability of care) before they can have their social and personal needs met (love and belonging through social support; positive childbirth experience).
- Many rural women do not have even their primary needs met because of lack of appropriate access to maternity services. Dr. Kornelsen shared some stories from her studies:
 - One family from Port Hardy stayed in a referral community for 6 weeks before and after the delivery of their child. They never recovered from the financial costs of this extended stay and were forced to sell their home.
 - One woman from the remote community of Bella Bella was so motivated to access midwifery care that she regularly flew to an urban centre for routine midwifery visits throughout her pregnancy and for her delivery.
- Rural care providers also incur stress in supporting access to maternity care.

Dr. Grzybowski then presented quantitative data on rural women's utilization of intrapartum care by service level and patient outcomes stratified by service level. There has been a precipitous decline in the number of hospital offering intrapartum services over the past 10 years. As the level of services in a community increases, so does the number of women who can give birth locally:



Maternity service closures are due to a confluence of reasons: physician distribution; rural recruitment and retention issues; decreased birth rate; improved road access; provincial health services policy (a regionalized health care system with care centered in large referral communities). Proposed solutions to health human resource challenges include: expanding the scope of practice for rural care providers; improving incentive plans for physicians and nurses; and encouraging interprofessional models of care.

Dr. Grzybowski then presented research on the theme “Distance Matters” with regard to maternal and newborn outcomes. Existing research from Canadian and international studies finds that small hospitals perform almost as well as large hospitals in serving populations. These small centres are 1.4x more likely to have a neonatal death (Moster, 2001), which shows that birth is relatively safe. The social and cultural risks of removing birth from these small centres are significant. High outflow communities, which are typically small, experience higher costs and higher maternal stress (Nesbitt, 1990). Perinatal mortality is higher for rural women who live further from hospitals (Lisonkova, 2010) and women who live more than 20 minutes from hospital have increased mortality (Ravelli, 2010). The Rural Pregnancy Experience Scale (RPES) finds that rural women are 7x more likely to experience moderate to high stress during pregnancy (Grzybowski et al, 2011).

A study of maternal and newborn outcomes in rural BC (Grzybowski et al, 2011) also found that “distance matters” in childbirth. This study defined catchment areas for hospitals (1 hr travel time), defined the obstetrical service level for each hospital, and through a BC Perinatal Health Database cohort analysis linked outcomes by residence of mother (postal code). Findings for newborn outcomes include these highlights:

- Perinatal deaths by service level were highest if a mother lived 4+ hours from care.
- GP Surgeon-led services have fewer premature births than mixed models; the authors hypothesize that this is due to reduced maternal stress in giving birth close to home.
- Rates of admission to NICU2 were higher in women living 1-2 hours away from services than women in obstetrician-led communities.
- Infants whose mothers lived 1-2 hours away from care spent more days in the NICU.

Study of maternal outcomes also found that distance from care impacted health. Rural birthing women are 1.3x more likely to receive an induction if they live 2-4 hours from care. Qualitative data determined that these “geographic inductions” reflected women’s desire to return home. Unplanned out of hospital births spiked for women living 1-2 hours from care.

GP Surgery plays a significant role in sustainable local maternity care for small rural communities. The specialization has a long history in Western Canada and communities fight hard to maintain their surgical services. Through GP Surgery-led services, 75% of women can remain in the community to have babies. Birthing women in GP Surgery communities have decreased risk of prematurity, admission to NICU 2, and perinatal mortality is less than in communities without local access to cesarean section (controlled and adjusted for influencing factors). Erosion of these services coincides with regionalization, where concerns about regional resources do not always coincide with the needs and desires of services in individual communities.

GP Surgeons experience significant professional and regulatory challenges, including:

- No professional college,
- No health authority support for privileging,
- No regulatory or credentialing structure,
- No formal education program in BC limits the supply,
- Urban-centric specialists train GP Surgeons in Alberta,
- Most GP Surgeons recruited internationally (i.e. South Africa), and
- Retirement of long-established GP Surgeons.

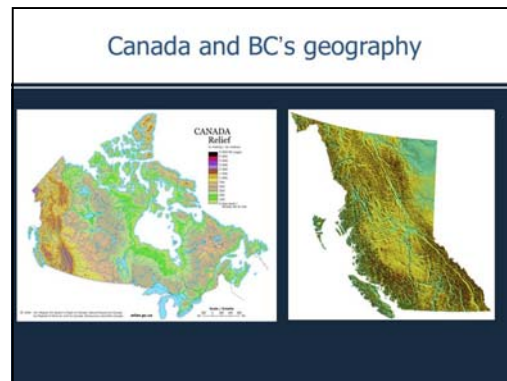
There are efforts to establish a formal GP Surgery training program through UBC. Currently, students graduating from medical school who want to pursue GP Surgery must acquire funding from the BC Rural Education Action Plan (REAP), and find a mentor themselves.

Session 1: Slideshow



Objectives

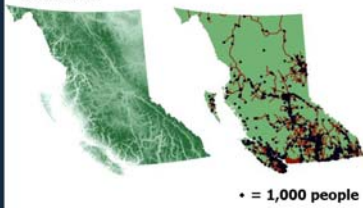
- To explore the relationship between community need and appropriate and sustainable level of service;
- To review current data on maternal-newborn outcomes related to access to services and service model;
- To discuss the challenges and potential of inter-professional maternity care in rural environments.



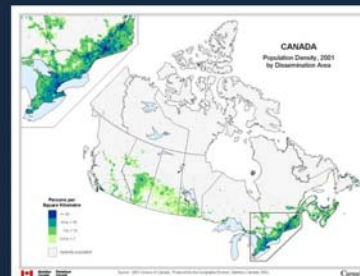


British Columbia's Geography and Population Distribution

British Columbia's geography is epitomized by the variety and intensity of its physical relief, which has defined patterns of settlement and industry since colonization.



Canada's Population Density



	BC	Canada
Population	4,510,858	33,304,000
Area (km ²)	944,735	9,970,610
Density (pop. /km ²)	4.7	3.30
% of Aboriginal	5%	3.8%
% Living Rurally	15%	22%
Motor Vehicles per 1,000 Population		584
GNI PPP* Per Capita, 2007 (US\$)		\$35,310

	BC	Canada
Birth Rates (per 1000)	9.8	11
Lifetime Risk of Maternal Death - 1 Woman in:		11,000
Total Fertility Rate (TFR)	1.5	1.6
Births Attended by Skilled Health Personnel (%)	99%	98%
Infant Mortality Rate (infant deaths per 1,000 live births)	4.44	5.4

LEVEL OF MATERNITY SERVICE AND POPULATION BIRTH OUTCOMES FOR RURAL BRITISH COLUMBIA, 2000-2004



Objective

- To compare population based provincial maternal and newborn outcomes by distance to access services and level of local services catchments for 2000-2004

Rural Pregnancy Experience Scale (RPES)

- The RPES is a reliable and valid measure of the stress rural parturient women experience during their pregnancy.
- Women without local access to obstetric services were **7 times** more likely to experience moderate/high stress

Foundational Research

Black D, Fyfe I. (1984) The safety of obstetric services in small communities in northern Ontario. CMAJ 130: 571-576	<ul style="list-style-type: none"> Northern Ontario populations served by small hospitals with limited facilities Hospitals had perinatal mortality rates similar to populations served by larger secondary or tertiary facilities despite lower rates of interventions.
Rosenblatt RA, Reinken J, Shoemaker R (1985) Is obstetrics safe in small hospitals? Evidence from New Zealand's regionalized perinatal system. Lancet 2: 429-432	<ul style="list-style-type: none"> New Zealand, nation-wide For infants greater than 1500 g, the lowest levels of birthweight specific perinatal mortality were in Level 1 facilities.
Nesbitt TS, Connell FA, Hart LG, Rosenblatt RA. (1990) Access to obstetric care in rural areas: Effect on birth outcomes. Am J Public Health 80 (7): 814-818	<ul style="list-style-type: none"> Rural Washington State Communities which were high outflow had a greater proportion of complicated deliveries, higher rates of prematurity, and higher costs of neonatal care than low outflow communities.
Visaia K, Gissler M, Hemminki E. (1994) Birth outcomes by level of obstetric care in Finland: a catchment area based analysis. J Epidemiol Community Health 48 (4):400-405.	<ul style="list-style-type: none"> Finland, large, population-based survey Compared birth outcomes for catchment areas of different levels of care provided in hospitals Found no statistically significant difference in any outcomes between the different levels of care.
Mooster D, Terje Lie R, Markestad T. (2001) Neonatal mortality rates in communities with small maternity units compared with those having larger maternity units. Br J Obstet Gynaecol 108:904-909.	<ul style="list-style-type: none"> Norway Examined neonatal mortality in geographic areas served by different sized maternity units Found statistically significant small increases in risk of neonatal death for smaller maternity units

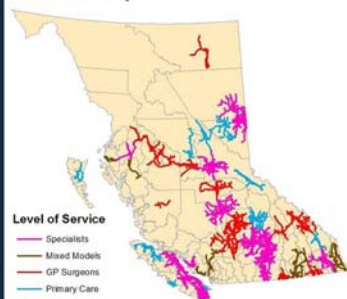
More Recent Research

Zhong-Cheng Luo et al. (2010) Birth outcomes and infant mortality by the degree of rural isolation among First Nations and Non-First Nations in Manitoba	<ul style="list-style-type: none"> 150,000 births in Manitoba 1991 - 2000 Rural vs urban comparison based on proportion of workforce commuting to urban areas. Non-First Nations rural residents had higher mortality, no rural urban gradient for First Nations outcomes.
Lisonkova, S et al. (2010) Birth outcomes among older mothers in rural vs urban areas: a residence-based approach.	<ul style="list-style-type: none"> Women age > 35 - 30,000 births 1999 to 2003 in BC Rural (< 10,000 population) vs urban (> 10,000) and focusing on older mothers For rural women increased OR of 1.5 (CI 1.01 - 2.14) for perinatal death, decreased OR for C/S 0.85 (CI 0.79 - 0.91)
Ravelli ACJ et al. (2010) Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands.	<ul style="list-style-type: none"> 750,000 births 2000 to 2006 Netherlands 20 minutes or more travel time from home to hospital was associated with increased total mortality OR 1.17 (CI 1.002 - 1.36)

