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Original Research

Report on Implementation, Use, and Sustainability of a Labor Epidural Service in Georgetown, Guyana

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Introduction

In today's medical community, medical missions by North American and European trained physicians offer medical and training care to the developing world in areas where it is often lacking and under-used. It is estimated more than 250 million dollars are spent annually on medical missions, signifying large health care expenditures despite minimal data on their impact.[1] Given these expenditures and the popularity of medical missions, evaluating the efficacy and safety of these programs is of increasing importance to furthering cost-effective interventions and lowering the global burden of disease.

Georgetown is the capital of Guyana, a developing nation on the northern border of South America. Overall, the maternal mortality rate in Guyana was 250 per 100 000 live births in 2013, more than 3.5 times the regional average and significantly higher than the global rate despite over 80% of deliveries taking place at health facilities and over 90% of mothers attending at least 1 prenatal care visit.[2] Hence, it has been suggested that quality of care, rather than access to facilities, is driving maternal mortality rates.[3] The Georgetown Public Hospital Corporation, the largest Hospital in Guyana, is the crown jewel of the public health system. Its Maternity Ward delivers approximately 40% of the country's births annually, or over 7000 deliveries, and the most common causes of maternal mortality are hemorrhage and eclampsia.[4,5]

Prior to April 2014, anesthesia providers in the Guyanese public hospital system did not use epidural analgesia for laboring parturients, including for patients with preeclampsia, for whom the American Society of Anesthesiologists guidelines, based on an expert review of literature, recommend early insertion of epidural catheters.[6] Additionally, general anesthesia remains widely used in Guyana for cesarean delivery despite documented risks of increased infant and maternal complications and the higher costs that result from the treatment of these complications.[7-9] Given the absence of this best practice, local obstetricians and anesthesiologists, several of whom had exposure to epidural through prior work and training, identified the use of labor epidural analgesia as an opportunity for targeted education and practice change in an effort to improve the quality and safety of the labor experience for Guyanese women.

Importantly, epidural analgesia has recently become safer to administer in low resource settings because of the widespread adoption of ultra-low dosing strategies that rely on large volumes of very dilute local anesthetics.[10] Maternal hypotension and the resultant fetal bradycardia occur less frequently with ultra-low dosing strategies, minimizing workforce interventions and potentially permitting intermittent monitoring.

A team of physicians and nurses (Doctors International, Washington, DC) traveled to Guyana for a 1-week targeted intervention to train local providers in the technique and management of labor epidural. Like many medical missions, this mission was done with the goal of improving the quality of care and maternal health in Guyana through education and training. Despite positive reception from local providers and the ministry of health, the effect of this training program on the long-term use of epidural anesthesia was unknown. Therefore, this study aims to evaluate the effectiveness of a single, targeted, medical training mission to Guyana in increasing the use of epidural anesthesia.

Materials and Methods

Institutional approval was granted by Georgetown Public Hospital Corporation (GPHC) to conduct this study. Data on the number of epidurals and complications from placement were collected (RD) at 2 months and 6 months posttraining.

Over the course of 5 days, the visiting team of providers trained and educated local providers. Over 8 hours of didactic lecture as well as hands-on procedural training in the placement of epidurals were completed with anesthesia providers, obstetric providers, and nursing staff (Appendix A). In total, 11 epidurals (8 cesarean delivery; 3 labor), 1 unintentional dural puncture, 1 epidural blood patch for postdural puncture headache, and 1 combined spinal-epidural were placed by Guyanese anesthesia providers under the

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direct supervision of the visiting team. A different member of the anesthesia staff placed each epidural with observers from the anesthesia department present to learn the technique.

A survey (Appendix B) was distributed to all providers of obstetric services at GPHC. The survey included questions regarding demographics, experience, knowledge, and attitudes toward the use of labor epidurals. The survey was designed with input from local providers and the visiting team. The initial survey was modified after testing on several local providers from other departments for face validity. Experts from obstetrics, nursing, and anesthesiology at the author's home institution reviewed the survey for content validity. Modifications included the addition of several questions and the simplification of the responses to a dichotomous scale.

Qualitative analysis was based on individual interviews with local providers at 6 months posttraining. Interviews were conducted with 2 obstetricians and 2 nurse anesthetists. It was felt that 4 providers, 2 each from obstetrics and anesthesia, would capture the majority of concerns; this represented a convenience sampling of available providers. Interviews began with open-ended questions about each practitioner's prior experience and impression of the epidural training mission. Questions were then focused to each provider's experience in obstetric practice, with particular focus on experiences with labor epidurals. Finally, the discussion was directed toward the challenges to using epidurals, local perceptions of epidural use, and the barriers to successfully maintaining an epidural service for laboring women at public hospitals in Guyana. Notes from qualitative interviews were reviewed for themes and reported in results.

