Birth in Bella Bella

Emergence and demise of a rural family medicine birthing service

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ABSTRACT

OBJECTIVE To explore a once successful rural maternity care program and the variables surrounding its closure.

DESIGN Analysis of archived logbook data, reports, and communications with medical staff.

SETTING Bella Bella, a Heiltsuk First Nation community on British Columbia's central coast.

PARTICIPANTS Every patient delivering at the Bella Bella hospital since 1928.

METHODS We extracted delivery rates, cesarean section rates, and local perinatal and maternal mortality rates from the hospital logbooks. In 2003, a consultant's report reviewed the viability of surgical and maternity care services in Bella Bella; this was also reviewed. Finally, several personal communications with past and present medical staff added to an understanding of the issues that initially sustained and, in the end, closed the local maternity care program.

MAIN FINDINGS Bella Bella had an intrapartum service with operative backup, and intervention and perinatal mortality rates were comparable to national data. There was only 1 maternal death in 80 years of intrapartum service. In the 1990s, with sparse cesarean section coverage, more mothers were obliged to travel to referral centres, until an eventual closure of the intrapartum care service in 2001.

CONCLUSION Bella Bella provided safe and comprehensive maternity care until, in the context of an insufficient supply of family medicine generalists trained in anesthesia, surgery, and maternity care, the service closed.

EDITOR'S KEY POINTS

- Bella Bella, a Heiltsuk First Nation community on British Columbia's central coast, has a long history of local intrapartum care. With a full-service hospital and operative capability, it provided a vibrant maternity service to its residents for 80 years. In 2000, with unreliable cesarean section capability, the service closed. Parturient women now deliver in distant referral centres. In the current atmosphere of uncertainty regarding rural birth, Bella Bella provides an excellent case study to explore a once successful rural maternity care program and the variables surrounding its closure.
- Historically, rural maternity care has been provided by generalist family physicians with training in operative delivery and anesthesia. It has been shown that local operative capability is integral to the provision of local birth. Without operative capability, family physicians are reluctant to provide the service, fearing adverse outcomes. The demise of generalist training in family medicine, and the specialization of family medicine in primary care, has deprived rural Canada of the secondary care in anesthesia and surgery required to support birthing services.

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Accouchements à Bella Bella

Naissance et fermeture d'un service d'accouchement de médecine familiale en milieu rural

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RÉSUMÉ

OBJECTIF Examiner un programme de soins de maternité en milieu rural auparavant efficace et les facteurs entourant sa fermeture.

TYPE D'ÉTUDE Analyse de registres archivés et de comptes rendus et communications avec le personnel médical.

CONTEXTE Bella Bella, une communauté Heitsuk des Premières nations de la côte centrale de Colombie-Britannique.

PARTICIPANTS Toutes les patientes ayant accouché à l'hôpital de Bella Bella depuis 1928.

MÉTHODES Nous avons extrait des registres hospitaliers les taux d'accouchement et de césarienne, et les taux locaux de mortalité périnatale et maternelle. En 2003, un rapport de consultants a examiné la viabilité des services de soins de maternité et de chirurgie à Bella Bella; nous avons aussi utilisé ce rapport. Enfin, plusieurs communications avec des membres actuels ou anciens du personnel ont permis de mieux comprendre les facteurs qui ont d'abord soutenu le programme local de soins de maternité pour finalement entraîner sa fermeture.

PRINCIPALES OBSERVATIONS Bella Bella possédait un service de soins de maternité avec possibilité de chirurgie, dont les taux d'intervention et de mortalité périnatale était comparables aux données nationales. Il n'y a eu qu'une seule mortalité maternelle en 80 ans de service. Dans les années 1990, les césariennes devenant moins disponibles, davantage de mères devaient se rendre dans des centres de référence, jusqu'à ce qu'on ferme le service en 2001.

CONCLUSIONS Bella Bella assurait des soins de maternité sécuritaires et complets jusqu'au moment où on a décidé de fermer ce service en raison d'un nombre insuffisant de médecins de famille formés en anesthésie, en chirurgie et en soins de maternité.

