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SPECIAL ARTICLE

Key issues and barriers to obstetrical anesthesia care in Ontario community hospitals with fewer than 2,000 deliveries annually

Problèmes et obstacles clés aux soins d'anesthésie obstétricale dans les hôpitaux communautaires ontariens pratiquant moins de 2000 accouchements par année

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Abstract

Purpose *Lack of the availability of anesthesia services may be a factor in the closure of maternity services in rural Canada, limiting the capacity for Cesarean delivery and intensifying the urbanization of maternity care. Unlike other professions involved in maternal newborn care, health services research in obstetrical anesthesia is virtually non-existent. This study explored barriers physicians encountered in providing obstetrical anesthesia care in Ontario community hospitals experiencing low volumes (fewer than 2,000) deliveries per annum (PA). Solutions proposed by a mixed focus group of academic and community hospital leaders were also described.*

Methods *Following Research Ethics Board approval, the authors performed a secondary analysis of qualitative data from 18 anesthesiologists and family practitioner (FP/GP) anesthetists who had participated in a larger provincial study that was also conducted by the authors. Participants were leaders from community hospitals with fewer than 2000 deliveries PA and university-based teaching programs from across Ontario. Fourteen community physicians participated in focus groups that explored key issues and barriers to care and their potential solutions. A final group of eight academic and community physician key informants further explored solutions.*

Findings *Three themes emerged: Obstetrical Anesthesia in the "Periphery", "Key Issues and Barriers to Obstetrical Anesthesia Care", and "A Multi-faceted but Context-Specific Solution is Required." The physicians identified barriers within the greater context of those encountered during the provision of anesthesia services in the periphery, including lack of time, need for continuing medical education (CME), need for hospital infrastructure support to develop and implement best practice protocols, and need for resources and anesthesia mentorship supports from the system. Difficulties were greatest for FP/GP anesthetists in rural communities who described lack of locums, need for relevant CME, and worsening physician shortages threatening provision of services in some rural hospitals. Family practitioner anesthetist multi-taskers were described as the best solution to the provider shortage in rural communities. Participants described the need for increased numbers of FP/GP anesthetists and the development of formal funded networks for knowledge transfer between academic and community hospitals as a mechanism to provide supports.*

Conclusions *Physicians in community hospitals face significant barriers in the provision of obstetrical anesthesia care. These are greatest among FP/GP anesthetists and in rural hospitals where physician shortages and lack of supports threaten provision of services in some hospitals. Local context-specific and systems-level solutions are required.*

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Résumé

Objectif *Le manque de disponibilité des services d'anesthésie pourrait jouer un rôle dans la fermeture des services de maternité dans les régions rurales du Canada, limitant la capacité de réalisation d'accouchements par césarienne et intensifiant l'urbanisation des soins de maternité. À la différence des autres professions impliquées dans les soins aux mères de nouveau-nés, la recherche sur les services de santé en anesthésie obstétricale est quasiment inexistante. Cette étude a examiné les obstacles que les médecins rencontrent lorsqu'ils fournissent des soins d'anesthésie en obstétrique dans les hôpitaux communautaires ontariens réalisant une faible quantité (moins de 2000) accouchements par année (PA). Les solutions proposées par un groupe de discussion composé de chefs de file dans les domaines universitaire et des hôpitaux communautaires sont également décrites.*

Méthode *Après avoir obtenu le consentement du Comité d'éthique de la recherche, les auteurs ont réalisé une analyse secondaire des données qualitatives de 18 anesthésiologistes et médecins de famille anesthésistes (FP/GP) qui avaient participé à une étude provinciale plus vaste, également réalisée par les auteurs. Parmi les participants, on comptait des leaders d'hôpitaux communautaires provenant de partout en Ontario ainsi que de programmes d'enseignement universitaires où moins de 2000 accouchements PA étaient réalisés. Quatorze médecins communautaires ont pris part à des groupes de discussion examinant les problèmes et obstacles clés à la prestation des soins ainsi que les solutions potentielles à ces problèmes. Un groupe de discussion privilégié final, composé de huit médecins universitaires et communautaires, a examiné ces solutions de façon plus approfondie.*

Constatations *Trois thèmes sont apparus : L'anesthésie obstétricale dans la « Périphérie », « Les problèmes et obstacles clés aux soins d'anesthésie en obstétrique », et « Il faut une solution à plusieurs facettes mais spécifique au contexte ». Les médecins ont identifié les obstacles qui se dressent dans le contexte plus large de ceux rencontrés lors de la prestation de soins d'anesthésie en périphérie, notamment le manque de temps, le besoin de formation médicale continue (FMC), le besoin de soutien de la part des infrastructures hospitalières pour élaborer et mettre en œuvre des protocoles de meilleures pratiques, et le besoin de ressources et de soutiens de mentorat en anesthésie de la part du système de santé. Les difficultés les plus importantes étaient rencontrées par les anesthésistes FP/GP travaillant dans les communautés rurales. Ils décrivent un manque de remplaçants, le besoin de FMC pertinente, et les pénuries de médecins menaçant l'offre de soins dans certains hôpitaux dans les régions rurales. L'anesthésiste médecin de famille polyvalent a été décrit comme la meilleure solution pour combler le manque d'anesthésistes dans les communautés rurales. Les participants ont décrit le besoin d'un nombre plus important d'anesthésistes FP/GP et de l'élaboration de réseaux financés formels pour faciliter le transfert de connaissance entre les hôpitaux universitaires et communautaires et ainsi créer un mécanisme de soutien.*