Survey data was correlated anonymously and analyzed using SPSS 20.0 (IBM Corp., Armonk, NY). Data was then analyzed as a whole and within each specialty (anesthesia and obstetrics). Distribution of data was then accessed for normativity. Statistical analysis used Student *t* test with statistical significance noted for a $P < .05$.

Results

Study Population

Thirty-one providers were surveyed including 3 anesthesiologists, 4 nurse anesthetists, 19 obstetricians, and 5 midwives. The mean provider experience was 9 years including a mean of 11 years in practice for anesthesia providers and 8.7 years of experience among obstetrics providers.

Only 12% of respondents had witnessed or used epidurals in their practice. Upon closer analysis, this group of providers with epidural experience consisted almost exclusively of obstetrics physicians with international experience. Only 1 physician who noted experience with epidurals did not have any previous international experience.

Among anesthesia providers, only 1 of the 7 respondents had prior exposure to labor epidurals in their professional career despite frequent use of spinal anesthesia.

Cultural Norms

Ninety-three percent of obstetrics and anesthesia providers believed that epidurals should be offered to Guyanese women in labor. Additionally, 80% of all providers felt that epidurals could be performed safely even in resource-limited settings like GPHC. There was significant variation between anesthesia (43%) and obstetrics (83%) providers in their desire to have an epidural for themselves or their significant other (Table 1). We were unable to elicit the specific reasons explaining the difference between groups in targeted interviews. Data from the epidural knowledge survey revealed improved identification of labor epidural myths for 6 out of 9 myths presented among obstetrics providers compared to anesthesia providers (Table 2).

Provider Knowledge

On average, labor epidural myths were correctly identified by 60% of anesthesia providers and 78% of obstetrics providers. Gaps in understanding maternal risks of labor epidural analgesia were most significant. However, both anesthesia and obstetrics providers were well informed of the effects of epidurals on the fetus and breastfeeding, with greater than 97% correct response rates in both groups (Table 2).

Efficacy of Intervention

Following training, targeted interviews revealed that anesthesia providers reported comfort with the technique and management of labor epidurals. Nursing staff felt comfortable with monitoring and reporting responsibilities. Obstetric providers agreed to pilot the use of labor epidural with a limited subset of eligible parturients.

Two months posttraining follow-up revealed that, since training, 16 epidurals were placed, including 14 for women undergoing cesarean delivery and 2 for women in active labor. All epidural placements occurred in the first month following training, and no complications occurred as a result of epidural placement.

At 6 months post-training, it was confirmed that no epidurals were placed since the 2-month follow-up.

Barriers

Sixty-four percent of respondents reported staffing shortages to be the greatest barrier to labor epidural. Other important barriers identified included lack of supplies (16%) and monitoring required (11%) (Table 3).

Interviews confirmed anesthesiologist shortages as a limiting factor in the ongoing use of labor epidural. Obstetric providers reported that requests were placed in the months following the initial training for epidurals; however, no anesthesiologists were available to supervise nurse anesthetists for placement. Nurse anesthetists reported a desire to participate in epidural care but lacked the necessary experience for independent placement and management without attending oversight.

Interviews revealed that concern for lack of supplies was unfounded. The GPHC maintained an ample supply of epidural kits and anesthetic drugs. Nurse anesthetists interviewed were unclear on labor epidural ultra-low dosing parameters because of the time elapsed since training without practicing the technique.

Five respondents noted concern for the increased monitoring requirements with

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labor epidural. Interviews confirmed that a policy was implemented to ensure safe monitoring of parturients with a labor epidural. The new policy limits the number of patients that may receive a labor epidural at any given time to 2, thereby ensuring adequate access to monitoring on the Labor and Delivery Unit.

Discussion

The results of our study show that a 1-week medical training mission did not achieve long-term success in implementing the use of labor epidurals into routine practice among providers at the major public hospital in Georgetown, Guyana. Despite initial training, 1 in 4 providers continued to believe inaccurate myths about the use and safety of epidural analgesia for labor. However, the initial training revealed widespread interest and support for labor epidural analgesia among providers with minimal or no prior experience with the technique.

Knowledge retention from a singular, week-long, intensive exposure to training and anesthesia provider availability for epidural placement were identified through qualitative interviews as the primary barriers to implementation. Results from surveys and individual interviews suggest that training nurse anesthetists and consultant anesthesiologists for 1 week was insufficient to achieve the proficiency necessary to perform labor epidural placement independently after expert trainers departed. Staffing workflows were never adjusted to account for this new skill and the time it would require from anesthesia providers (ie. assigning an anesthesia provider to the labor and delivery unit each day), leading to both an inability to practice the technique proximal to the time of training and provider unavailability when epidural analgesia was requested by obstetric providers and patients. Furthermore, continuing education aimed at improving the knowledge and skills is necessary to increase the use of labor epidurals.