Methods

- Define unique catchment area for each rural hospital using postal codes
- Define obstetrical care service levels
- British Columbia Perinatal Health Database cohort analysis
- Link perinatal outcomes by residence of mother

Local Health Areas Overlayed by 1 Hour Hospital Catchments



Definition of Service Level

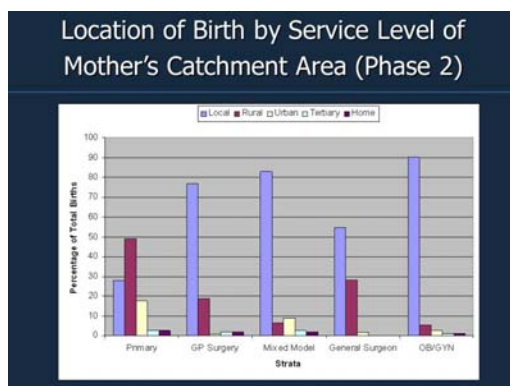
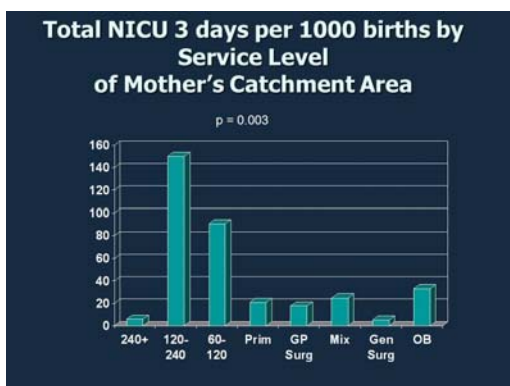
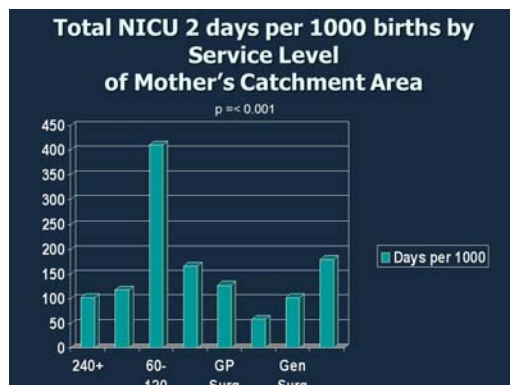
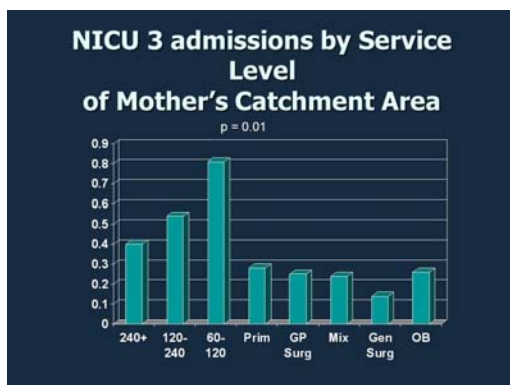
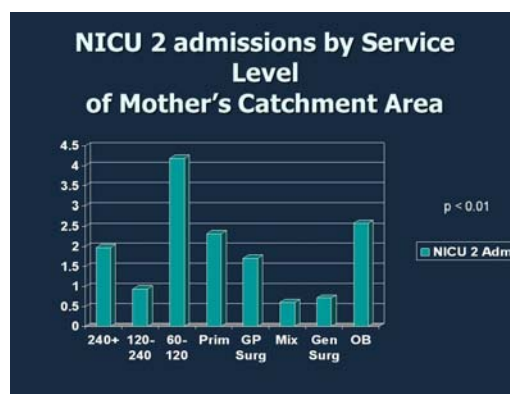
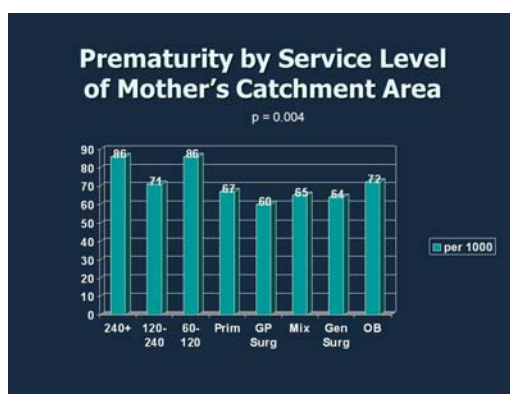
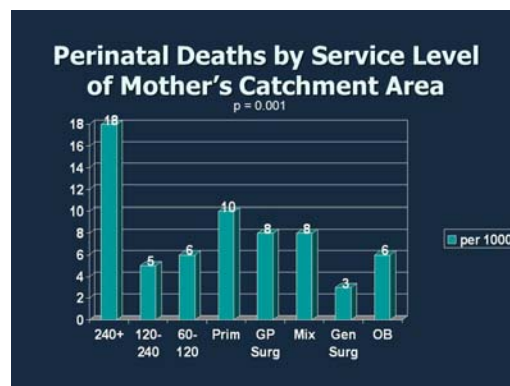
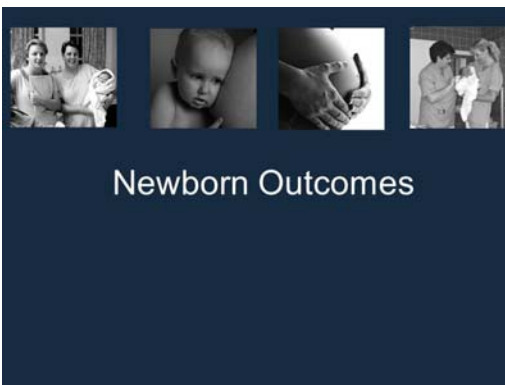
Service Level	Definition of Service Level	# of Catchment Areas	# of Births
240+	Greater than 240 minutes (4 Hours) from maternity services	15	506
121-240	121-240 minutes (2-4 Hours) from maternity services	19	747
61-120	61-120 minutes (1-2 Hours) from maternity services	23	1,359
Primary	No local C-section availability (Mat Care Via Family Physician)	16	2,884
GP Surgery	C-section provided by GP surgeons only	20	5,147
Mixed Model	C-section provided by GP surgeon or Specialist	15	5,945
General Surgeon	C-section provided by General Surgeon	2	2,147
OB/GYN	C-section provided by Obstetrician	17	30,667
Total		127	49,402

Data Analysis

- Exclude mothers who gave birth to twins and multiples and babies with fetal anomalies
- Bi-variate analysis to test sig. associations between outcomes and obstetric service levels
- Regression modelling to test predictors of neonatal and maternal outcomes.

Background

- Rural parturient women are increasingly being evacuated from their home communities to access services in referral centres [14-18].
- This is part of a general trend towards the centralization of care [19].
- Recent qualitative research has suggested that rural parturient women from communities without local maternity services experience high degrees of stress and anxiety due to the actual or potential evacuation from their community for labour and delivery [14,20-24].



Conclusions

- In British Columbia lack of local access to intrapartum services is associated with increased rates of neonatal admission to NICU 2 beds and longer stays in both NICU 2 and NICU 3 beds.
- Greater than 4 hour travel time to access services is associated with 3 times higher perinatal mortality

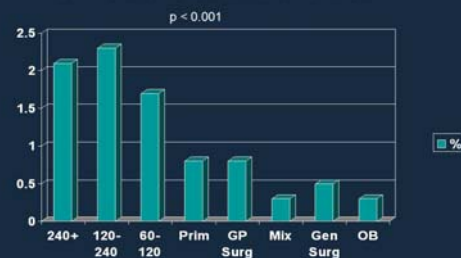


Maternal Outcomes

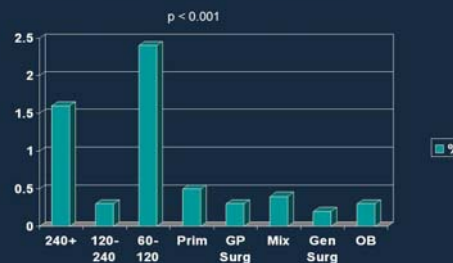
Inductions by Service Level of Mother's Catchment Area



Logistics as a Reason for Induction by Service Level of Mother's Catchment Area



Birth Outside Hospital by Service Level of Mother's Catchment Area



Conclusions

- In British Columbia women who have to travel 2 to 4 hours to access maternity services are 1.3 x's more likely to receive an induction and the reason is logistics of care.
- Women who live 1 to 2 hours from a maternity service were 9.6 x's more likely to experience an unplanned out of hospital delivery.

Summary Conclusions

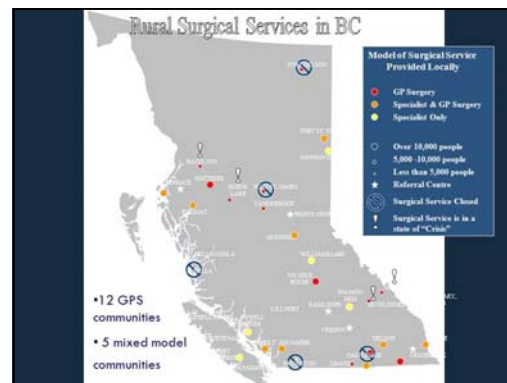
- Lack of local access to maternity services in British Columbia is associated with significant perinatal consequences for rural women and families.