POINTS DE REPÈRE DU RÉDACTEUR

- Bella Bella, une communauté Heitsuk des Premières nations de la côte centrale de Colombie- Britannique, a une longue histoire de soins de maternité. Avec un service hospitalier et chirurgical complet, les résidents ont profité pendant 80 ans d'un service de maternité dynamique. En 2000, les césariennes devenant peu fiables, ce service fermait. Les femmes en travail doivent maintenant accoucher dans des centres de référence éloignés. Dans le contexte actuel d'incertitude entourant les accouchements en milieu rural, Bella Bella représente un cas idéal pour étudier un programme de soins de maternité efficace et les facteurs qui ont entraîné sa fermeture.
- Historiquement, les soins de maternité en milieu rural étaient assurés par des médecins de famille généralistes possédant une formation en anesthésie et en césarienne. Il a été démontré qu'un service d'accouchement local exige une capacité de chirurgie sur place. Sans cette capacité, les médecins de famille hésitent à fournir ce service, craignant des issues défavorables. La disparition de la formation généraliste en médecine familiale et la spécialisation en soins primaires des médecins de famille a privé le Canada rural des soins secondaires d'anesthésie et de chirurgie qu'exigent les services de maternité.

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There has been attrition in rural maternity care services in Canada.[1-5] Rural surgical programs are closing[6] and communities are losing local birth. Despite literature documenting safe rural birth with or without local operative capability,[3,7-15] with the loss of cesarean section backup many rural physicians are reluctant to provide intrapartum care,[16-18] leading either to complete closure of such services or to high outflow to referral centres.[19,20]

A community that has undergone such changes to its birthing service is Bella Bella. Nestled in the Great Bear Rainforest on British Columbia's (BC's) central coast, Bella Bella is home to the Heiltsuk Nation. With a population of slightly more than 1000 people, accessibility only by plane or boat, and hundreds of kilometres to the nearest regional or tertiary care centre, Bella Bella is rural by any definition.

In October 1902, the first hospital in Bella Bella opened under the medical supervision of Dr R.W. Large, a Methodist missionary. Over the next several decades, physicians at the hospital provided medical and surgical services to both the local village and the cannery and fishing industries of BC's central coast, including the communities of Klemtu, Ocean Falls, and Shearwater. In the summer season, medical services were provided to the seasonal workers of Namu and Rivers Inlet. For the first few decades, maternity care was not usually among these services. Birthing was provided by First Nation midwives.

From the early writings of Dr George Darby in the 1930s, midwifery services appeared effective and uncomplicated: "Obstetrical practice amongst the natives is not very thrilling, many of the babies being two or three days old before the doctor knows anything about them."[21] However, for reasons not documented, and in a story not yet told, birthing became a physician and hospital service. Paralleling a cross-Canada trend,[22] by the 1940s almost all of Bella Bella's births happened in the hospital.[23]

As was the norm in all of rural western Canada,[24-26] the family physicians who came and stayed in Bella Bella were trained as generalists, skilled in obstetrics, surgery, and anesthesia. Remarkably, the first cesarean section in Bella Bella was performed by Dr Darby in 1933—this was only 10 years after the first cesarean section was performed at the Kingston General Hospital in Ontario.[27]

Over much of the second half of the 20th century, Bella Bella's family physicians provided a comprehensive maternity care program. With local cesarean section services, and almost insurmountable isolation and travel issues, there was little or no outflow to urban hospitals for deliveries.