Conclusion *Les médecins dans les hôpitaux communautaires font face à d'importants obstacles au niveau de l'offre de soins d'anesthésie pour l'obstétrique. Les obstacles les plus importants se retrouvent chez les anesthésistes FP/GP et dans les hôpitaux de campagne, où la pénurie de médecins et le manque de soutien mettent en péril l'offre de services d'anesthésie dans certains hôpitaux. Des solutions locales et spécifiques au contexte ainsi qu'au niveau des systèmes sont requises.*

Background

Anesthesia services are a vital part of the maternal newborn safety net within the Canadian health care system. Anesthesia services include: pre-labor and pre-Cesarean medical consultations and use of labor epidurals as part of obstetric, medical, and anesthetic risk management during childbirth, high quality labor epidural pain relief, primary maternal medical and anesthesia care during operative deliveries, and management of peripartum pain. Importantly, anesthesiologists and family practice (FP/GP) anesthetists provide frontline emergency medical care during crises that require maternal (and in some institutions neonatal) resuscitation and acute maternal medical stabilization and intensive care during life-threatening emergencies (e.g., hemorrhage, pre-eclampsia/eclampsia) that occur in the peripartum period.

Unlike other professions contributing to maternal newborn care, health services research related to obstetrical anesthesia care in Canada is virtually non-existent. The important contributions made by anesthesiologists and FP/GP anesthetists to maternal newborn safety and care within the system are poorly reported, are not interpreted, and are largely unrecognized in national and provincial perinatal reports. Obstetrical anesthesia care is commonly reduced to epidural frequencies and Cesarean delivery rates. Other important aspects of the provision of obstetrical anesthesia services that are not reported include common adverse outcomes and the impact of the limitation of anesthesia services on maternal care, maternal safety, and birth outcomes within the system, particularly in small town and rural hospitals.

Despite these limitations, the data reported bears witness to the overall large and important role played by obstetrical anesthesia providers during labor and delivery. In the most

recent Canadian Perinatal Report, more than one-in-three women in the nation received obstetrical anesthesia care as an *essential* service in 2004 and 2005 (Cesarean delivery rate 25.6%, operative vaginal delivery rate 14.8%, forceps 4.6%).[1] The most recent Ontario Provincial Report, which provides additional data regarding epidural use, suggests an even greater role.[2] In 2005 and 2006, more than 60% of parturients in the province received anesthesia care during labor and delivery (labor epidurals 59%, Cesarean delivery 28%, forceps and vacuum 13%). Compared with the levels of involvement by primary providers of obstetric care during childbirth in Ontario, the frequency of obstetrical anesthesia provider involvement ranked second only to obstetricians (obstetricians 86%, anesthesiologists/FP anesthetists more than 60%, FP obstetricians 9%, and midwives 4%).

To date, several national and provincial reports have focused on Canada's capacity to provide primary maternity care due to a shortage of providers.[3–5] The limited information available also suggests that significant issues exist regarding provision of obstetrical anesthesia care, particularly in small town and rural communities. Authors of Ontario provincial perinatal reports have noted an association between a shortage of the availability of anesthesia services and closure of maternity services in small town and rural hospitals[6] and an association between a shortage of maternal access to epidural pain relief and urbanization of low-risk maternity care.[2,7] A 2005 Ontario hospital survey identified anesthesia providers as the group most commonly limiting hospital capacity to provide Cesarean deliveries. Of 102 hospitals surveyed, 28% reported intermittent Cesarean delivery capacity and 9% reported no local capacity for Cesarean delivery.[8] Despite these issues and the recognized shortage of anesthesia providers in these communities,[9,10] little research has been conducted to explore the issues and barriers they encounter related to provision of services or systems of support.

This paper presents findings from a secondary analysis of data obtained from physician leaders in a larger provincial study that was also conducted by the authors.[11] The primary study explored a variety of areas with physicians across Ontario regarding the provision of obstetrical anesthesia care, including local obstetrical anesthesia practices, issues and barriers to provision of services, and potential solutions. The current study focused specifically on the issues and barriers physicians encountered in community hospitals with fewer than 2,000 deliveries per annum, and it also explored potential solutions. We chose to focus on this group of providers for two reasons: (1) Leaders within the Child Health Network (Greater Toronto Area) involved in maternal newborn care suggested delivery volumes of 2,000 or more as the threshold required to provide efficient, high quality maternal care within maternity units;[12] and (2) Findings from our larger provincial study suggested that physicians in these hospitals, particularly small rural hospitals, were in most urgent need of supports and solutions from the health care system to ensure continued provision of services.

Methods

Following Sunnybrook Health Sciences Centre Research Ethics Board approval, we performed a secondary analysis of the qualitative data collected in a larger Ontario study from 18 physician participants. The primary study involved 28 physician leaders representing the spectrum of obstetrical anesthesia care from large urban to rural remote Ontario hospitals. The study, which is reported elsewhere,[11] employed a three-phase, sequential mixed-method research design using both a qualitative exploratory descriptive approach[13] and a quantitative practice survey approach. Data were collected in the summer of 2005.

The current study specifically focused on and analyzed all of the data from the primary study that addressed the provision of obstetrical anesthesia services in community hospitals with fewer than 2,000 deliveries. The data explored were from four university-based obstetrical anesthesia leaders and 14 FP/GP anesthetist and anesthesiologist leaders representing community hospitals with fewer than 2,000 deliveries per annum. Community hospitals were sampled using a purposeful strategy of maximum variation based on delivery volumes, level of neonatal care, and geographic region in Ontario. Hospitals were located outside of major metropolitan areas and represented all five geographic regions of Ontario (Fig. 1). Physician leaders from these hospitals (Director of Obstetric Anesthesia, Department Head of Anesthesia, or anesthesia provider most responsible) participated in at least one-of-three focus groups exploring issues and barriers encountered regarding obstetrical anesthesia care in their hospitals and their potential solutions (Box 1). To further explore potential solutions, leaders from all major university-based obstetrical anesthesia teaching programs were invited to participate in a final physician focus group with community hospital key informants. Eighty-two percent (14/17) of the community anesthesia leaders who were invited participated in one or more focus group. Obstetrical anesthesia leaders from three of six university-based obstetrical anesthesia teaching programs participated. All participants had been in practice for at least 3 years..