Costs of NICU days in BC

- Average public cost of a NICU 2 Day :
 - \$1300
 - Private Cost - \$1700
- Average public cost of a NICU 3 Day:
 - \$2500
 - Private cost - \$4300

GP Surgery Maternal and Newborn Outcomes 2000 to 2007

- In 2000, there were 76 communities in western Canada with local surgical services provided by GP surgery and GP anesthesia teams.
- Twenty of these services were located in British Columbia. Currently, in British Columbia only 15 of these communities continue to offer local surgical services.



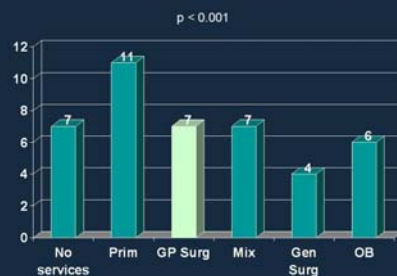
Challenges Experienced by GP Surgeons include:

- Lack of collegial and health authority support,
- Lack of provincial regulatory structure (procedural privileging occurs at the Health Authority level), and
- Lack of formal training avenues and continuing medical education (CME) opportunities

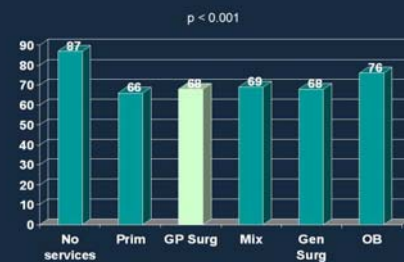
Definition of Service Level (2000-2007)

Service Level	Definition of Service Level	# of Catchment Areas	# of Births
No local services	Greater than 240 minutes (4 Hours) from maternity services to 61-120 minutes (1-2 Hours) from maternity services	55	4,672
Primary	No local C-section availability (Mat Care Via Family Physician)	16	4,569
GP Surgery	C-section provided by GP surgeons only	15	9,174
Mixed Model	C-section provided by GP surgeon or Specialist	8	10,295
General Surgeon	C-section provided by General Surgeon	2	3,840
OB/GYN	C-section provided by Obstetrician	17	54,714
Total		115	87,294

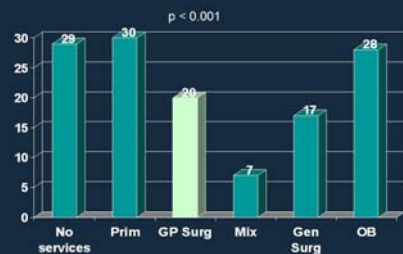
Perinatal mortality per 1000 by Service Level of Mother's Catchment Area



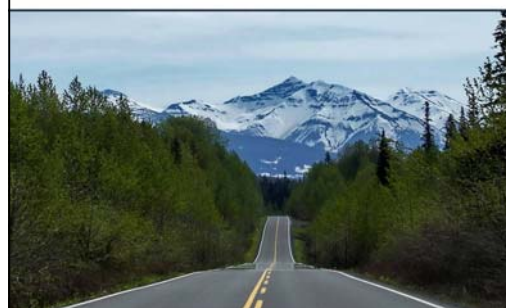
Prematurity (< 37 wks per 1000) by Service Level of Mother's Catchment Area



NICU 2 admissions per 1000 by Service Level of Mother's Catchment Area



Distance Matters



Total NICU 2 days per 1000 by Service Level of Mother's Catchment Area



Total NICU 3 days per 1000 by Service Level of Mother's Catchment Area



Conclusions

- Mothers residing in GP surgery communities are at significantly decreased risk of having a premature baby (OR's=0.86).
- Mothers residing in GP surgery communities are at significantly decreased risk of having their infant admitted to NICU 2 (OR's=0.69), compared to mothers residing in level 6 communities.
- Perinatal mortality was 1.6 times more likely to occur if Mothers resided in communities with primary mat care without local C Section

2. Planning Sustainable Rural Maternity Services

Rural maternity service planning, Dr. Grzybowski outlined, takes place in an ad-hoc manner, usually in response to a local crisis. Due to the absence of planning tools for rural maternity services, the Centre for Rural Health Research developed a three-stage model. This planning model builds on the Rural Birth Index (RBI), a mathematical model that weights key community characteristics (population, isolation, and social vulnerability) and calculates a score for maternity service level needs, ranging from no local maternity services to local access to services provided by a specialist. A detailed description of the RBI and its utility for maternity service planning can be found in Appendix B. A summary of the tool is outlined below.

The Rural Birth Index

The development of the RBI was informed by a recognition that in the special circumstances of rural and isolated communities, two dominant characteristics are predictive of rural service sustainability: population characteristics and degree of isolation. The model was tested against a sensitivity analysis and extensive qualitative data from field-work in 23 communities.

The formula is $RBI = (PBS \times APV) + IF$

PBS (Population Birth Score)

The average number of births in a hospital's one hour catchment over 5 years divided by 10

IF (Isolation Factor)

The degree of isolation based on travel time to cesarean section services

APV (Adjustment for Population Vulnerability)

A social vulnerability score derived from BC Statistics, ranging from 0.8 (advantaged) to 1.4 (disadvantaged)

The RBI score for a community correlates to a recommended service level, as follows:

RBI Score	Recommended Service Level
0-7	No local intrapartum services
7-9	Local intrapartum services without operative delivery
9-14	Local GP Surgical services
14-27	Mixed model of Specialists and GP Surgeons
>27	Specialist service

The RBI model “flags” under- and over-served communities, allowing planners to review services in communities that may have an unsuitable level of service. Communities with an inappropriate level of service will experience poorer perinatal outcomes. For instance, over-served communities will likely have high intervention rates while under-served communities may experience out-of-hospital and unassisted deliveries.

The proposed health service planning model for rural maternity care aims to 1) objectively measure need, 2) address feasibility issues, and 3) provide transparency of equitable services between rural communities. To that end, the three-stage planning process consists of:

- 1) **Determining** the appropriate level of service to meet the needs of a given community based on size of birthing population and degree of isolation using the Rural Birth Index (RBI);
- 2) Assessing the **feasibility** of implementing the proposed model of care based on community characteristics;
- 3) Considering the potential implementation within the planning **priorities** of the Health Authority.

This model is premised on the understanding that when a community has a level of service that is too high or too low for its population need, the service will be unsustainable and lead to suboptimal outcomes. Communities with too high a level of service will likely encounter higher intervention rates (i.e. more cesarean sections), may undermine the sustainability of intrapartum services in surrounding communities, and may experience problems with recruitment and retention of care providers. Sites with a level of service that is below the level of population need will encounter increased physiological and social morbidity. When a community has an optimal level of service for its population's needs, it is more likely to encounter optimal outcomes and be more sustainable in the long-term.

Once a community's appropriate level of service has been determined using the Rural Birth Index, feasibility issues should be considered—what are the human resource, physical infrastructure, fiscal, and transportation issues that need to be addressed at the planning table in order to provide a given rural community with an appropriate level of maternity service? Once these feasibility issues have been considered, planners would then consider current administrative, political, and spending priorities.

This model differs from current approaches to rural maternity service planning, in that it provides an evidence-based, proactive planning approach that privileges the needs of birthing women. Current ad-hoc approaches to service planning are more likely to consider human resource availability, political mandates, or financial priorities *before* population need. These “top-down” approaches have led to unsustainable service planning for many rural communities.

Session 2: Slideshow

Planning Rural Maternity Services: A Three Stage Process

How are Rural Health Services Planned?

- Review of Health Services Policy Literature
- “Closer to Home” BC Royal Commission 1992
- Romanow Report 2002
 - “Currently there is no coherent national approach for addressing issues specific to rural communities” including:
 - “the lack of consensus on what ‘adequate’ access should include”
 - “the challenges of serving the smallest and most remote communities”

Goals of a Hypothetical Planning Tool

- Objectively Measure Need
- Address Feasibility Issues
- Provide Transparency of Equitable Services between Rural Communities

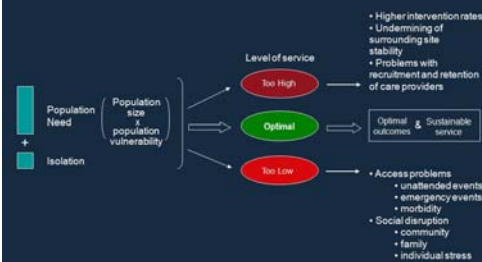
Rural Maternity Service Closures in British Columbia Since 2000



NICU 3 admissions per 1000 by Service Level of Mother's Catchment Area



I. Deterministic Stage



The RBI Model

A health service delivery tool to determine the appropriate level of rural maternity service for a given rural community population.

RBI Formula

$$RBI = (PBS \times APV) + IF$$

RBI: Rural Birthing Index

PBS: Population Birthing Score

APV: Adjustment for Population Vulnerability

IF: Isolation Factor

East Kootenay, British Columbia



Local Health Areas Overlayed by 1 Hour Hospital Catchments



Adjustment for Population Vulnerability (APV)

- Social vulnerability is represented by a score derived from a BC stats composite score (range -1 to +1) of several social indicators* and is weighted in the RBI between:

0.8 (advantaged) to 1.4 (disadvantaged)

* Overall regional socio-economic index including levels of: human economic hardship, crime, health problems, education concerns, children and youth at risk.
www.bccstats.gov.bc.ca/data/sep11_rbi/rbi_main.asp

RBI Model: Proximity to nearest cesarean section service

Measured by an Isolation Factor (IF):

Surface travel time is weighted as follows:

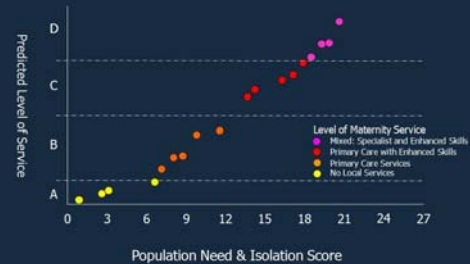
< 30 minutes	= -3
31-45 minutes	= -2
46-60 minutes	= -1
61-90 minutes	= 1
91-120 minutes	= 2
2-4 hours	= 3
> than 4 hours	= 4

* If Cesarean Section provided locally then distance to next service is calculated as if existing local service was closed.