By the 1990s much had changed. Generalism in medicine was replaced by specialization. Family physicians were trained as specialists in primary care.[28-30] Secondary care, including most procedural medicine and especially anesthesia and surgery, became the purview of the fellows of the Royal College of Physicians and Surgeons of Canada. Access to training programs for rural family physicians to acquire these procedural skills became increasingly difficult.[31,32] Concurrently, family physicians left intrapartum maternity care in great numbers. By 2004 only 13% of family physicians provided intrapartum care.[33] Because there are only a few specialists in rural Canada, the collateral damage from the demise of generalism in family medicine was extensive. The generalist physicians who had sustained almost a century of maternity care in Bella Bella could no longer be recruited.[34] Faced with irregular and interrupted availability of local cesarean section services, and fewer family physicians prepared to practise intrapartum birthing, more and more pregnant women traveled for delivery in urban centres. Unable to recruit and retain physicians with anesthesia and surgical skills, the Bella Bella surgical program closed in 2000. The stresses of offering local birthing without local cesarean section services were too much. In 2001, the Bella Bella physicians withdrew birthing services.[34]

This paper uses the logbooks of the Bella Bella maternity care program from 1928 to 2000 to describe and document the historical dimensions of these services and to critically examine how the outcomes of the local program compare with Canadian data. Although it is a story of Bella Bella, it is also a story of the changes in family medicine in Canada and the consequences of these changes to rural populations.

History of Bella Bella's medical services

As far back as 1874, the Methodists had made the decision to reach out to the peoples of the north and central BC coast. The Reverend Thomas Crosby established a marine mission in Port Simpson, BC, close to Prince Rupert. He spoke widely about a lack of medical services on the coast north of Nanaimo on Vancouver Island. Inspired by Reverend Crosby, Methodist medical missionaries were attracted to service in the Pacific Northwest.

In 1897, Dr R.W. Large was put in charge of the Bella Bella Indian Mission, with additional responsibilities for the summer hospital in Rivers Inlet, where much of the canning industry was based. In 1902, Bella Bella's first hospital opened—beds and a surgical suite. It was built for $2500 in supplies (provided by surplus medical fees from the previous 4 years' work) and 400 hours of voluntary First Nation labour. In its first year, 7 surgeries were performed. Local villagers were trained to provide anesthesia.

When Dr Large relocated to Fort Simpson in 1910, a series of temporary replacements filled in until the arrival of Dr George Darby, newly graduated from the University of Toronto in Ontario, in 1914. Over the

subsequent 41 years, Dr Darby (Chief Woo-Ya-La ["the highest"]) became a legend for his work up and down the central coast.

In 1918, and again in 1967, new hospitals were built. The latter was named the R.W. Large Memorial Hospital. A second staff physician was appointed in 1952 and a third in 1983. The first nurse was trained in Bella Bella in 1903. The local nursing training program continued for decades until the small rural training programs for nurses were consolidated in the urban centres.[23,35,36]

METHODS

The R.W. Large Memorial Hospital has kept logbooks of all deliveries performed in the hospital from 1928 until present day. For each delivery the logbooks document the following: parity; whether it was a vaginal delivery or cesarean section; use of vacuums or forceps; analgesia or anesthesia used; labour induction or augmentation methods; adverse perinatal outcomes either at the time of birth (stillborn) or in the hours following delivery; and any adverse maternal outcomes either at the time of birth or within the hours following delivery. The logbooks are kept and completed by the hospital staff at the time of delivery; therefore, the quality of each record is dependent on the accuracy and detail of the recorder.

We analyzed logbooks from the beginning of the available records in 1928 up to the end of 1999 when all planned deliveries stopped. Data were extracted in a nonidentifiable fashion. For each year, we extracted the number of deliveries, vaginal deliveries, cesarean sections, stillbirths or early neonatal deaths, and maternal deaths. Parity was also documented.

Because the volume of deliveries each year was small (ranging from 9 to 67), we aggregated the data by decades to yield more meaningful results. For each decade, we calculated the total number of vaginal deliveries and the total number of cesarean sections, the percent of nulliparous women receiving intrapartum care, the cesarean section rate per 100 deliveries, the perinatal mortality rate, and the maternal mortality rate. Perinatal mortality was defined as any neonatal death recorded (stillborn and those infants who died in the hours or days following birth) and was expressed as a rate per 1000 live births. Maternal mortality was defined as any maternal death recorded. Twins, if delivered vaginally, were counted as 2 vaginal deliveries. Twins, if delivered by cesarean section, were counted as 1 cesarean section but as 2 births for the total number of deliveries.