Focus groups were held via teleconference and were moderated by the physician investigator and an assistant moderator. The focus groups included four or five participants, lasted 1.5 to 2.5 h, were audio-taped, and were transcribed *verbatim*. At the conclusion of each focus

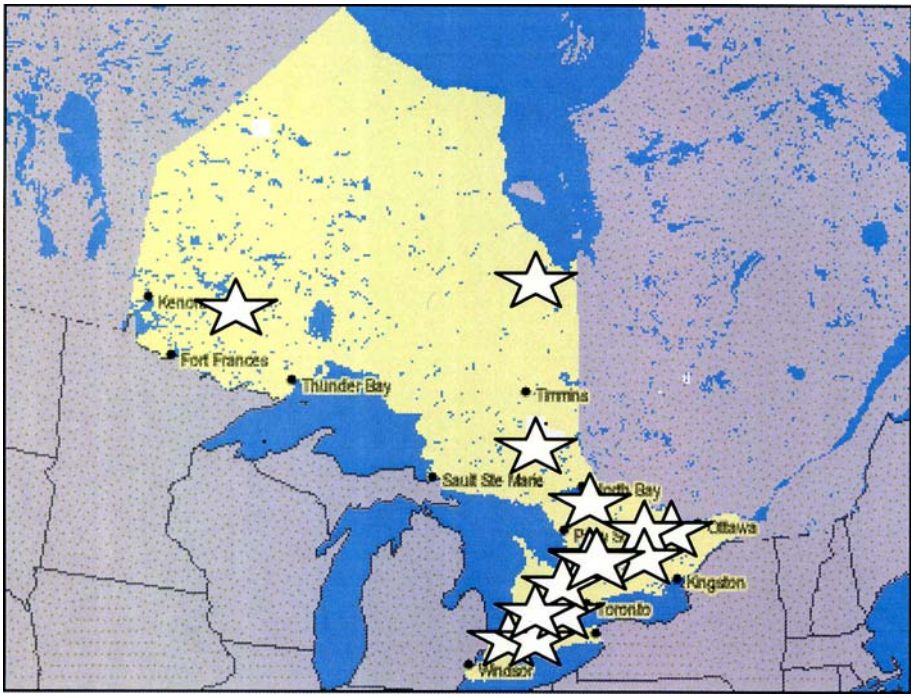

Fig. 1 Geographic map of 14 hospitals represented by anesthesia leaders from hospitals with fewer than 2,000 deliveries per annum

Box 1 Focus group semi-structured interview guide

1. When a woman comes to your primary hospital in labor and requests pain relief what is the process that ultimately leads to getting an Anesthetist's services?
2. How is labor analgesia managed in your hospital?
3. How are operative deliveries managed in your hospital?
4. What do you think are the key issues and barriers to providing anesthesia care to women during childbirth?
5. What do you think should be done to address these issues?

group, member-checking was used to verify the researchers' initial interpretation of key issues.[14] Researchers debriefed after each session and identified issues requiring further exploration in subsequent focus groups until saturation of responses. In the final focus group, findings from previous focus groups were initially described to provide a context for physicians from university-based maternity anesthesia teaching programs as well as to further cross-validate findings with key informants prior to exploring potential solutions.

Qualitative content analysis was used for the analysis.[13] Transcripts were initially read to check for accuracy and to provide a comprehensive view of each physician's discussion. A provisional list of codes was developed from the focus group interview schedule. The researchers (an obstetric anesthesiologist/researcher and a labor nurse/health services researcher) independently read transcripts and, with the assistance of the software, NVivo QSR 2.0,[1] they applied the devised codes to portions of the data. They then used pattern coding and memo linking observations to facilitate making inferences from the data. Codes representing similar ideas within and across focus groups were clustered into categories (themes and sub themes). The two reviewers compared emerging analyses and, through critical discussion, consensus was reached on the development of new codes and categories needed to represent the data. Data collected on the physician practice survey were entered into SPSS 12.0.[2] Descriptive statistics were used to present the demographic characteristics of the hospitals sampled and the participants representing them.

Results

The characteristics of the participants and the community hospitals they represented are shown in Table 1. Three themes, each comprised of two or three subthemes, emerged from the data. The themes were profusely interwoven and interactive; however, for the purposes of presentation, they are discussed separately in the paper.

Obstetrical anesthesia in the "periphery"

The theme, Obstetrical Anesthesia in the Periphery, had three subthemes that described the greater context in which obstetrical anesthesia services are provided in community

[1] QSR International Pty, L. (2002). QSR NVivo 2.0 (Version 2.0) [Computer software].

[2] SPSS (2003). SPSS 12.0 for Windows, release 12.0.0. Chicago: Author. SPSS Version 12.0, Chicago, Illinois [Computer software].