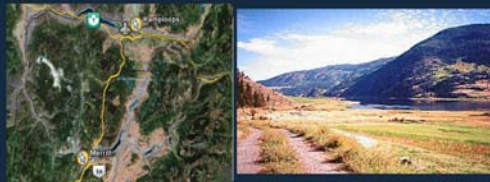
Three-stage planning process for rural maternity care services

- Determining** the appropriate service level to meet the needs of a given community based on size of birthing population and degree of isolation using the Rural Birth Index (RBI);
- Assessing the **feasibility** of implementing the proposed model of care based on community characteristics;
- Considering potential implementation within the planning **priorities** of the Health Authority.

Theoretical Relationship Between Population Need/Isolation and Sustainable Service Level (<25,000 rural population catchments)



Merritt



Merritt

Data: Average # of births (5 years): 105 → **RBI Factors:** PBS: 10.5
 Socio-economic status: 0.87 → **Adjustment for Population Vulnerability (APV): 1.35**
 Travel Time to C/S: 53 minutes → **Isolation Factor (IF): -1**
RBI = (10.5 x 1.35) - 1 = 13.2

Recommended level of service: Local intrapartum services with operative delivery

II. Feasibility Stage



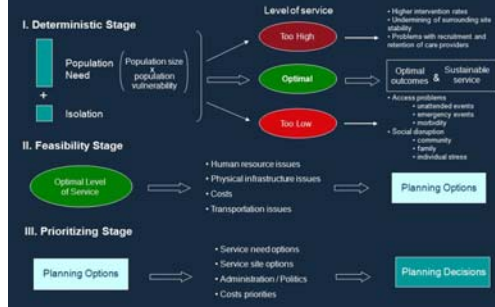
Level of Maternity Services and Population Need



III. Prioritizing Stage



Three-Stage Planning Phases for Locating Rural Maternity Services



What does the RBI Score mean?

The calculated score corresponds to the appropriate level of service for a given rural service catchment population in contemporary British Columbia:

0–7	No local intrapartum services
7–9	Local intrapartum services
without	operative delivery
9–14	Local GP Surgical Services
14–27	Mixed model of specialists and GPS
>27	Specialist service

Recommendations for planning rural maternity services

- Map rural services both current and recently active and assign service level.
- Define catchment areas based on surface travel time to each service. (GIS or alternative)
- Score each catchment using the RBI tool by linking to perinatal data.
- Sequence catchments by RBI score and assess natural cut offs for service levels
- Examine outliers in detail. Sensitivity analysis.

3. Models of Rural Interprofessional Collaboration

The growth of midwifery in rural BC faces many challenges. The Centre for Rural Health Research has hosted three symposia to date on the barriers and solutions to sustainable rural midwifery and interprofessional collaboration. The centre has also pursued a program of research on interprofessional collaboration in rural BC, the findings from which include models of collaboration between midwives and other maternity care providers.

The research took place in four BC communities – Campbell River, Creston, Smithers, and Trail – each of which had a different level of service and composition of maternity care teams. In rural communities, the care providers involved in the web of care include midwives, family physicians, obstetricians, GP Surgeons, general surgeons, pediatricians, nurse practitioners, nurses (labour and delivery, surgical, and public health), as well as community health workers and peer support groups. This study highlighted that the introduction of midwifery to rural communities must include measures to ensure the stability of existing care providers, who provide a generalist range of services to the community. Although the integration of midwifery may be perceived as a threat to some physicians and nurses, there is a significant demand for midwifery care from birthing women.

Dr. Kornelsen outlined the specific funding, regulatory, and lifestyle challenges that rural care providers face in attempting to create interprofessional teams. Some of these barriers include:

- There is no obstetrical *on-call remuneration* family physicians, dis-incenting rural doctors from practicing maternity care;
- There are *no formal mechanisms or funding structures* to support interprofessional collaboration in rural environments;
- Midwives face difficulties in *obtaining privileges* at some rural hospitals, preventing the establishment of interprofessional teams; and
- Midwives and physicians have differences in scope of practice that pose challenges to shared care and continuity of care.

Individual professions also face significant barriers to practice. GP Surgeons, who are the lynchpin of maternity care in many rural communities, have no formal training, accreditation, or professional support. Rural nurses experience stress in rural obstetric practice due to low volume of deliveries, and lack of hands-on experience. Nurses with midwifery training (typically from international jurisdictions) face logistical challenges in working as both a nurse and midwife, juggling both shift and on-call work and switching back and forth between professional roles. Symposium participants noted that in New Zealand, midwifery-led primary maternity care is a model where midwives can take on either community caseloads or hospital-employed shift work, and they can move between these environments at different stages in their life. Some saw the potential for elements of this model to be built into a model of interprofessional collaboration for rural BC. For instance, health authorities could post job positions for applicants that have both nursing and midwifery skills. As midwives have achieved an expanded scope of practice in BC, so too could nurses.

Dr. Kornelsen outlined a number of hypothetical models of primary maternity care, including three models for interprofessional collaboration, including the potential benefits, costs, and issues of feasibility. She then provided recommendations for rural sustainability of primary maternity care, including on-call funding for family physicians, a start-up stipend for rural midwives, improved communication between referral and satellite communities, a regional approach to supporting midwives' applications for hospital privileges, and ongoing evaluation of outcomes.

Barriers to interprofessional collaboration in BC are numerous, but the issue of chief discussion amongst participants was the lack of funding models to support sustainable collaborative practice. Symposium participants observed that interprofessional teams must continue to pool their funds in an ad-hoc manner or the provincial government must change existing funding schemes to facilitate collaborative models of practice.

Dr. Kornelsen ended her session with an observation that, beyond equitable pay schemes, interprofessional collaboration depends on a number of abstract qualities: mutual respect, trust, clarity around roles and responsibilities, flexibility, adaptability in approaches to care, and communication.

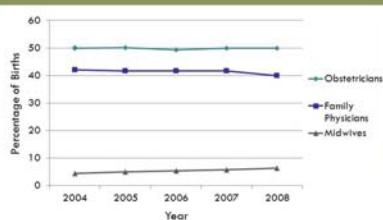
Session 3: Slideshow

Models of Rural Inter-professional Collaboration for Primary Maternity Care

Primary Maternity Care Providers in Rural BC

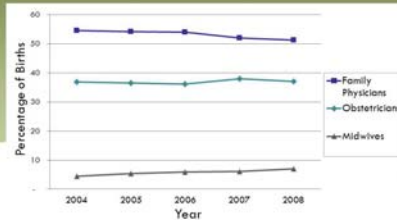


Health Human Resources



Distribution of Maternity Care in British Columbia, 2004-2008
Average – 41,000 births per year

Health Human Resources



Distribution of Maternity Care in Rural British Columbia, 2004-2008
Average – 13,000 births per year



Family Physicians

55% of rural births performed by family physicians

Challenges

- No on-call remuneration for maternity call for rural Family Physicians (disincentive compared to ER call rate)
- Lack of nurses with maternity training
- Lack of mechanisms to support inter-professional collaboration in rural environments
- Lifestyle concerns of new grads
- Lack of anonymity in rural communities for care providers

Registered Midwives

19.2% of Registered midwives practice in rural and semi-rural communities

Challenges

- Midwifery funding model does not reflect the realities of rural practice, leading to burn-out
- Currently no formal shared care models exist supporting the collaboration of rural midwives and general practitioners (one informal shared care model exists)
- Lack of inter-professional support
- Difficulties obtaining privileges at some rural hospitals

GP Surgeons

GPS are currently practicing in 15 communities in British Columbia

Challenges

- No formal program of training, accreditation, and support for GP Surgeons
- Where GP Surgery programs exist, local maternity care is more sustainable
- Evidence supports the conclusion that GP Surgeons provide safe care

Nurses

Challenges

- Rural maternity nursing shortage due to retirement, limited recruitment, and generalist training of new graduates (limited maternity exposure)
- Lack of training in obstetrics makes providing rural intrapartum care a stressful experience
- Rural physicians identify that rural nursing is the most important issue underpinning their sustainability
- Question: Have rural maternity programs been sustained by foreign-trained nurse midwives?