Research on successful international medical missions typically highlights the importance of incorporating sustained local training over time.[1,11-13] Regular visits to reinforce training allow local physicians to gain experience with new techniques. Previously, the association of Canadian General Surgeons developed a postgraduate training program to increase the capacity of local surgeons in Guyana. This 2.5-year course featured structured education and clinical rotations with operative training by visiting surgical faculty. By 2008, 5 residents had completed training and have begun work locally in regional public hospitals.[14]

Several limitations of this study should be noted. First, this study has a sample size of 31 healthcare providers. While this represents outreach to most practicing obstetric and anesthesia physician and nursing providers at the largest hospital in Guyana, it may not be a large enough sample. Moreover, because of shortages of anesthesiology attendings, the majority of providers were nurse anesthetists who may have different views than attending anesthesiologists. Additionally, despite assurances of anonymity and aggregate reporting, there may be inherent bias in data reporting due to mistrust of outside providers and staff, and fear of retribution from hospital leadership for negative reporting. Finally, this study reflects the outcomes following a medical training mission in a single public hospital, suggesting that the results may not be generalizable to missions that are structured differently or in other destinations.

This paper reflects one of the only evaluations of medical training missions and the barriers to success. Results suggest that a single, short-term medical mission can achieve wide-spread provider acceptance of a novel technique; however, knowledge retention, competency, and use among providers may remain a challenge requiring dedicated follow-up and commitment to local workflow adjustments. Future medical missions should consider this drawback in the planning and allocate resources accordingly. Specifically, it may be beneficial to hold a monthly conference call with in-country partners and establish provider champions to achieve long-term support, as well as refresher courses to maintain competency. While increased staffing may remain a challenge, additional training for nurse anesthetists may decrease the demand on attending anesthesiologists. Further research is warranted to determine the best approach to achieve sustainable results.

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Abstract

Background: The use of epidural analgesia for laboring women is generally unavailable at public hospitals in Guyana despite favorable utilization rates in private institutions. In 2014, a healthcare team completed a targeted mission aimed at neuraxial analgesia training of providers at the preeminent public hospital in Georgetown, Guyana. This study evaluates the impact of the training, including provider attitudes, use, and barriers.

Methods: A prospective, mixed methods study of all obstetric, nursing, and anesthesiology providers at Georgetown Public Hospital Corporation was completed. Quantitative assessment of the posttraining use of epidural analgesia at 2 and 6 months was documented. Provider surveys were distributed anonymously at 2 months posttraining. Targeted interviews were completed from a random sampling of providers at 6 months; qualitative analysis of interviews formulated the basis for reporting limitations and barriers.

Results: Providers surveyed included 7 anesthesia providers and 24 obstetrics providers. Respondents believed Guyanese women should be offered epidural analgesia (93%), epidurals could be performed safely (87%), and Guyana has the resources necessary for routine use (81%). In assessing epidural knowledge, anesthesia providers achieved 60% correct response rate compared to 84% among obstetrics providers. Nurse anesthetists placed 16 epidurals following training. However, placement ceased after 2 months. The largest barriers to placement were unavailable anesthesia staff (63%), lack of supplies (16%), and insufficient nursing staff to monitor patients with epidurals (11%).

Conclusions: A 1-week mission achieved widespread Guyanese provider acceptance despite a lack of previous experience. However, barriers proved insurmountable to achieving a sustainable, independently functioning epidural analgesia program.

Key Words: Epidural, obstetric anesthesia, medical mission, neuraxial anesthesia

Tables

Table 1. *Provider Impressions of Epidural Use in Guyana: Percent Agreement*

Opinion	All Providers n=31	Anesthesia Providers Only n=7	Obstetrics Providers Only n=24
Epidurals are a safe procedure	87.0%	85.7%	95.7%
I would like to have an epidural for myself or my spouse for labor*	75.0%	42.9%	83.3%
Epidural should be offered to Guyanese women in labor	93.8%	85.7%	95.8%
GPHC has the human capacity to offer labor epidurals routinely	34.4%	28.6%	33.3%
GPHC has the resources to offer labor epidurals to select patients	75.0%	57.1%	79.2%
Advances in epidural technique allow for safe administration in a resource-limited setting such as GPHC	81.3%	71.4%	83.3%