Table 1 Characteristics of focus group participants from hospitals with <2,000 deliveries

Participants ($n = 14$)	Hospitals <2,000 deliveries per annum ($n = 14$)
Characteristics	
Age mean (SD)	44.8 years (7.5)
Gender	Male 12/14 (85.7%)
	Female 2/14 (14.3%)
Anesthesiologist	4/14 (28.6%)
FP/GP anesthetist	10/14 (71.4%)
Years in practice, mean (SD)	13.9 (8.7)
Geographic areas of hospitals represented	Northern Ontario: 3/14
	Eastern Ontario: 3/14
	Central Ontario: 3/14
	Western Central Ontario: 3/14
	Southwestern Ontario: 2/14
Level of neonatal care provided	Level 1: 13/14
	Level 2: 1/14
Location of primary hospital as reported by participants	Urban: 0/14
	Large community: 2/14
	Small community: 6/14
	Small community/rural or rural: 6/14
# Anesthesia providers, mean (SD)	Large community: 17 (5.7)
	Small and rural communities combined: 3 (1.7)
Estimated delivery rates per annum by participants, mean (SD)	Large community: 1,450 (212)
	Small and rural communities l: 547 (369)
	Minimum 120 deliveries per annum

FP/GP family practice anesthetists

hospitals outside large metropolitan areas. The first sub theme was *Rural Anesthesia is Not like Big City Anesthesia* (Box 2A). Participants indicated that specialist anesthesiologists provide complex anesthesia care in large community hospitals while FP/GP anesthetists provide most of their anesthesia services in small and rural communities. Family practitioner anesthetists described themselves as medical services multi-taskers who provide a variety of family medicine (e.g., office, obstetric, emergency ward, and nursing home care) and anesthesia services for their communities. While multi-tasking is necessary to earn a living in their low-volume practice settings, 24-h on-call coverage of anesthesia and family medicine is onerous and complex.

The second subtheme, *The Heavy Toll of the Anesthesia Human Resources Shortage in the Periphery* (Box 2B), reflected the impact of the anesthesia human resources shortage on providers and services. Staffing shortages were described among anesthesiologists in distant large community hospitals and FP/GP anesthetists in small town and rural hospitals. Both groups voiced concern over the future capacity of providing anesthesia services in their communities. The greatest shortages were described by FP/GP anesthetists, who noted that the deficiency worsens as communities decrease in size and increase in distance from large southern Ontario cities. Family practitioner anesthetists explained that FP/GP anesthesia shortages, once far removed from major urban centers, were now present in community hospitals in close proximity to cities and that small town and rural communities "compete" for scarce anesthesia resources. Designation of more desirable communities in close proximity to southern Ontario cities as underserviced left rural remote providers unable to compete for the scarce supply of anesthesia practitioners. Providers from desirable small town and rural communities indicated that the underserviced designation was the main reason that they were able to offer the level of anesthesia services currently provided. Family practitioner anesthetists voiced frustration over difficulties with recruitment and retention, inadequate numbers of FP/GP anesthetists being trained, and lack of incentives for FP/GP anesthesia re-entrant training. Arduous on-call requirements, geographic and professional isolation, and lack of affordable and available anesthesia locum relief make it difficult for them to leave their communities for continued medical education (CME) or vacations. These factors, combined with the lack of anesthesia mentorship and supports in the system, were noted to be important contributors to early family physician burn-out from anesthesia practice.

The third subtheme, "*And so We've got a Two-tiered Maternity System*," (Box 2C) described participants' perceptions of women's access to epidural pain relief during

Box 2 Obstetrical anesthesia in the "periphery"

(A) "Rural GP-type anesthesia is not like big city anesthesia"

- "*I mean you really want to break down your normal kind of views of what we do everyday and the way the world works because things [here] are so different. … most of us are multi-tasking and doing a bazillion things.*" *[FP/GP Anesthetist, Small Community, Rural]*
- "*Our Anesthetists are split sort of half and half. Two of them are doing anesthesia… one works in some walk-in clinic, I have a general practice as well as doing anesthesia; and, the fourth one … is almost coming to retirement. so he's doing like nursing home and stuff like that.*" *[FP/GP Anesthetist, Small Community, Rural]*
- "*…none of us [do] full-time Anesthesia here… We only get about 2 or 3 [operating room] lists a week so we all rely on something else [for an income].*" *[FP/GP Anesthetist, Small Commnity]*

(B) The heavy toll of the anesthesia human resources shortage in the "periphery"

- "*… we're a bit gloomy about the future because we don't have as great a pool [of Anesthesiologists] to draw from … we're getting more and more pressure to work post-call …there's more and more on the urgent list or after hours and yet they still want us to work the next day…*" *[Anesthesiologist, Large Community]*
- "*…I've been on [anesthesia] call 16 days a month. I'm also "on call" for my emerg[ency room] 1 in 3. I've been on call at least half of the [past] year.*" *[FP/GP Anesthetist, Rural]*
- "*…one [of our 4 Anesthetists] tells us they are leaving…and already we're talking that there won't be 24 h coverage of anything anymore.*" *[FP/GP Anesthetist, Small Community, Rural]*
- "*When the under-serviced area program came out and places that were under-serviced were rural remote communities—well—it worked and we were able to utilize it to help us get people. Now when the under-serviced area program calls XX Small Community [within 100 km from Toronto] under-serviced and we're on par with them for support it ain't working anymore.*"*[FP/GP Anesthetist, Rural]*
- "*The problem with Anesthesia is [that] you either have to drop or quit.*" *[FP/GP Anesthetist, Smalltown]*