OBs and General Surgeons

3% of OB-GYN's practice in rural Canada

Challenges

- Small work volume and staffing shortages make specialists reluctant to work in rural communities
- Rural specialists are often the sole surgical service, requiring 24/7 on-call surgical back-up

Top Challenges of Care Providers in BC

- Rural maternity **nursing shortage** due to retirement, limited recruitment, and generalist training of new graduates (limited maternity exposure)
- No **on-call remuneration** for maternity call for rural Family Physicians
- Midwifery funding** model does not reflect the realities of rural practice, leading to burn-out
- Lack of mechanisms to support **inter-professional collaboration** in rural environments
- No formal **program of training**, accreditation, and support for GP Surgeons

Models of Primary Maternity Care

Model A: Physician-based service with no local C/S

Model B: Midwifery-based service with no local C/S

Model C: Physician-based service with local C/S

Model D: Integrated physician and midwifery-based service with local C/S

Model E: Midwife-Physician Collaboration

Model F: Independent physician + midwifery practices [parallel practice]

Model A: Physician-based service with no local C/S

Description

- Local maternity services supported by at least 3 FTE physicians all with maternity skills.
- On-call maternity nurse rota supported by call-back funding

Benefits

- Ability to meet the maternity care needs of some women within the community (approx. 30-50%)
- Honouring the importance of local birth to the community as a whole
- Better perinatal outcomes for the population than with no local intrapartum services

Challenges

- No local caesarean section back-up
- High risk moms must travel to referral communities
- Retaining physicians comfortable with providing intrapartum care in a low-resource environment
- Recruitment and retaining of physicians and nurses with maternity skills
- Recruitment and retention of maternity care nurses
- Maintenance of maternity skills due to low volume
- Transport issues due to inclement weather

Model A: Physician-based service with no local C/S

Feasibility Issues

1. Professional Issues

- Challenge of recruitment & retention of providers
- Attractiveness of positions to providers
- Challenge of appropriate coverage for time off call (eg. CME, holidays)
- Need for strong and supportive relationship with referral centre obstetrician(s)
- Need for locums with maternity skills

2. Funding

- Cost of CME for maternity skill maintenance for physicians
- Cost of CPD for maternity skill maintenance for nurses
- Need for incentives to support enhanced skill providers (nurses and doctors; MOCAP/on-call premiums for nurses)

Model A: Physician-based service with no local C/S

Feasibility Issues continued

3. Transport and Travel

- Need for subsidized travel for women from outlying communities
- Need for increased funding for First Nations women
- Seasonal weather challenges to evacuation of women with pregnancy complications

4. Risk management

- Necessity of having a reliable regionalized perinatal transport system for evacuating women in emergency situations
- Quality improvement/assessment programs (MoreOB)
- Clear criteria for women who can attempt local birth

5. Community Issues

- Need for clear community understanding of risks and benefits of local birth
- Good communication with referral community to ensure needs of moms are met (accommodations, access to services, doula support)

Model B: Midwifery-based service with no local C/S

Description

- Midwives providing primary maternity care to local community (min. 2 midwives)
- Expanded role for midwife (ex. well-woman care; sexual education in school)
- Pre- and postnatal outreach to satellite communities; no midwifery deliveries outside of community where there are travel challenges
- On-call maternity nurse rota supported by call-back funding

Benefits

- Midwifery care in more rural communities
- Availability of home birth
- Midwifery model of care well suited to meet the needs of a high risk/ vulnerable population
- Ability to meet the maternity care needs of some women within the community (approx. 30-50%)
- Honouring the importance of local birth to the community as a whole
- Better perinatal outcomes for the population than with no local intrapartum services

Model B: Midwifery-based service with no local C/S

Challenges

- Onerous on-call responsibilities for midwives
- Challenge of attracting midwives to the community
- Challenges of low-resource environment for care (home birth)
- Very low volume of births limiting midwifery practice
- Need for mechanism to define roles and responsibilities between midwives, nurses, and PHN's
- High risk moms must travel to referral communities
- Transport issues due to inclement weather

Model B: Midwifery-based service with no local C/S

Challenges

- Onerous on-call responsibilities for midwives
- Challenge of attracting midwives to the community
- Challenges of low-resource environment for care (home birth)
- **Very low volume of births limiting midwifery practice**
- Need for mechanism to define roles and responsibilities between midwives, nurses, and PHN's
- High risk moms must travel to referral communities
- Transport issues due to inclement weather

Model B: Midwifery-based service with no local C/S

Feasibility Issues

- Regulatory Issues
 - Feasibility of practice without reasonable proximity to cesarean section
- Professional Issues
 - Midwives perform a specialized function and require a certain number of births to maintain satisfaction in practice
 - Attractiveness of positions to midwives
 - Challenge of appropriate coverage for time off call (eg. CME, holidays)
 - No locum program for midwives
 - Need for strong and supportive relationship with referral centre obstetrician(s)

Model B: Midwifery-based service with no local C/S

Feasibility Issues

- Funding
 - Need for a service contract as fee-for-service billing is unsustainable in this model
- Transport and Travel (see Model A)
 - Cost and time spent for travel to provide outreach to satellite communities
- Risk Management
 - Necessity of having a reliable regionalized perinatal transport system for evacuating women in emergency situations

Model B: Midwifery-based service with no local C/S

Feasibility Issues

- Funding
 - **Need for a service contract as fee-for-service billing is unsustainable in this model**
- Transport and Travel (see Model A)
 - Cost and time spent for travel to provide outreach to satellite communities
- Risk Management
 - Necessity of having a reliable regionalized perinatal transport system for evacuating women in emergency situations

Model C: Physician-based service with local C/S

Description

- Local maternity services supported by at least 2 FTE physicians: all with maternity skills and at least 1 with surgical skills and 1 with anesthesia skills
- On-call maternity nurse ratio supported by call-back funding with at least 2 nurses with surgical/OR skills
- Functional OR
- Expanded surgical scope of practice to sustain GP Surgery or cesarean-section only

Benefits

- Ability to meet the maternity care needs of the majority of women within the community
- Increased overall complement of services in the community (ex. Emergency services)
- Better perinatal outcomes for the population than with no local intrapartum services
- If expanded surgical services available: Ability of hospital to meet more community needs

Challenges

- Recruitment of physicians with specialized skills
- Recruitment and retention of OR/maternity care nurses
- Maintenance of surgical skills due to low volume
- Transport issues due to inclement weather
- Travel time to nearest cesarean section service
- If OR services limited to cesarean-section only: Challenges to sustaining OR

Model C: Physician-based service with local C/S

Feasibility Issues

1. Regulatory Issues
 - **Lack of consistent regulatory framework for GP Surgeons**
2. Professional Issues
 - **Challenge of recruitment & retention of providers**
 - Attractiveness of positions to providers
 - Challenge of appropriate coverage for time off call (eg. CME, holidays)
 - No locum program for GP Surgeons and GP Anesthetists
 - Need for strong and supportive relationship with referral centre obstetrician(s)
3. Funding
 - Expense of OR infrastructure and operating costs
 - Cost of CME for specialized skill maintenance for physicians
 - Cost of CPD for specialized skill maintenance for nurses
 - **Need for incentives to support enhanced skill providers (nurses and doctors): MOCAP/on-call premiums for nurses)**

Model D: Integrated physician and midwifery-based service with local C/S

Description

- Mid-wife and physician providing primary maternity care to local community with physician-based surgical back-up
- Supported by 1 mid-wife and at least 1 physician working together in shared practice (ex. Shared call for labour and delivery; independent patient roster)
- Home birth with second attendant back-up from nurses or other qualified community members
- Expanded role for mid-wife (ex. well-woman care; sexual education in school)
- Pre- and postnatal outreach to satellite communities; no mid-wifery deliveries outside of hospital catchment due to travel challenges
- On-call maternity nurse ratio supported by call-back funding
- Expanded surgical scope of practice to sustain GP Surgery or cesarean-section only

Benefits

- Increased choices for birthing women in the community
- Availability of home birth
- Mid-wifery model of care well suited to meet the needs of a high risk/ vulnerable population
- Ability to meet the maternity care needs of the majority of women within the community
- Better perinatal outcomes for the population than with no local intrapartum services
- If expanded surgical services available: Ability of hospital to meet more community needs

Model D: Integrated physician and midwifery-based service with local C/S

Challenges

- Low volume of births limiting midwifery practice
- Current regulatory challenges of shared care between physicians and midwives (ex. Funding and scope of practice)
- Need for mechanism to define roles and responsibilities between midwives, nurses, and PHN's
- Recruitment and retention of physicians with specialized skills and midwives
- Recruitment and retention of nurses with enhanced skills
- Maintenance of maternity skills due to low volume
- Transport issues due to inclement weather
- Travel time to next cesarean section service
- If OR services limited to cesarean-section only: Challenges to sustaining OR

Model D: Integrated physician and midwifery-based service with local C/S

Feasibility Issues

1. Regulatory Issues
 - Need to reconcile differing scopes of practice between physicians and midwives
2. Professional Issues
 - Need for mutual consultative framework
3. Communication
 - Need for clear structures for sharing patient information
 - The need for a community of practice to support the midwife (ex. contact with midwives from other rural communities)
4. Funding
 - Midwife could be paid through salaried/contract position
 - Challenge of cross-billing (ex. midwives billing for physician/patient care)
 - Decreased physician remuneration for maternity care due to presence of midwife
 - Need for a service contract as fee-for-service billing is unsustainable in this model

Model F: Collaborative call + community midwifery practice

Description

- Shared call between physicians and midwives and Community based midwifery practice including home birth (2 midwives minimum)
- Maternity nurses as potential second attendants for home births
- Group prenatal care led by midwife and GP (Centering Pregnancy Model)
- Collaborative postpartum care (PHN's, lactation consultant, midwives and physicians)

Model G: Independent physician + midwifery practices [parallel practice]

Description

- Physician call group
- Independent community-based full scope midwifery practice (Minimum 2 midwives)

Recommendations for Rural Sustainability

1. Increased recruitment and retention through on-call funding of rural GPs doing maternity care
2. A start-up stipend for rural midwives
3. Increased mechanisms of communication between hospital and community-based care providers in regional and satellite communities
4. A regional approach to supporting midwives
5. The allocation of resources to facilitate the introduction of midwifery
6. An inclusive process to determine the model of inter-professional care in communities
7. Ongoing evaluation of outcomes

Barriers to Inter-professional Collaboration in BC

Barriers	Specific Challenges
Leadership provided by the professional and regulatory organizations	<ul style="list-style-type: none"> • Resistance to homebirth and physician back-up from the College of Physicians and Surgeons • Physicians responsible for reviewing requests for hospital privileges
Home birth	<ul style="list-style-type: none"> • College statements denouncing support for homebirth • Midwives must offer choice in place of birth; cannot share call with physicians who do not attend home births
Remuneration and reimbursement	<ul style="list-style-type: none"> • Midwives are paid by course of care; physicians are paid through fee-for-service • No funding models to support interprofessional collaboration
Liability issues	<ul style="list-style-type: none"> • Physicians fear being held legally responsible for bad outcomes at midwife-led births
Scopes of Practice	<ul style="list-style-type: none"> • Different scopes of practice can cause inconsistencies in shared care environments <ul style="list-style-type: none"> • Prescription privileges; tests and diagnostic choice in place of birth; instruments and procedures; and postpartum care.