GPHC indicates Georgetown Public Hospital Corporation

* $P < .05$

Tables

Table 2. *Epidural Knowledge: Percent Correct*

Statement	Correct Answer	All Providers n=31	Anesthesia Providers Only n=7	Obstetrics Providers Only n=24
Epidurals will prolong the labor process	F	65.60%	42.90%	70.80%
Epidural will increase the caesarean delivery rate	F	78.10%	50.0%	82.60%
Epidurals could cause paralysis*	F	75.00%	42.90%	83.30%
Epidurals will cause a complete motor block - inability to move legs	F	62.50%	28.60%	70.80%
Epidurals will require increased oversight, monitoring and support of laboring patient	T	81.30%	85.70%	83.30%
Epidurals would stress the fetus and cause toxicity to the baby	F	100.00%	100.00%	100.00%
Epidurals will impair the mother's ability to breastfeed by tainting the milk supply	F	96.90%	100.00%	95.80%
Epidurals must be delayed until the patient is in active labor	F	68.70%	57.10%	69.60%
Epidurals cannot be placed (too late) once a woman is fully dilated	F	40.60%	28.60%	41.70%

* $P < .05$

Table 3. *Barriers to Epidural Use in Guyana*

Barrier	Guyanese Provider Response
Trained Staff Available	64%
Availability of Supplies and Medications	16%
Nurse Monitoring Capability	11%
Other	9%

Appendix

Appendix A. *Didactic Lectures, Audience and Objectives*

Lecture	Audience	Topic	Objectives
1	A	The Epidural Kit	1. Become comfortable with the contents of the particular kit we are using 2. Discuss alternatives in other kits - and understand pros and cons 3. Review technique for epidural placement
2	A, OB	Epidural Consent	1. To review a formal epidural consent for patients 2. Understand indications and contraindications for epidural
3	A, OB, N	Myths and facts for Epidural	1. Know when it's too early or too late to offer an epidural for labor analgesia 2. Proper counseling for patient regarding risks of epidural with respect to inducement of cesarean delivery, instrumental delivery 3. Learn if labor epidural leads to prolongation of labor
4	A, OB, N	Pharmacology and physiology of labor epidural	1. Establish comfort with initial and bolus dosing of epidural 2. Review medications, concentrations, dosing, metabolism, side effects 3. Become facile with epidural "test dosing"
5	A, OB, N	Complications of labor epidural	1. Know common and rare complications of epidural 2. Review management of common complications 3. Review management of "wet tap," including post-dural puncture headache and epidural blood patch
6	A OB, N	"My epidural isn't working any more" - Trouble-shooting a labor epidural	1. Learn a step-wise approach to management of a non-working epidural 2. Determine when a patient needs an epidural replaced.
7	A, OB, N	Combined-spinal epidural (CSE) and conversion of labor epidural to cesarean delivery	1. CSE technique undertanding and indications. 2. Risks and benefits of CSE over epidural or spinal alone. 3. Strategy for conversion of a labor epidural to a cesarean epidural
8	OB, N	Trouble-shooting a labor epidural that "isn't working" from a nursing perspective	1. Positioning 2. Signs of impending delivery with epidural anesthesia 3. When to call for a provider
9	OB, N	Charting, documentation, and monitoring	1. Frequency of monitoring 2. Fetal heart rate monitoring 3. Test dose
10	OB, N	Basics of epidural management	1. Monitoring during placement 2. Sterility 3. Patient limitations with epidural 4. Epidural removal

A indicates anesthesia providers; OB, obstetric providers; N, labor nurses; P, patients

Appendix

Appendix B. *GPHC Obstetric Epidural Evaluation Tools*

HEALTH CARE PROVIDERS SURVEY

Which department do you work in:

Anesthesia: doctor nurses

Obstetrics: doctor nurse/midwife

Years of experience

Have you practiced in another country? (Y/N)

Which ones?

Have you practiced with labor epidurals? (Y/N)

POST-EDUCATIONAL INTERVENTION SURVEY

I believed that…

Epidurals could be placed by non-anesthesia nursing staff (Y/N)

Epidurals will prolong the labor process (Y/N)

Epidurals will increase the caesarean delivery rate (Y/N)

Epidurals could cause paralysis (Y/N)

Epidurals will cause a complete motor block – inability to move legs (Y/N)

Epidurals will require increased oversight, monitoring and support of laboring patient (Y/N)

Epidurals would stress the fetus and cause toxicity to the baby (Y/N)

Epidurals would impair the mother's ability to breastfeed by tainting the milk supply (Y/N)

Epidurals must be delayed until the patient was in active labor (Y/N)

Epidurals cannot be placed (too late) once a woman is fully dilated (Y/N)

Epidurals were a safe procedure (Y/N)

I would like to have an epidural for myself/my spouse for labor (Y/N)

Epidurals should be offered to Guyanese women in labor (Y/N)

GPHC has the capacity to offer labor epidurals routinely (Y/N)

GPHC has the resources to offer labor epidurals in a limited capacity to select patients (Y/N)

Advances in epidural technique allow for safe administration in a resource-limited setting such as GPHC (Y/N)

Current limitations to offering epidurals during labor include: (fill in the blank)