(C) And so We've got a Two-tiered Maternity System

- "*We're a large community hospital… so we provide an epidural service 24 h 7 days per week…we're generally busy in the OR 24 h as well so we're usually in[hospital].*" *[Anesthesiologist, Large community]*
- "*…timing the request is important…we can't come at the drop of a hat because we do not have staff attending to the obstetrical floor…*" *[Anesthesiologist, Small Community]*
- "*On a few occasions… a GP[obsletric provider] asked us to kind of hold the[OR] list while they decided about a [C]section. This kind of shocked me …I didn't hold the [OR] list. I just kept on going, and then they were kind of annoyed at me that when they wanted a [C-]section, I was actually in the middle of another case.*" *[FP/GP Anesthetist, Small Community]*
- "*I'm the only person doing epidurals… so they'll call and we'll try to use our epidurals judiciously… I think those are just survival rules.*" *[FP/GP Anesthetist, Small Community]*
- "*So women who want an epidural as soon as they come in, generally speaking, make the choice of going to the city and women who stay here for the most part are not expecting epidurals.*" *[GPAnesthetist, Small Community]*

childbirth in their hospitals. Anesthesiologists in large community hospitals described relatively replete obstetrical anesthesia services and, although they covered other assigned services while on-call from home after hours, they had the capacity to provide services within reasonable time limits. Participants from large community hospitals described administration of labor epidural pain relief within an hour, on average, from time of request, pointing out that other anesthesiologist colleagues while often "in house" after hours covering the needs of other services and might be able to help out. The availability of obstetrical anesthesia services in small town and rural communities, however, varied significantly between communities. Participants described that labor epidural pain relief was simply not available in some communities. In other communities, there was a 4–6 h delay following maternal requests due to competing needs of other services or inaccessibility after hours. Physicians practicing in small town and rural hospitals with low epidural rates described that women (particularly multiparous) seeking epidural pain relief simply choose to deliver outside of their communities. All rural hospitals in this sample provided Cesarean delivery coverage. Participants described that cases were triaged according to level of urgency and were attended with more or less difficulty based on the degree of anesthesia provider shortages, timing of the request, and co-existing demands for services on a given day.

Key issues and barriers to obstetrical anesthesia care

This second theme captured the barriers encountered by participants during provision of obstetrical anesthesia services in their primary hospitals of practice. It was comprised of three sub themes. The first was "*Caught in the Middle*" (Box 3A). Participants in large hospitals and small town and rural hospitals pointed out that the unpredictable nature and low volume of obstetrical anesthesia services requirements meant that these services were provided ad hoc and according to level of urgency by physicians assigned to other anesthesia services. Participants explained that this method of covering these services made sense from an efficiency and remuneration

Box 3 Key issues and barriers to obstetrical anesthesia care

(A) "Caught in the middle"

- "*The OR's usually pretty busy. If you have to tell the surgeon. I have to go up [to obstetrics]…sometimes even just to do an epidural…they can get somewhat nasty about it…or sometimes there's a confrontation. There've been times when you feel like you're being pulled in both directions.*" *[Anesthesiologist, Large community]*
- "*But we can't attract someone to sit and do 3 or 4 epidurals a day and do a [C]section or two in obstetrics. That's just not going to pay it.*" *[Anesthesiologist, Large Community]*
- "*It's a matter of triaging… there's always pressure to be doing something else. The obstetrician's not happy I didn't put an epidural into his patient. The patient's not happy …and upstairs [the operating room] is not happy because I have to go downstairs [to obstetrics]. It's just difficult…we don't have the volumes to staff [obstetrics] but it's getting busy enough that it's interrupting things very frequently.*" *[FP/GP Anesthetist, Small Community]*

(B) Local barriers to uptake of best practices obstetrical anesthesia care

- "*I think everybody would agree that we've all said 'gee that'd be a really good idea' and the thing dies on the table because there's just no time, resources, initiative or help to make these ideas come to fruition.*" *[Anesthesiologist, Large Community]*
- *Once you've got the motivation. you've still got a long way to go with establishing protocols and the shifting sands of the hospital bureaucracy*
- "*It's easy for me to get protocols but it's hard for me to get the rest of the team organized and get matching team teaching… you know…the nurse educators, the pharmacy, everybody has more questions.*" *[FP/GP Anesthetist, Rural]*
- "*We introduced the PCEA (patient controlled epidural analgesia) about 4 months ago but there is a lot of reluctance among our [anesthesia] colleagues and as well as the nurses too, to do the PCEA.*"
- "*… and you can't guarantee success unless people are educated.*"

(C) Lack of access to obstetrical anesthesia resources within the greater system

- "*Every institution has been re-defining [protocols] again and again…it's a real waste of time. It would really be nice if there was a central process." [Anesthesiologist, Large Community]*
- "*I often have no trouble getting the protocol, but when I say what about the nursing package? I get referred on to this nurse who's not really interested in talking to me. And then I go to some more trouble and I try and set it up so my nurse calls them We've never had a successful link with nursing.*" *[GP Anesthetist, Rural]*
- "*That's the problem, we [FP/GP Anesthetists] have all been relying on a friend who turned up to be an Anesthesiologist somewhere [for mentorship] and when those people move on the link goes.*" *[FP/GP Anesthetist, Rural]*
- "*I think part of…the problem is that once you've been out in practice all by yourself for 5 years you might not be able to recognize your own needs….*" *[FP/GP Anesthetist, Small Community/Rural]*
- "*We don't have a formal link with anybody. We're out in the middle of nowhere.*" *[FP/GP Anesthetist, Rural]*

perspective, but it left them struggling to attend to simultaneously occurring needs for coverage of Cesarean deliveries and epidurals. Participants also mentioned that cross-coverage sometimes led to interpersonal difficulties with surgeons whose elective surgical lists in the operating room were being interrupted to cover maternity ward needs.

Local Barriers to Obstetrical Anesthesia care (Box 3B) was the second subtheme. Anesthesiologists and FP/GP anesthetists described the variety of barriers they encountered as they attempted to update obstetrical anesthesia practices. Regardless of size and location, some barriers were common across hospitals. These included the lack of time and the shortage of hospital infrastructure supports required to develop 'best practices' obstetrical anesthesia protocols. They also included the shortage of interdisciplinary human resources and the lack of access to the interdisciplinary education packages required for uptake of best obstetrical anesthesia practices. Participants indicated that resistance to change was often encountered across the various professions (e.g., nursing, pharmacy) involved in peripartum care and often undermined successful implementation of new "best" obstetrical anesthesia practices. Local hospital culture and negative caregiver attitudes, which, according to participants' descriptions, varied considerably between hospitals, were also described as important barriers to women's access to epidural pain relief.