Remuneration Barriers to Inter-professional Collaboration in BC

Barriers	Participant quotes
Funding as a proxy for respect	"We are undervalued and under-funded. It doesn't pay to do obstetrics around here. The consequences to your lifestyle for the amount of money you get just isn't worth it." [Participant 19:17]
Perceived inconsistencies in MOCAP guidelines	"The argument around making sure you're not getting reimbursed for covering your own patients doesn't work in a regional setting where they closed two hospitals and you're getting an influx of more than a hundred orphaned patients a year." [Participant 15:288]
The reality of competing call schedules	"For reasons that are not entirely clear the family physicians who provide obstetrical care in this province are not paid to do call ... From a financial point of view it doesn't make sense for a family physician to put their life on hold, not being able to schedule things with their children ... on the off chance that somebody might come in labour." [Participant 8:14]
Financial losses for physicians	"I was working [on-call] for \$472 an hour. I made more cutting fish at Safeway before I went to university." [Participant 12:143]

Qualities of Inter-professional Collaboration

- Mutual respect
- Trust
- Clarity around roles and responsibilities
- Flexibility
- Adaptability in approaches to care

4. Monitoring System Outcomes

Dr. Grzybowski gave a short session on data reporting and outcomes monitoring of perinatal health in rural communities. He spoke to the improvements in rural data reporting by the PSBC through the “rural spreadsheets” and discussed how the Rural Birth Index and its associated 3-Stage Planning Process could facilitate better rural primary maternity quality assurance and improvement initiatives.

Session 4: Slideshow

Monitoring System Outcomes

Monitoring Outcomes of Rural Catchments and Services

Demonstrate the potential strengths of reporting by maternity service Catchment population versus by traditional Local Health Area (LHA).

- Introduction of Rural Spreadsheets

Local Health Areas

British Columbia's Geography and Population Distribution

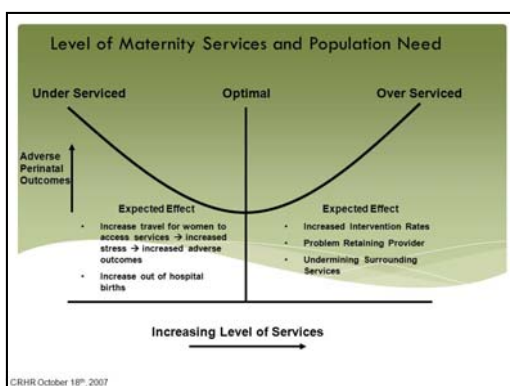
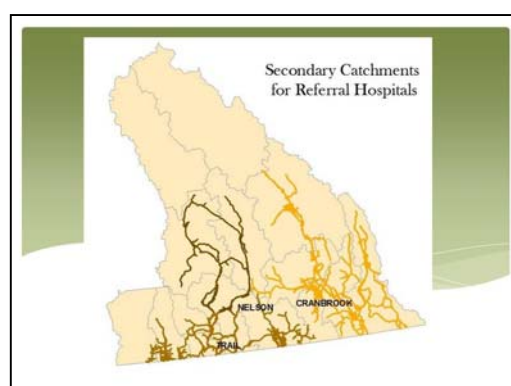
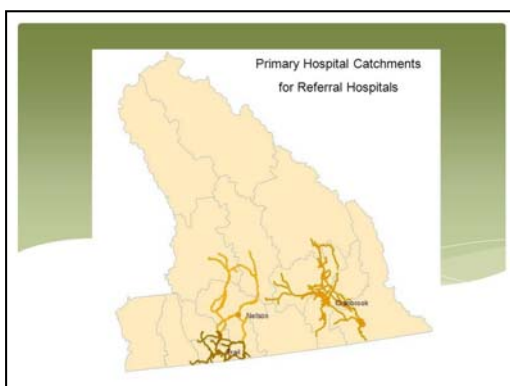
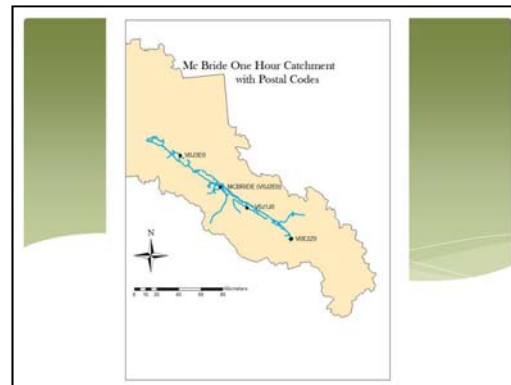
British Columbia's geography is epitomized by the variety and intensity of its physical relief, which has defined patterns of settlement and industry since colonization.

• = 1,000 people

Local Health Areas Overlayed by 1 Hour Hospital Catchments

Level of Service

- Specialists
- Specialist
- GP Surgeons
- Primary Care



[illegible]

The diagram is a geological cross-section showing various rock units and their relationships. The units are color-coded and labeled as follows:

- Green units (Sedimentary rocks):**
 - Top green layer: *Sandstone*
 - Second green layer: *Siltstone*
 - Third green layer: *Shale*
 - Fourth green layer: *Claystone*
 - Fifth green layer: *Limestone*
 - Sixth green layer: *Dolomite*
 - Seventh green layer: *Gypsum*
 - Eighth green layer: *Halite*
 - Ninth green layer: *Anhydrite*
 - Tenth green layer: *Marl*
 - Eleventh green layer: *Sandstone*
 - Twelfth green layer: *Siltstone*
 - Thirteenth green layer: *Shale*
 - Fourteenth green layer: *Claystone*
 - Fifteenth green layer: *Limestone*
 - Sixteenth green layer: *Dolomite*
 - Seventeenth green layer: *Gypsum*
 - Eighteenth green layer: *Halite*
 - Nineteenth green layer: *Anhydrite*
 - Twentieth green layer: *Marl*
 - Twenty-first green layer: *Sandstone*
 - Twenty-second green layer: *Siltstone*
 - Twenty-third green layer: *Shale*
 - Twenty-fourth green layer: *Claystone*
 - Twenty-fifth green layer: *Limestone*
 - Twenty-sixth green layer: *Dolomite*
 - Twenty-seventh green layer: *Gypsum*
 - Twenty-eighth green layer: *Halite*
 - Twenty-ninth green layer: *Anhydrite*
 - Thirtieth green layer: *Marl*
- Yellow units (Igneous rocks):**
 - Top yellow layer: *Granite*
 - Second yellow layer: *Diorite*
 - Third yellow layer: *Gabbro*
 - Fourth yellow layer: *Basalt*
 - Fifth yellow layer: *Andesite*
 - Sixth yellow layer: *Rhyolite*
 - Seventh yellow layer: *Trachyte*
 - Eighth yellow layer: *Dacite*
 - Ninth yellow layer: *Obsidian*
 - Tenth yellow layer: *Basalt*
 - Eleventh yellow layer: *Andesite*
 - Twelfth yellow layer: *Rhyolite*
 - Thirteenth yellow layer: *Trachyte*
 - Fourteenth yellow layer: *Dacite*
 - Fifteenth yellow layer: *Obsidian*
 - Sixteenth yellow layer: *Basalt*
 - Seventeenth yellow layer: *Andesite*
 - Eighteenth yellow layer: *Rhyolite*
 - Nineteenth yellow layer: *Trachyte*
 - Twentieth yellow layer: *Dacite*
 - Twenty-first yellow layer: *Obsidian*
 - Twenty-second yellow layer: *Basalt*
 - Twenty-third yellow layer: *Andesite*
 - Twenty-fourth yellow layer: *Rhyolite*
 - Twenty-fifth yellow layer: *Trachyte*
 - Twenty-sixth yellow layer: *Dacite*
 - Twenty-seventh yellow layer: *Obsidian*
 - Twenty-eighth yellow layer: *Basalt*
 - Twenty-ninth yellow layer: *Andesite*
 - Thirtieth yellow layer: *Rhyolite*
- Red units (Metamorphic rocks):**
 - Top red layer: *Schist*
 - Second red layer: *Gneiss*
 - Third red layer: *Quartzite*
 - Fourth red layer: *Mylonite*
 - Fifth red layer: *Amphibolite*
 - Sixth red layer: *Eclogite*
 - Seventh red layer: *Marble*
 - Eighth red layer: *Schist*
 - Ninth red layer: *Gneiss*
 - Tenth red layer: *Quartzite*
 - Eleventh red layer: *Mylonite*
 - Twelfth red layer: *Amphibolite*
 - Thirteenth red layer: *Eclogite*
 - Fourteenth red layer: *Marble*
 - Fifteenth red layer: *Schist*
 - Sixteenth red layer: *Gneiss*
 - Seventeenth red layer: *Quartzite*
 - Eighteenth red layer: *Mylonite*
 - Nineteenth red layer: *Amphibolite*
 - Twentieth red layer: *Eclogite*
 - Twenty-first red layer: *Marble*
 - Twenty-second red layer: *Schist*
 - Twenty-third red layer: *Gneiss*
 - Twenty-fourth red layer: *Quartzite*
 - Twenty-fifth red layer: *Mylonite*
 - Twenty-sixth red layer: *Amphibolite*
 - Twenty-seventh red layer: *Eclogite*
 - Twenty-eighth red layer: *Marble*
 - Twenty-ninth red layer: *Schist*
 - Thirtieth red layer: *Gneiss*

The diagram also shows various geological features such as faults, folds, and unconformities. The faults are labeled as *Normal fault*, *Reverse fault*, and *Strike-slip fault*. The folds are labeled as *Anticline* and *Syncline*. The unconformities are labeled as *Erosional unconformity* and *Angular unconformity*.