The perinatal mortality rates were compared with historical Canadian data as a measure of the safety of the birth experience in Bella Bella. The yearly perinatal mortality rate in Canada from 1960 to current day was obtained from a published report from the Canadian Institute for Health Information.[37] Cesarean section rates were compared with the Canadian rates[37] as a measure of intervention. The national cesarean section rates from 1979 to 2002 were also obtained from the Canadian Institute for Health Information report.[37]

In 2003, a consultant's report reviewed the viability of surgical and maternity care services in Bella Bella.[34] More recently, an unpublished qualitative study examined the effects of the loss of local birthing on the community. These reports, and several personal communications with past and present medical staff, supplemented our understanding of the issues that initially sustained and, in the end, closed the local maternity care program.

This study was approved by the following review bodies: the University of British Columbia Clinical Research Ethics Board, the University of Toronto Department of Family and Community Medicine and Scarborough Hospital, the Heiltsuk Tribal Council in Bella Bella, the R.W. Large Hospital Board, the United Church Health Service Society, and Vancouver Coastal Health Authority.

FINDINGS

There were 2462 babies delivered at the R.W. Large Hospital from 1930 to the end of 1999. Of these, 13 were twin deliveries. **Table 1** summarizes the deliveries and perinatal mortality for these births. **Figure 1** shows the number of local deliveries rising to a peak in the 1950s, with a total number of deliveries in that

Table 1. Summary statistics of the R.W. Large Hospital obstetrical service from 1930 to the end of 1999

YEAR	NO. OF VAGINAL DELIVERIES	NO. OF CSs	TOTAL NO. OF DELIVERIES	PERINATAL MORTALITY,* N	PERINATAL MORTALITY RATE†	NULLIPAROUS,§ %	CS RATE‡
1930s	276	1	277	5	18.38	NC	0.36
1940s	376	1	377	10	27.25	NC	0.27
1950s	555	2	557	10	18.28	NC	0.36
1960s	463	15	478	9	19.19	14	3.14
1970s	261	21	284	4	14.29	32	7.39
1980s	267	43	310	2	6.49	35	13.87
1990s	152	5	157	1	6.41	10	3.18

CS—cesarean section, NC—not calculated.

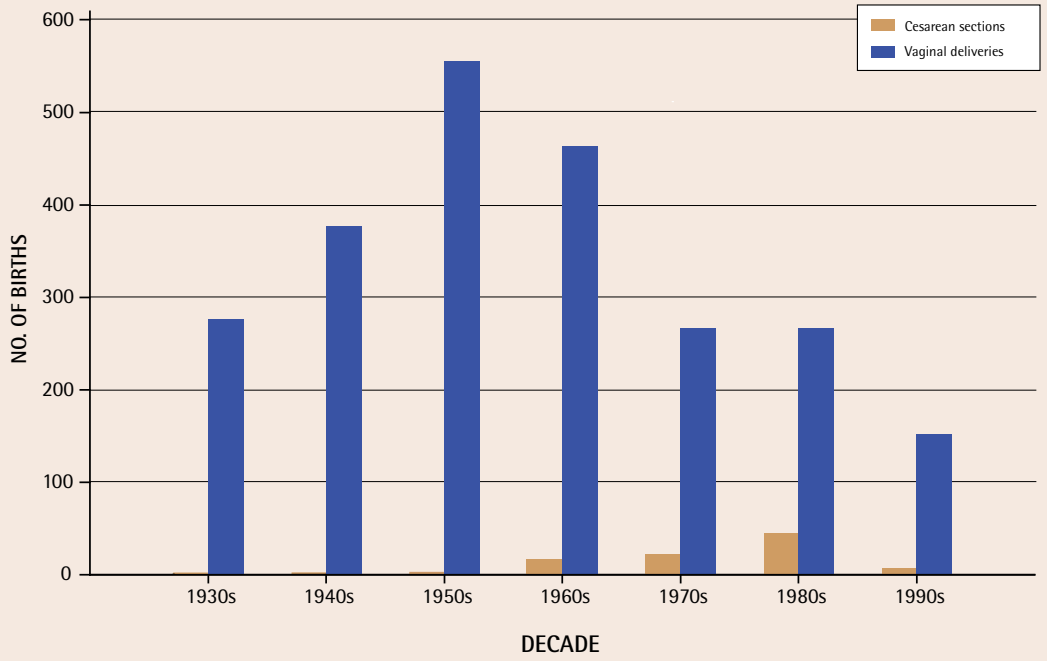
*Neonatal death occurring at birth (stillbirth) or in the hours following birth, as recorded in the delivery record.