The third subtheme, *Lack of Access to Obstetrical Anesthesia Resources within the Greater System* (Box 3C), described the variety of ways in which anesthesiologists and FP/GP anesthetists believed lack of access to anesthesia resources within the system magnified local barriers to obstetrical anesthesia care. Physicians from across the sampled spectrum of hospitals described the difficulties they encountered in obtaining obstetrical anesthesia protocols and, in particular, the difficulties in obtaining educational resources from centers of obstetrical anesthesia excellence within the system for in-service training of interdisciplinary team members. Anesthesiologists in large community hospitals described the need for a central resource for information, describing their frustration at the inefficiencies involved in "re-creating the wheel" in every hospital. While they lacked time and infrastructure supports to create and implement practices, they had far greater capacity than physicians practicing in small town

and rural communities. Family practitioner anesthetists described that lack of resources and time left them with little capacity to develop and implement best practices protocols for local use. They expressed a need for ongoing connectivity with obstetrical anesthesia mentorship to assist them in modifying the protocols designed for use in larger centers to meet the requirements of their rural resource-poor communities. Family practitioner anesthetists further voiced their need for access to obstetrical anesthesia expertise, advice, and consultation during difficult obstetric cases, for access to technical skills updates (epidural retraining or training), if necessary, and for provision of CME more suited to their specific learning requirements and practice context. Family practitioner obstetrical anesthetists explained that the absence of such mentorship supports, particularly in obstetrical and pediatric anesthesia, was an important contributor to early "burn out" and cessation of FP/GP anesthesia practice in rural communities.

A multi-faceted but context-specific solution is required

This theme included two sub themes and described solutions proposed by participants. The first subtheme related to *The Need for Formal Knowledge Exchange Networks between Obstetrical Anesthesia Centers of Excellence and Community Hospitals* (Box 4A). Participants from across the spectrum (university-based obstetrical anesthesia teaching to rural remote Ontario) of hospitals described, in a variety of ways, that anesthesia networks would be the best solution to meet the needs of community hospitals for knowledge transfer. They proposed that uptake of "best practices" obstetrical anesthesia care would be best facilitated if these relationships were formalized, funded, and geographically based according to existing clinical care alignments (if present), providing linkages between mentorship and interdisciplinary educational supports in centers of excellence and the spectrum of community hospitals across the province. Participants indicated that such networks could be used to facilitate consultation with mentorship, skills updates, team training, and ongoing CME (via telemedicine, onsite, and offsite teaching), as well as facilitate efficient and timely uptake of best practices protocols. Networks were also described as potential sources for locum relief in rural remote areas.

The second subtheme was *FP/GP Anesthetists are the Answer to the Anesthesia Human Resources Shortage in Small and Rural Hospitals in the Periphery* (Box 4B). Family practitioner anesthetists explained that anesthesiologists did not commonly desire work in their small and

Box 4 A multi-faceted but context-specific solution is required

(A) FP/GP anesthetists are the answer to the anesthesia human resources shortage in small and rural hospitals in the periphery

- "*The vast majority of people … are totally ignorant about what is being done to them [during anesthesia] … medical issues [make the practice of anesthesia complicated] … You need to have experience and a medical background to deal with these… in a way that a technician wouldn't have….*" *[FP/GP Anesthetist, Small Community]*
- "*…it seems sort of silly to set up a separate group [of anesthesia providers]. Certainly in the rural areas when you already have the GP anesthetists who are the best resource… I think training more GP anesthetists would probably be the answer.*" *[Anesthesiologist, Large Community]*
- "*… that approach [alternative providers] just hasn't worked in the rural areas.*" *[FP/GP Anesthetist, Rural]*
- "*Family practice anesthesia provides a much broader service to a rural hospital than just anesthesia services in the OR or labor pain relief … it's help in resuscitation, it's help in critical care, it's help in trauma, it's help in neonatal resuscitation, as well as emergency services and family practice services. So…we're a bloody good bargain.*" *[FP/GP Anesthetist, Rural]*
- "*The bottom line is Anesthesia is Anesthesia…if you have a fire, you want a fire extinguisher.*" *[FP/GP Anesthetist, Small Community/Rural]*

(B) The need for formal networks between obstetrical anesthesia centers of excellence and community hospitals for knowledge exchange

- "*…it would be good if there was a network…and we could just contact somebody, get a package of information and…[just get it up and running].*" *[FP/GP Anesthetist, Small Community]*
- "*… we never bring anesthesia CME to the little places…it'd be a marvelous thing if we could do it by teleconferencing.*" *[FP/GP Anesthetist, Smalltown]*
- "*I don't think you can ever get away from the phone call. Again if you have a specific linkage…I'm sure in most teaching centers, they're 24 h a day providers. But it can't be for you know anything other than intrapartum emergencies.*" *[FP/GP Anesthetist, Small Community]*
- "*I think that [maternity anesthesia networks] would be probably better institutionally-linked so that there's ownership amongst group of [anesthesia providers] and…we kind of divide geographically and become linked to whatever communities that [are designated to us]. You want to set it up for success.*" *[Anesthesiologist, University]*
- "*… I think that it's a good idea [opening up places where re-training and updating skills are possible] because that's salvaging people who you're going to lose maybe from …anesthesia. So and that would always [need to] be a … one-on-one situation where they could come to be a bigger center and be supported and taught and encouraged.*" *[FP/GP Anesthetist, Small Community]*
- "*We need program funding to provide this networking service to bring the provincial bar of maternal [anesthesia] services up.*" *[FP/GP Anesthetist, Rural]*