[illegible]

5. Group Discussion

Throughout the day, symposium participants commented on barriers to sustainable primary rural maternity care and strategies for better meeting the needs of rural birthing women. At the close of the day, a general group discussion yielded further strategies and insights. The content of this discussion is summarized below, while the bulk of the day's discussion is organized thematically in the ensuing pages.

Discussion

Volume of deliveries: How do we give care providers enough patients?

- Good funding = access to more training = sustainable practice
- Administrators and health authorities could take a top down approach and remove red tape where a program requires funding.

Divisions of Family Practice

- We have to find solutions for local decision making models that can be replicated for all parts of the province.
- We need to sit down with someone from the ministry and discuss how to make the service contract work at a local level.

Cost savings

- Decrease transfers out of communities; it will reduce interventions; reduce mortality; save money.
- Speed up return home of NICU infants.
- Stop paying based on title (MW, GP) – pay for skill, based on competency.
- Improve community supports (i.e. breastfeeding support) so that women can leave hospital sooner.
- There has been no analysis of cost-effective solutions for primary maternity care; are there *short-term strategies* to create immediate benefits?

Midwifery locums

- Regional midwifery leadership could take care of locums (midwifery departments or Health Authority administration).
- Need to have more flexibility because in some communities they might be better suited to a different administrative model.
- We need to build back in resilience and flexibility in midwifery positions.

Quick wins

- Funding models are complicated and take time; salaried positions would be related to contracts and are not a quick win.
- Increase the number of funded training seats for midwives, family doctors providing maternity care, and obstetrical nurses. (Appeal to the Ministry of Advanced Education.)
- The fee for service and course of care inconsistencies are a major barrier – need incentives to collaborate.

Newborn health and pediatrics are not well addressed by maternity care planners.

Coordinate **interprofessional education** such as doula training, swapping roles in training environments, getting experience in rural environments, and getting exposure to different styles of practice.

Need for a rural **locum pool** for surgical care providers. This could be organized by the proposed provincial Division of Operative Services.

Need for **community and care provider buy-in** to new models; include communities in the decision making process.

The **RBI** is a tool for tackling primary maternity care planning.

6. Opportunities for Action

Appropriate access to primary maternity care for rural birthing women depends on services that support the sustainability of care providers; the development of collaborative, interdisciplinary teams; and the involvement of communities in the planning process. Participants at the “*Interdisciplinary Primary Care in Rural Environments*” meeting discussed numerous opportunities for action, which are explored below.

Funding	
Challenge	Action
<i>Physicians and midwives have different funding models, preventing sustainable interdisciplinary practice.</i>	Resolve funding models between GPSC, MABC, CPSBC and increase physician funding through GPSC. This process may take time as the resolution of funding issues can be lengthy and involve service contract negotiations.
<i>There are no formal payment schemes in BC for shared practice between physicians and midwives.</i>	<ul style="list-style-type: none"> — Consider alternative payment plans (APP) or pooled funding models for shared care practices. — Learn from the funding schemes of successful shared practices (i.e. South Community Birth Program). — This approach may have feasibility challenges as applying for alternative payment plans take a great deal of administrative time and effort and would not be a systematic approach to resolving interdisciplinary funding issues.
<i>Rural care providers lack incentives for on-call primary maternity care coverage.</i>	Establish an on-call payment scheme for rural coverage of primary maternity care.
<i>Start-up costs for midwives are a barrier to the growth of rural midwifery.</i>	Create a start-up stipend for rural midwives.
<i>In the current funding models, there can be only one “most responsible person” to submit billings.</i>	Create new funding models for shared care practices that remove financial disincentives to collaboration.

Interprofessional Teams	
Challenge	Action
<i>Midwives, physicians, and nurses have different scopes and styles of practice, leading to different expectations in care and confusion of roles and responsibilities.</i>	<ul style="list-style-type: none"> — Educate care provider teams together through MOREOB to facilitate shared knowledge and increase confidence of nursing staff. — Establish roles and responsibilities through regular meetings and iterative communication.
<i>Rural communities offer services based on the skills and personalities of individual care providers, leading to gaps in care.</i>	Recruit and train care providers to offer an “obstetrical package” so that local services remain sustainable.
<i>Rural surgical services require full teams of skilled providers, but such specialization is challenging in a generalist environment.</i>	<ul style="list-style-type: none"> — Use the UNBC nurses’ maternity training program as a template for a surgical skills training program. — Provide support for rural GP Surgeons to train their own OR team.
<i>Rural care provider teams are stretched thin and have limited specialized obstetrical skills.</i>	<ul style="list-style-type: none"> — Use specialists (midwives, obstetricians) as mentors for nurses and general practitioners. — Utilize midwives’ scope of practice and pay them on salary as consultants for obstetrical cases in rural communities for family physicians’ orphaned patients.
<i>Regionalized decision making diminishes care providers’ ability to make locally responsive decisions.</i>	Create more local Divisions of Family Practice. Promote interdisciplinarity by inviting other disciplines to participate (nurse practitioners, midwives), and use associated funds for infrastructure projects and “attached” personnel (i.e. medical office workers).

Communication	
Challenge	Action
<i>Rural women often fall through the cracks during the postpartum period due to ineffective communication between care providers.</i>	<ul style="list-style-type: none"> — Improve communication pathways between primary care providers, referral and satellite communities, public health, community health, and peer support groups. — Educate care providers on the use and utility of the Maternity Care Passport. — Communication between health care professionals depends in large part on good personal relationships, not just communication tools.
<i>Rural women seeking unassisted homebirths from unregulated lay providers lack knowledge to make informed decisions.</i>	Rural midwives should continue to provide outreach to populations that seek unassisted homebirth.

Midwifery Integration	
Challenge	Action
<i>Midwives have been unable to practice in some rural communities because they have been refused hospital privileges by physician-led boards.</i>	<ul style="list-style-type: none"> — Health Authorities should take responsibility for midwives' hospital privileges. They have built-in capacity, administrative support, and lack inter-professional conflicts of interest. — Establish midwifery privileges committees through the perinatal planning departments of each health authority.
<i>Rural midwives have a limited voice at the regional decision making table.</i>	Establish local and regional departments of midwifery to facilitate locum coverage and professional support.
<i>A recent MABC survey of midwives' access to locum coverage shows that few midwives get time off.</i>	<ul style="list-style-type: none"> — Improve locum access for midwives through Health Authority management of midwifery locum pools or, for OR teams, through the proposed Provincial Division of Operative Services. — Hire a locum midwife to rotate through rural midwives' practices.

Health Human Resources	
Challenge	Action
<i>Rural communities need generalist nurses with specialized maternity skills.</i>	<ul style="list-style-type: none"> — Recruit nurses with appropriate maternity skills and experience, potentially even with midwifery training. — Make rural nursing a practice specialty at BC post-secondary institutions other than UNBC. — Challenges may arise in hiring specialist nurses, as specialized training may not be utilized in low volume environments, leading to care provider dissatisfaction.
<i>Rural communities require practitioners skilled in sexual health and well-woman care.</i>	<ul style="list-style-type: none"> — Utilize midwives' advanced scope of practice in low-volume communities to make their work sustainable and provide expanded care. — Rural midwives should begin providing and billing for well-woman care.
<i>GP Surgeons are the lynchpin of maternity care in many rural communities, but recruitment and retention are a challenge.</i>	<ul style="list-style-type: none"> — Establish for GP Surgeons a professional college, health authority support, a formal regulatory structure and certification process, a structure for transfer of hospital privileges, and a formal education program. — Move forward in establishing a formal education program for GP Surgery at UBC.

Education	
Challenge	Action
<i>Recruitment and retention of skilled rural care providers is an ongoing challenge.</i>	Expose students to rural practice environments and rural preceptors.
<i>Rural nurses lack time and funding to acquire advanced training.</i>	<ul style="list-style-type: none"> — Increase funding for rural nurses' CME/CPD. — Have existing specialists in the community train nurses locally. GP Surgeons could train their nurses for the OR while midwives could train them for obstetrical care. — Although health care dollars are in short supply, local care providers would have to be remunerated for their mentorship.
<i>Many care providers fear obstetrical bad outcomes and believe that birth without immediate cesarean section back-up is risky.</i>	<ul style="list-style-type: none"> — Increase care providers' level of comfort through "normal birth" training experiences. — Provide nurses and physicians with doula training to develop understanding of normal birth and women's experiences.
<i>Midwives face significant interpersonal and professional barriers to rural practice, including physicians' and nurses' lack of understanding of midwives' training and skill set.</i>	<ul style="list-style-type: none"> — Allow for different disciplines to receive maternity training, including basic coursework, together in an interdisciplinary manner. — Have providers from different disciplines swap roles in training scenarios to understand different styles of practice. — MABC should educate physicians on regulated midwifery through Medical Advisory Meetings or through the proposed Provincial Division of Operative Services.