†The perinatal mortality rate is the number of neonatal deaths per 1000 live births.

‡The CS rate is the number of CSs per 100 deliveries.

§Data in the early logbooks were unclear, so the proportion of nulliparous women was not calculated for before the 1960s.

Figure 1. Number of deliveries at the R.W. Large Hospital from 1930 to 1999, illustrated by decade, divided by method of delivery



decade of 557. The number of deliveries remained high in the 1960s, with 478 deliveries performed. The number of deliveries then decreased in the 1970s and 1980s, with 289 and 310 deliveries performed in those decades, respectively. The number of hospital deliveries reached their lowest level in the 1990s, with only 157 deliveries.

Since 1928 there have been 88 cesarean sections performed in Bella Bella. Remarkably, the first cesarean section was performed in 1933, long before the operation was commonly done.

The most cesarean sections were performed in the 1980s, with a rate of 13.9 per 100 deliveries (**Figure 2**). In the 1980s there were 43 cesarean sections performed. The most common indications for the operation were elective repeat cesarean section, failure to progress, and malpresentation.

In the 1980s, when the cesarean section rate in Bella Bella reached its peak of 13.9%, the cesarean section rate in Canada ranged from 15% to 20%.[37] The rate continued to climb in Canada, reaching its high of 22.5% in 2001 to 2002.[37] In Bella Bella, however, the rate of cesarean section fell in the 1990s to 3.2%. In the 1990s, only 5 cesarean sections were performed.

In the 1960s, 14% of women delivering at the R.W. Large Hospital were nulliparous. This number increased to 32% in the 1970s and to 35% in the 1980s. In the 1990s, however, only 10% of women were nulliparous.

Figure 3 demonstrates the perinatal mortality rate for babies delivered at the R.W. Large Hospital from 1930 to the end of 1999. The perinatal mortality rate was highest in the 1940s, with a rate of 27.2 deaths per 1000 live births. The perinatal mortality rate subsequently declined, reaching its lowest in the 1980s and 1990s, with rates of 6.5 and 6.4, respectively.

Comparing the perinatal mortality rates in Bella Bella with Canadian data from 1960 to the end of 1999, we find comparable outcomes (**Table 2**[37]). In Bella Bella in the 1960s, the perinatal mortality rate was 19.2 per 1000 live births. In Canada the rate ranged from approximately 22 to 27.[41] Perinatal mortality rates then declined in Bella Bella, and in Canada as a whole,

Table 2. Perinatal mortality rate at the R.W. Large Hospital* from 1960 to the end of 1999 compared with national rates†: *Perinatal mortality rate was calculated per 1000 deliveries.*

	PERINATAL MORTALITY RATE	
YEAR	BELLA BELLA	CANADA
1960s	19.2	22-27
1970s	10.7	11-22
1980s	6.5	9-11
1990s	6.4	6-9

*Neonatal death at birth (stillbirth) or in the hours following birth, as recorded in the delivery record.
†Neonatal death in the first week of life, or stillbirth at 28 weeks or more gestational age, as reported by the Canadian Institute for Health Information.[37]

Figure 2. Cesarean section rate at the R.W. Large Hospital from 1930 to 1999, illustrated by decade: *Cesarean section rate was calculated per 100 deliveries.*