rural communities and that use of anesthesia assistants, anesthesia extenders, or nurse anesthetists made little sense in their low anesthesia case volume context. They shared concerns that anesthesia extenders and assistants would only further dilute their anesthesia skills and do little to address their need for independent coverage of both anesthesia and family medicine "on-call" duties. Participants voiced their beliefs that FP/GP anesthetists provided the best solution to the anesthesia shortage in their communities, citing their medical training, their ability to efficiently and cost effectively multi-task and provide "on-call" coverage for a variety of much needed family medicine services, and the existence of long-established training programs for FP/GP anesthetists in Ontario. To answer staffing needs in peripheral hospitals, participants expressed the need for additional training slots for FP/GP anesthetists, improved incentives for family physicians desiring re-entrant positions anesthesia training, and novel methods of increasing locum anesthesia pools. Family practitioner anesthetists described that a minimum of four physicians were required to maintain 24/7 coverage of obstetrical anesthesia services in small and rural hospitals.

Discussion

This health services study focused on key issues and barriers encountered by physicians providing obstetrical anesthesia care in Ontario hospitals with delivery volumes of fewer than 2,000. Numerous significant stressors were identified. Overall, these were greatest in small and rural hospitals and among FP/GP anesthetists. Some barriers, however, were commonly described by providers across community hospitals, regardless of delivery volumes, hospital size, or location. These included lack of time, resources, and hospital infrastructure supports required to develop and implement "best practices" protocols as well as difficulties arising from lack of dedicated anesthesia staffing in labor and delivery suites.

Other barriers more specific to practice in the periphery included worsening FP/GP anesthesia shortages, lack of CME suited to rural practice context, the need for better access to anesthesia mentorship, the need for suitable environments for skills updating and retraining, and professional isolation. All of these obstacles further magnified difficulties experienced by anesthesiologists in large community hospitals in the distant north and by FP/GP anesthetists. FP/GP anesthetists in small rural communities described provider isolation and an inability to access obstetrical anesthesia mentorship and resources in the system as important barriers to care. Although FP/GP anesthetists also looked to anesthesiologists in large nearby community hospitals for technical skills updating and retraining, providers from these hospitals described limited capacity to perform this role due to heavy clinical loads and lack of time in our larger study.[11]

While anesthesiologist shortages were described in large northern Ontario hospitals, these providers described continued capacity to provide full obstetrical anesthesia services coverage in their hospitals; this was not the case in many small and rural communities where FP/GP anesthesia staffing shortages led to reductions in services availability. Physicians in small and rural hospitals described a variable and unpredictable capacity for obstetrical anesthesia care on a day-to-day basis, often with little capacity to cover more than most urgent and emergent cases. Family practitioner anesthetists described worsening shortages that, if left unchecked and without remedy, might threaten continued capacity for Cesarean deliveries in some communities. Loss of Cesarean delivery capacity has been noted to be an important contributor to closure of rural maternity services.[15]

Also, labor epidural pain relief in many small and rural communities was regularly delayed beyond limits deemed acceptable in larger centers or was simply not available despite providers' best efforts. Our findings, along with those from other work examining labor pain relief with parturients,[16] support suggestions that reductions in availability of labor epidural pain relief is contributing to the urbanization of low-risk maternity care in Ontario.[2] Urbanization further dilutes rural provider skills, further jeopardizes the availability of local services, and creates additional expense and stress elsewhere in the system. More than 50% of maternity beds in higher acuity urban Ontario hospitals are occupied by low-risk pregnancies,[2] forcing higher-risk pregnancies to be transferred elsewhere, including out of the province. It should be noted, that, although labor epidural rates are generally lower in smaller hospitals, their use has steadily increased in some regions of Ontario since 2003.[7,17,18] Whether this implies an increase in anesthesia providers in some areas of the province or an increasing strain on limited anesthesia resources is not clear.

Community anesthesiologists from hospitals with 2,000 or more deliveries (larger provincial study), those from hospitals with fewer than 2,000 deliveries, as well as FP/GP anesthetists described difficulties in establishing the required ongoing linkages with obstetrical anesthesia mentorship and resources for advice and support and uptake of best practices. Difficulties, however, were greatest among FP/GP anesthetists in small and rural communities, who described little local capacity to develop, modify, or implement uptake of "best practices" without additional resources and mentorship from the system. For anesthesiologists in large community hospitals with more than 2,000 deliveries, the challenging issues

were related generally to their lack of time to develop best practice protocols, to bring them through hospital committees, and to attend to the interdisciplinary team training required.[11] Providers from university to rural remote community hospitals described the need to develop, over a period of time, formal funded geographically based knowledge transfer networks between community hospitals and university-based hospitals to support evidence-based changes in practice across the system. Family practitioner anesthetists expressed that networks might also lead to improved FP/GP anesthetist retention, lessen FP/GP anesthesia "burn out" in rural areas, and provide a platform to build strategies that could better address locum staffing and anesthesia CME needs.

Despite the difficulties encountered, FP/GP anesthetists were described as the "best answer" to the medical provider shortage in small and rural communities, and participants indicated that anesthesia extenders and assistants made little sense in their practice setting. Participants described the need for increased dedicated funding for FP/GP anesthesia training and re-entry training positions in university-based anesthesia teaching programs. They also described the need to address disparities between rural communities in funding obstetrical anesthesia services and the need to re-address under-serviced grading to permit more distant rural communities to attract and retain FP/GP anesthetists.

Study limitations include the absence of participants from hospitals where maternity services had already been closed. Physicians from these centers might have provided additional valuable insight into the "human" factors associated with closures. Closures have also been associated with reductions in staffing as well as hospital cost-saving measures.[5] In addition, the information obtained in this study may not be applicable to all obstetrical anesthesia providers in community hospitals in the "periphery," although participants from all regions of Ontario were interviewed.