Appendix A: Symposium Participants

Invited Participants			
Name	Title	Affiliation	Location
Gloria Big Sorrel House	Aboriginal Health Navigator	Interior Health Authority	Kamloops
Jeanette Boyd	Board Member	Kootenay Boundary Division of Family Practice	Nelson
Ruth Brighthouse	Family Physician		Kamloops
James Chrones	Family Physician		Haida Gwaii
Joan Geber	Executive Director, Healthy Women, Children, and Youth	Ministry of Health Services	Victoria
Bev Grossler	Registered Nurse	Interior Health Authority	Lillooet
Stefan Grzybowski	Co-Director, Centre for Rural Health Research	University of British Columbia	Vancouver
Kelly Hayes	Board Member	Midwives Association of BC	Vancouver
Laurianne Jodouin	Director, Health Human Research Planning (Nursing and Allied)	Ministry of Health Services	Victoria
Ruth Johnson	Network Director, Perinatal	Child Health Services (Interior)	Kelowna
Patty Keith	Director of Planning, Maternal/Child Services	Vancouver Coastal Health	Vancouver
Jane Kithoi	Executive Director	College of Midwives of BC	Vancouver
Jude Kornelsen	Co-Director, Centre for Rural Health Research	University of British Columbia	Vancouver
Marie Mascher	Registered Nurse	Interior Health Authority	Lillooet
Jessi Minnabarriet	Public Health Nurse	Interior Health Authority	Ashcroft
Shiraz Moola	Obstetrician		Nelson
Joanna Nemrava	Registered Midwife/Vice-President	Midwives Association of BC	Kamloops
Erin O'Sullivan	Leader, Perinatal Program Development	Vancouver Island Health Authority	Victoria
Rose Perrin	Perinatal Program Executive Lead	Northern Health Authority	Prince George
Alex Scheiber	Director, Performance Accountability	Ministry of Health Services	Victoria
Maggie Watt	Family Physician		Duncan
Kim Williams	Director	Perinatal Services BC	Vancouver
Marty Willms	Leader, Provincial Networks	Perinatal Services BC	Vancouver
Leanne Yeates	Vice President	College of Midwives BC	Vancouver

Appendix B: Policy Brief

POLICY BRIEF

Issues in Rural Maternity Care Series

1.2

AUGUST 2008

A Systematic Approach to Rural Service Planning—The Rural Birth Index (RBI)

Rural Maternity Care New Emerging Team

Background

- Since 2000, 20 rural BC hospitals have closed their maternity services, leaving local maternity care in flux.
- Service allocation decisions have often been made in an ad-hoc manner.
- The need for a systematic approach to planning rural community maternity services is evident.

Rural maternity health services across Canada are currently in flux. In the past 10 years, many small, rural maternity services have closed in British Columbia and across Canada,¹⁻³ with 20 closures in British Columbia alone since 2000.^{4,5} These closures have occurred for a variety of reasons, including the centralization of services within a health authority,⁶⁻⁸ concerns about the safety of small units,² and difficulties recruiting practitioners to staff rural maternity units.^{6,9-12} The result is that many communities are left with limited or no intrapartum services, forcing pregnant women to travel to access birthing care,^{6,13,14} to employ the “10 cm strategy” (showing up at the local hospital fully dilated to preclude transfer out of the community), or to birth at home unattended.^{15,16}

In British Columbia, there is currently no systematic approach to planning rural maternity services and a limited evidence-base to inform such decision making.^{4,17-20} A review of British Columbia policy documents from the past decade provides little evidence of specific planning for maternity care services in general or for rural maternity services in particular, indicating that much of the decision making with respect to health services has been made in an ad-hoc manner in response to a local or regional sense of crisis.²⁰ Accordingly, there is a need to change planning strategies from reactive to proactive and systematic.

Health planners are tasked with the challenge of making economically viable and population sensitive decisions that meet the maternity care needs of rural populations within a context of competing social, political, and financial priorities.¹⁷ Traditionally, health care systems have been planned using a predictive approach that applies one strategy (such as regionalization of services) to a vast array of communities. In reality, the health care needs of each community are unique. In order for decision makers to plan maternity care services that are suited to the dynamic nature of indi-

SUMMARY

In the context of changing rural maternity services in British Columbia, the need for new health services planning tools is apparent. This policy brief presents a predictive model, the Rural Birth Index (RBI), for determining the appropriate level of maternity services for small, rural communities in British Columbia based on population need. The RBI highlights the importance of population characteristics and degree of isolation in determining service needs. These approaches and methods may be applied to other health service planning problems and jurisdictions.

CENTRE FOR RURAL HEALTH RESEARCH

GLOSSARY

Rural Birth Index (RBI)
A health service delivery tool to determine the appropriate level of rural maternity service for a given community.

Intrapartum Services Management and delivery of maternity care to women in labour

GP Surgeon
A general practitioner with enhanced skills training in surgeries relevant to a rural environment

Referral Hospital
A hospital offering specialist (surgical) labour and delivery services to outlying communities

The Rural Maternity Care New Emerging Team (RM-NET), housed in the Centre for Rural Health Research, is a collaborative group of academic and community-based researchers, policy makers, administrators, and other key stakeholders working together to achieve a comprehensive understanding of rural maternity care services in British Columbia. The RM-NET is co-directed by Jude Kornelsen and Stefan Grzybowski and its core team includes Shella Levangie, Sarah Munro, Melanie McDonald, and Bryce Westlake with student support for this policy brief from Laura Schummers.

vidual rural communities and health care programs, a flexible, community-based approach is necessary.

Why do we need the Rural Birth Index?

Optimal safety, equitable access, and sustainable cost-effective services are goals that ultimately drive our rural health service planning. The evidence base needed to drive this planning is, to date, sparse and largely inadequate. Yet decisions about specific rural community services need to be made now.

The Rural Birth Index is based on a systems approach to small rural maternity services across British Columbia and extensive field work in 23 communities.^{15,16,20} It compares objective characteristics of population need and isolation across communities using a formula developed through sensitivity analysis designed to establish a best fit within the context of rural British Columbia.

In the past, researchers and policy makers have used analytic approaches to predict health service delivery. The models have equally weighted a number of factors in predicting health service needs, such as geography, feasibility (existing facilities and human resources), and social demographic factors (population and socioeconomic status).^{17,21-23} While we don't disagree with the need to consider a broad range of characteristics of a given community, we believe that the most efficacious approach is to assess objective community need first and then subsequently consider feasibility issues, such as human resources and physical infrastructure in a multi-stage process. We have developed the Rural Birth Index within this conceptual approach.

What is the Rural Birth Index?

The Rural Birth Index (RBI) is mathematical model that weights key community characteristics (population, isolation, and social vulnerability) and calculates a score for maternity service level needs, ranging from no local maternity services to local access to services provided by a specialist. The development of the RBI was informed by a recognition that in the special circumstances of rural and isolated communities, two dominant characteristics are predictive of rural service sustainability: **population** characteristics and degree of **isolation**.

The formula is:

$$RBI = (PBS \times APV) + IF$$

- **PBS** (Population Birth Score): The average number of births in a hospital's one hour catchment over 5 years divided by 10
- **IF** (Isolation Factor): The degree of isolation based on the following travel times to cesarean services:

Distance	Score
Less than 30 minutes	-3
31-45 minutes	-2
45-60 minutes	-1
60-90 minutes	1
90-120 minutes	2
2-4 hours	3
Greater than 4 hours	4

- **APV** (Adjustment for Population Vulnerability): A social vulnerability score derived from BC Statistics, ranging from 0.8 (advantaged) to 1.4 (disadvantaged).

RURAL BIRTH INDEX

What does an RBI Score mean?

The RBI score for a community correlates to a recommended service level, as follows:

RBI Score	Recommended Service Level
0-6.5	No local intrapartum services
6.5-9	Local intrapartum services without operative delivery
9-14	Local GP Surgical services
14-27	Mixed model of Specialists and GP Surgeons
>27	Specialist service

We have calculated RBI scores for all rural communities in British Columbia with a population of 25,000 or less. The RBI works to predict appropriate service level in 32 of 42 small rural services, and our research suggests that 6 of the remaining 10 communities have unsustainable and suboptimal levels of care.

How to Use an RBI Score

- Use a community's RBI score as a guideline for maternity service needs
- Conduct a feasibility analysis
- Prioritize competing health service needs

The RBI model should be used as a starting point for decision makers in a three-stage maternity service planning process:

Stage 1: Use the RBI to determine the appropriate level of maternity service for a rural community;

Stage 2: Assess the *feasibility* of this level of service based on community characteristics (such as a review of existing facilities, availability of health human resources, consideration of transport, and economic issues); and

Stage 3: Consider the implementation of the appropriate level of service based on the Health Authority's *planning priorities* (e.g. maternity care versus palliative care for a given region).

Limitations

The RBI was developed within the social and geographic context of British Columbia's rural health services, and is intended for populations of 25,000 and under. Generalizability to other jurisdictions and health services needs to be tested.

Steps Forward

The RBI has the potential to be a foundational planning tool for health care decision makers. It highlights communities that have a service level out of sync with the majority of rural communities in British Columbia. As currently structured, it works effectively for maternity care services. It is likely to work well for other rural health services, such as emergency room care or cancer treatment. Additionally, as populations grow and community demographics change, the RBI may be further applied to plan services based on population projections. Adaptation of this index approach to other provinces and other health service issues provides us with a timely tool to make sustainable, proactive decisions about rural health care.

AT A GLANCE

What happens when a rural community has a maternity service level that is too low or too high for its needs? Our research suggests that certain effects may occur:

- When a community is under-served, a number of women will choose alternatives to traveling to access maternity care at referral hospitals including the "10 cm strategy," seasonal timing of pregnancy, and unassisted home birth.^{15, 16} These effects are enhanced as the social resources of the women decrease.
- Communities whose RBI score is out of synch with existing level of service will have significant challenges to sustainability and suboptimal maternal-newborn outcomes.^{24, 25}
- Over-served communities are likely to experience increased intervention rates and difficulties in provider retention.

The *Issues in Rural Maternity Care* policy brief series addresses current issues in the provision of maternity care in British Columbia and provides timely recommendations for improving the quality and safety of rural intrapartum care. Targeted at policy makers and maternity care providers, it is produced by the Rural Maternity Care New Emerging Team (RM-NET).

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