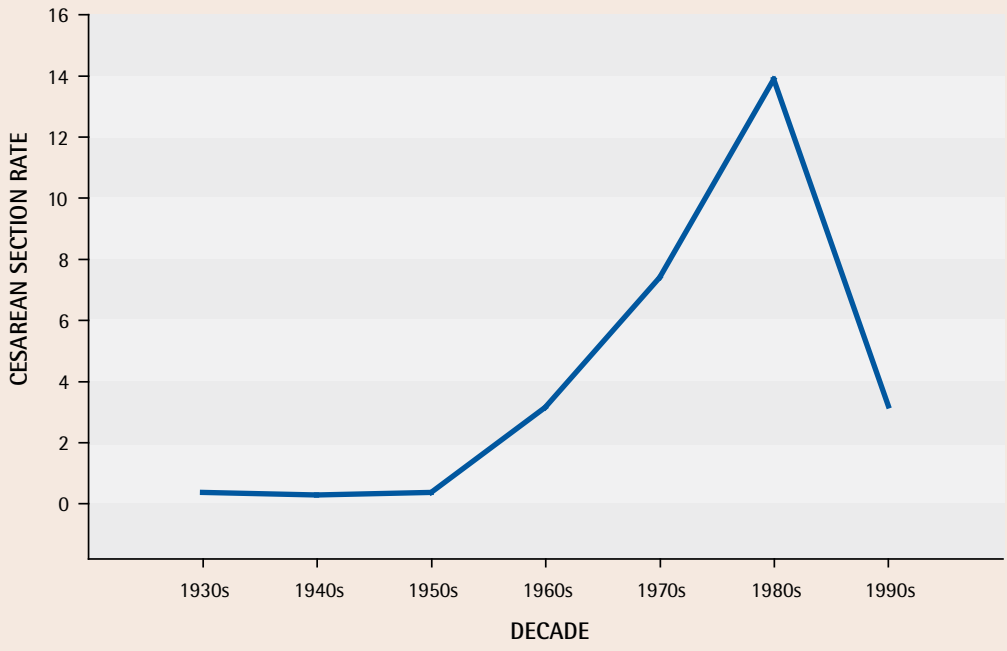
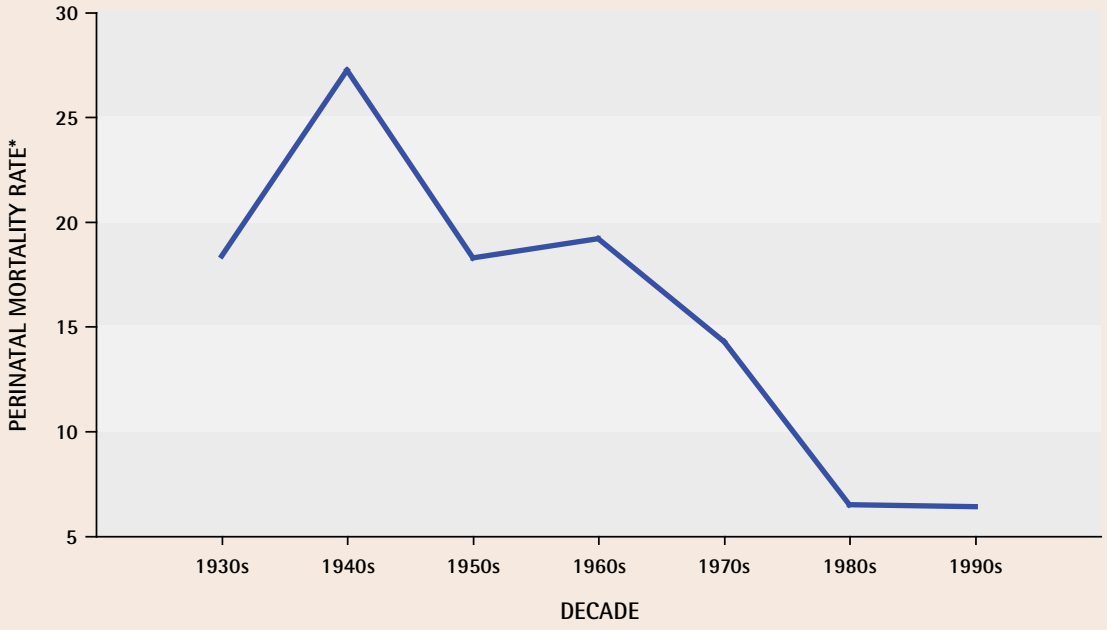