Overall, our findings suggest that the issues faced by anesthesia providers in the "periphery" are complex, require solutions at many levels, must be context-specific, and to be effective, must also simultaneously address the greater issues surrounding the provision of anesthesia services within these communities. Lastly, our findings should not be divorced from greater issues that appear to exist at the health "systems" level. These include the need to recognize the important roles played by anesthesiologists and FP/GP anesthetists in maternal and newborn care and safety and to ensure anesthesia representation in national and provincial health human resources planning, in high-level interdisciplinary maternal newborn advisory panels and in interdisciplinary teaching programs aimed at risk management and quality assurance in maternity units. Increased surveillance of services provided and associated outcomes are also needed. These deficiencies are only beginning to receive the attention they need in order to better develop, provide, and sustain safe high quality maternal newborn care in Canada.[5,19]

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References

1. *Public Health Agency of Canada*. Canadian Perinatal Health Report, 2008 edition. Ottawa, 2008. Published by authority of the Minister of Health ©Her Majesty the Queen in Right of Canada, represented by the Minister of Health, 2008. Cat. No. HP10-12/2008E, ISBN 9778-0-662-47236-0
2. 2006 Provincial Perinatal Report. Tailoring Services to Pregnant Women and their Babies in Ontario. Available from URL: http://www.pppeso.on.ca/site/pppeso/NIDAY_Perinatal_Database_p484.html (accessed 2008, December 16)
3. *Health Canada*. Multidisciplinary Collaborative Maternity Care Project. Final Report of MCP^2 June 2006. Available from URL: www.mcp2.ca (accessed 2008, December 12)
4. Final report: Babies can't wait: primary health care obstetrics in crisis: Ontario college of family physicians, University of Western Ontario. Executive summary. Available from URL: http://www.ocfp.on.ca/English/OCFP/Research/University%20of%20Western%20Ontario/default.asp?s=1 (accessed 2009, February 20)
5. *Ontario Women's Health Council.* Maternity Care in Ontario 2006: Emerging Solutions. Ontario Maternity Care Expert Panel, September 6, 2006. Available from URL: http://meds.queensu.ca/prn/downloads/OMCEP_Final_Report_1.pdf (accessed 2009, April 10)
6. At risk: Perinatal services in Southwestern Ontario issue summary and recommendations for action. Regional Perinatal Services Project Coordinating Committee. Available from URL: http://www.lhsc.on.ca/About_Us/ISAN/communication/reports/index.htm (accessed 2008, December 16)
7. Perinatal Partnership Program of Eastern and Southeastern Ontario (PPPESO) March 2005. Perinatal services in Ontario. How are we doing? Available from URL: http://www.aom.on.ca/Communications/Reports_and_Studies/ (accessed 2009, January 7)
8. Ontario Maternity Expert Care Panel, Summary Hospital Survey. Appendix F, p 270. Executive Report of the Ontario Maternity Care Expert Panel. Emerging Crisis, Emerging Solutions, September 6, 2006. Available from URL: http://www.ontla.on.ca/library/repository/mon/15000/268516.pdf (accessed 2009, April 10)
9. Seal RF. Crisis in rural anesthesia. CJRM 2001; 6: 241–3.
10. Brown G, Godwin M, Seguin R, Ashbury EL. Family medicine anesthesia: sustaining an essential service. Can Fam Physician 2005; 51:538–9.
11. *Angle P, Kurtz Landy C, Murthy Y, Cino P*. Anesthesia services for maternity care in Ontario. OMCEP report. November 2005. *In*: Appendix D. Executive Report of the Ontario Maternity Care

Expert Panel Emerging Crisis, Emerging Solutions, September 6, 2006. Available from URL: http://www.ontla.on.ca/library/repository/mon/15000/268516.pdf (accessed 2009, April 10)
12. Strengthening the Maternal, Newborn and Paediatric System *by* Design. IRC Phase 3 Report: Final Advice and Recommendations of the Internal Review Committee. A report to *the* Ministry of Health and Long-Term Care *by the* Child Health Network for the Greater Toronto Area, March 2005, p. 7. Available from URL: http://www.health.gov.on.ca/english/public/pub/ministry_reports/chnetwork_05.pdf (accessed 2009, April)
13. Sandelowski M. Whatever happened to qualitative description? Res Nurs Health 2000; 23: 334–40.
14. Miles MB, Huberman AM. Qualitative Data Analysis: An Expanded Sourcebook, 2nd ed. Thousand Oakes, CA: Sage; 1994.
15. British Columbia. Policy brief: Issues in Rural Maternity Care Series 1.1. Planning Rural Maternity Services to Meet Women's Needs (Rural Maternity Care New Emerging Team). March 2008. Available from URL: http://www.ruralmatresearch.net/ (accessed April 2009)
16. Angle PJ, Kurtz-Landy C, Streiner D, et al. Identifying major components of quality neuraxial analgesia. Can J Anesth 2004; 51: A62 (abstract).
17. Perinatal Partnership Program of Eastern and Southeastern Ontario (PPPESO). Annual Perinatal Statistical Report 2006–07. Available from URL: http://www.pppeso.on.ca/site/pppeso/NIDAY_Perinatal_Database_p484.html (accessed 2008, December 16)
18. Perinatal Partnership Program of Eastern and Southeastern Ontario (PPPESO). Annual Perinatal Statistical Report April 2007—March 2008. Available from URL: http://www.pppeso.on.ca/site/pppeso/Reports_p545.html (accessed 2008, December 16)
19. Ontario Medical Association Policy on Maternal and Newborn Care in Ontario: February 2008. Available from URL: http://www.oma.org/Health/IPC/MaternalandNewbornCare2008.pdf (accessed January 6, 2009)