Figure 3. Perinatal mortality at the R.W. Large Hospital from 1930 to 1999, illustrated by decade: *Perinatal mortality is expressed as a rate per 1000 deliveries.*



*Perinatal mortality defined as any death that occurred at birth (stillbirth) or in the hours following birth, as recoded in the delivery record.

both reaching their lowest values in the 1980s and 1990s. In each decade, the perinatal mortality rates in Bella Bella were similar to those in Canada (**Table 2**[37]).

From 1930 to the end of 1999 there was only 1 maternal death of 2449 women whose deliveries were associated with the hospital. The details surrounding the death are not clear in the logbook.

DISCUSSION

Before the arrival of the Methodist missionaries in Bella Bella, community midwives performed deliveries in the home. This practice continued in the early history of the hospital,[21] contributing to the low number of births recorded at the hospital in the 1930s and 1940s.

The reasons for the increase in the number of hospital deliveries in the 1950s and 1960s are likely multifactorial. A portion of the increase in births likely represents births shifting from home, with community midwives, to the hospital, under the care of physicians and nurses. A rise in the local birth rate is also likely to be contributory. In the 1950s and 1960s, all parts of Canada saw a rise in the birth rate, resulting in the generation known as the *baby boomers*. In the 1960s, only 14% of women delivering in Bella Bella were nulliparous. This might reflect the propensity historically for larger family sizes.

We assume that the decline in the birth rate at the hospital in the 1970s and 1980s corresponds to a decline in the birth rate in Bella Bella. We are told that during these decades, with full-service operative delivery facilities available locally and with the level of isolation of the community, it was almost unheard of for someone to travel out of Bella Bella for delivery. This is also reflected in the number of nulliparous women delivering at the local hospital in these decades remaining fairly constant (32% in the 1970s, 35% in the 1980s).

In contrast, in the 1990s outflow to referral centres for birth became increasingly common, contributing to few local births. By 2000, unpublished data show that there were only 4 deliveries in the community and 17 at the referral centre. As cesarean section backup in the community became increasingly sporadic, care providers and patients frequently planned to give birth in the referral centre. Sporadic cesarean section coverage is reflected in the drop in cesarean section rate from 14% in the 1980s to only 3% in the 1990s. The drop in cesarean section rate also reflects the characteristics of the women who were still allowed to deliver in Bella Bella in the context of intermittent operative coverage. In the 1990s, only 10% of women delivering in Bella Bella were known to be nulliparous.

Our data confirm that perinatal and maternal mortality rates, as well as intervention rates, are comparable to Canadian data. Not surprisingly, a similar study documented good outcomes from a sister rural hospital in Bella Coola (which has also recently closed their maternity service).[38,39]

By the late 1990s the surgical coverage in Bella Bella was absent at many times of the year, and physicians thought it was unsafe to offer local intrapartum care in its absence.[34] Given Bella Bella's isolation, an urgent transfer to a referral centre would not always be possible. In 2003 the consultant's report described the situation as follows:

> Historically, the hospital decided not to offer any planned obstetrical service over 2 years ago due to the lack of physicians willing to provide such a service without caesarean section backup. Compounding the withdrawal of this service was the lack of GP Anesthesia coverage that would allow the operating room to be used.[34]

The changing landscape of family medicine meant that Bella Bella was no longer able to recruit family physicians trained in obstetrics, surgery, or anesthesia. Family medicine was becoming a specialty in primary care.[28-30] Secondary care, which included all or almost all procedural medicine, belonged to specialists who worked in urban, not rural, hospitals.[40] If a family medicine resident had interest in obtaining additional procedural skills, these programs were increasingly difficult to access.[6,31,32]

In 2007 an unpublished qualitative study examined the effects of the loss of local birth on the Bella Bella community. In a series of interviews, the researchers heard local women talk about the stress, both emotionally and financially, of having to travel to distant centres to give birth. There were multiple costs to the community of losing local birth, including effects on their identity as Heiltsuk people and a loss of social and cultural traditions.

Bella Bella's story provides a good example of the evolution of a birthing service. With the arrival of Western medicine, the responsibility for birth shifted from community midwives to physicians at the hospital. This system thrived with a full-service hospital capable of providing operative obstetrics. When the skill set of family doctors changed, Bella Bella, and communities like it, suffered. No longer able to recruit family doctors with the skills necessary to provide a sustainable maternity service, women now travel, at 36 weeks' gestation, to distant referral centres for care, with great effects on the local community.

Limitations

The Canadian perinatal mortality rate reflects those babies who were stillborn or who died within the first 7 days of life. The Bella Bella maternity logs record whether the baby was stillborn and also indicate whether the baby died within the first day of life (the longest record was of a baby dying 12 hours after birth). It is possible that there were deaths a few days later that might not have been logged in the records. From our communications with staff who worked in the hospital through much of this time period, we believe this to be unlikely. In the maternity logbooks there is record of only 2 babies being transferred to a tertiary centre for further care.

We did not know the outcomes for these babies and, therefore, we did not include them in the analysis.

Our calculations of rates of cesarean section and perinatal and maternity mortality are not population-based. In the 1990s, outflow for delivery became substantial; these calculated rates exclude the outcomes of all those women who traveled for delivery. However, we are confident that outflow rates were so low in the earlier decades that our comparisons with Canadian rates are valid.

We used the proportion of nulliparous women as an indirect measure of outflow. There appears to be confusion in the logbooks in the early decades with regards to parity, with parity of 1 being used to define nulliparous women. In the newer logbooks, the parity data appear to be cleaner; therefore, we calculated these proportions only for the later decades.

Conclusion

Bella Bella has a long history of local birth. With local operative capability and a full-service hospital equipped to deal with emergent situations, it was an exemplary model of health care delivery on the north and central coast of BC. Generalist family physicians integrated intrapartum maternity care into their service profiles in the mid–20th century following a Canada-wide movement from midwifery to medical birthing. The maternity care program produced outcomes comparable to national standards. Family medicine began leaving birthing services when generalism in family medicine was replaced by specialization and secondary care (including anesthesia and surgical services) was relegated to Royal College fellows, and the Bella Bella maternity care program, like so many other rural maternity care programs, withered and died.

Many would like to see intrapartum care once again be offered at the Bella Bella hospital. They believe that after 100 years of disrupted family life, local birth would be healing to the community. The Heiltsuk people want once again for their children to have Bella Bella on their birth certificates. They want Bella Bella to not only be a community that honours death, but also one that has opportunities to celebrate life. They want to be able to rejoice as a community for each delivery and to uplift their children together in their ceremony *Caxila*, in which the newest members are introduced to the Nation.

They have hope that this might one day be the case. They have attempted to implement local measures: one community member is now training in the University of British Columbia's midwifery program and another is a successful obstetrician-gynecologist. We hope that this is not the end of Bella Bella's obstetrical story.

Dr Alexandra Iglesias is a second-year resident in family medicine at the University of Toronto in Ontario. **Dr Stuart Iglesias** is a rural family physician in Gibsons, BC. **Dr Arnold** is a rural family physician in Bella Bella, BC.

Contributors

Dr Alexandra Iglesias conducted a background literature search and organized the ethics applications; collected, analyzed, and organized the data; and was a main author for the paper. **Dr Stuart Iglesias** guided the literature search and conducted a historical literature search to put the paper's topics in context; supervised the data collection and analysis; and was a main author for the paper. **Dr Arnold** was integral in initiating the research project and in the data collection, and he edited the article.

Competing interests

None declared

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