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ELIMINATING MORTALITY: LESSONS FROM LUBLIN PROVINCE IN POLAND

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INTRODUCTION

Every year, over half a million women die of pregnancy, delivery and postpartum complications – equivalent to the death toll of 15 September 11th tragedies in a single year! Postpartum hemorrhage is almost always the number one cause of mortality, and in Poland it is no different. In the 10 years between 1991 and 2000, a total of 135 women died of postpartum hemorrhage, accounting for about 35% of all maternal mortality. In Lublin Province (2 181 018 inhabitants) in the south-eastern section of the country, a well-functioning regionalization system, based on three levels of perinatal care, introduced in 1993, has led to a marked reduction in perinatal mortality. A total of 25 obstetric units are part of the system – 18 in level I, five in level II and two in level III – the latter being the perinatal centers. The organizational structure is comprised of the heads of obstetric and neonatal units all of whom report to the Provincial Obstetrician-in-Chief who currently is the Head of the Department of Obstetrics and Perinatology of the Medical University in Lublin. Since 2002, no maternal death due to postpartum hemorrhage has been reported in Lublin Province.

This chapter describes the regionalization system in Lublin Province, along with a specific pathway that exists for all postpartum hemorrhage cases. In addition, the system is critically evaluated, and potential approaches to replicating this system elsewhere are provided. This effort can be viewed as a population-based, multicentric, prospective, controlled trial of an organizational system that aimed, and succeeded, in eradicating maternal mortality from postpartum hemorrhage in one of the Polish provinces. We are of the opinion that the findings from our province can be applied around the world and have immense impact on reducing unnecessary deaths.

THE SYSTEM

The regionalization system presently in place in Lublin Province is based on a very tight network of heads of obstetric and neonatal units throughout the Province. The Obstetrician-in-Chief of the Province, who is currently heading one of the perinatal centers, leads the network.

The postpartum hemorrhage pathway is based upon a centralized support system in which the Provincial Obstetrician-in-Chief acts as at all times as a 'last resort' for the most severe postpartum hemorrhage cases. If such a case occurs and the local obstetric unit decides that an intervention of this senior obstetrician is required, the unit pages the Obstetrician-in-Chief asking for immediate support. If the Obstetrician-in-Chief is unavailable (which happened four out of 33 times in the time under study), the next most senior person in the postpartum hemorrhage SWAT team is paged and attends to the patient. An ambulance is sent to pick-up a postpartum hemorrhage 'rescue kit' (containing recombinant factor VIIa, NovoSeven®, Novo Nordisk, and a set of faster absorption profile sutures for the B-Lynch operation) from the hospital of the Obstetrician-in-Chief and then takes him directly to the local obstetric unit. As the farthest unit is approximately 130 km away from the perinatal center

and the transport takes up to 1.5 hours in extreme cases, the average time from initiating the call and delivering the Obstetrician-in-Chief to the unit takes ~90 minutes.

The Obstetrician-in-Chief then takes charge of the local obstetric team, evaluates the status of the patient and makes a decision about the most appropriate management approach. After the intervention, the patient usually remains in the local obstetric unit (or is taken to the local intensive care unit) to which she was admitted but rarely is transferred to the perinatal center. During recovery, the Obstetrician-in-Chief then provides telephone consultations to the obstetric and intensive care unit teams.

RESULTS

A total of 86 237 births were recorded in Lublin Province between January 1, 2002 and March 31, 2006. During this time, no maternal mortality due to postpartum hemorrhage was reported. The numbers of maternal deaths from other direct obstetric causes are summarized in Table 1. No deaths were caused by indirect obstetric factors or non-obstetric factors.

Between January 1, 2003 and March 31, 2006, 33 cases of postpartum hemorrhage were managed in the collaborative fashion described above. In all instances, the local obstetric units did not manage to control the hemorrhage pharmacologically, and a decision was made to change the pharmacologic approach or to switch to surgical management (laparotomy or repeat laparotomy). In all cases, the Obstetrician-in-Chief was paged and took over further management. (See Chapter 22 for a US hospital-based approach to reducing mortality.)

Several types of cases can be described, depending on the status of the patient at the local obstetric unit as determined by the Obstetrician-in-Chief when he arrived on the scene (see Figure 1):

- Patient undergoing surgery with hemorrhage, difficult to manage but prior to hysterectomy;

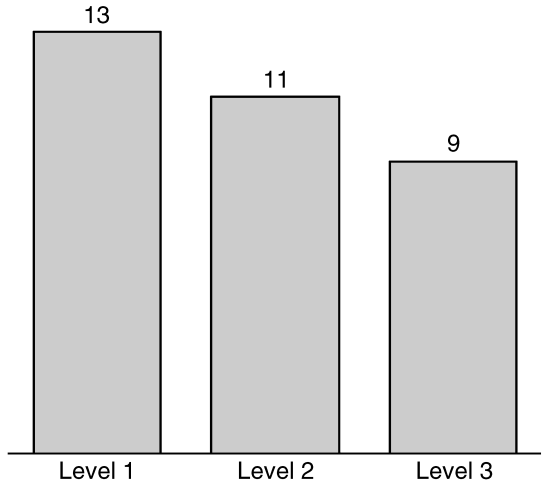

Figure 1 Level of the local obstetric unit in the 33 cases of postpartum hemorrhage managed through the regionalization system between 2003 and 2006

Table 1 Causes of maternal mortality in Lublin Province between 2002 and 2006

	Year					
	2002	*2003*	*2004*	*2005*	*2006 (1.01–31.03)*	*Total*
Deliveries	20 260	20 337	19 896	20 598	5146	86 237
Maternal deaths from:						
Postpartum hemorrhage	0	0	0	0	0	0
Infection	0	0	0	1	0	1
Embolism	0	0	0	0	0	0
Hypertensive disorders	1	1	0	0	0	2
Indirect obstetric factors	0	0	0	0	0	0
Non-obstetric factors	0	0	0	0	0	0
Total	1	1	0	1	0	3

- Patient undergoing surgery with hemorrhage, difficult to manage after hysterectomy;
- Patient after Cesarean section but repeat laparotomy needed (to perform hysterectomy or save the uterus);
- Patient after delivery – conservative management unsuccessful and a decision was required to switch to other conservative approaches or decide to operate.

Interventions were performed in six cases of vaginal delivery and in 27 cases of Cesarean section (Figure 2). Table 2 shows the various management approaches used in the 33 cases of severe postpartum hemorrhage described in this chapter.

DISCUSSION

Using coordinated and well-planned efforts, it is possible to 'eradicate' maternal mortality from postpartum hemorrhage in a large population. Even if half of these deaths could be prevented world-wide, 75 000–125 000 lives could be saved every year. In all 33 cases, patient status after surgery was satisfactory and they quickly recovered and were discharged home with no neurologic or other post-hemorrhagic complications. It is important to underline that these patients experienced the most severe postpartum hemorrhage in which the local obstetric team, usually very well trained, was helpless and required support from the Provincial Obstetrician-in-Chief. The other cases of postpartum hemorrhage which occurred in the province were less severe and responded to a variety of interventions without the need for outside assistance.

The regionalization system was critical in our success in eradicating maternal mortality due to postpartum hemorrhage in Lublin Province. The system in principle aimed at ensuring that the most complicated cases are transferred antenatally to the perinatal center, wherever such forecasting was possible (e.g. in cases of placenta previa in patients after prior Cesarean section). In acute cases, however, when patient

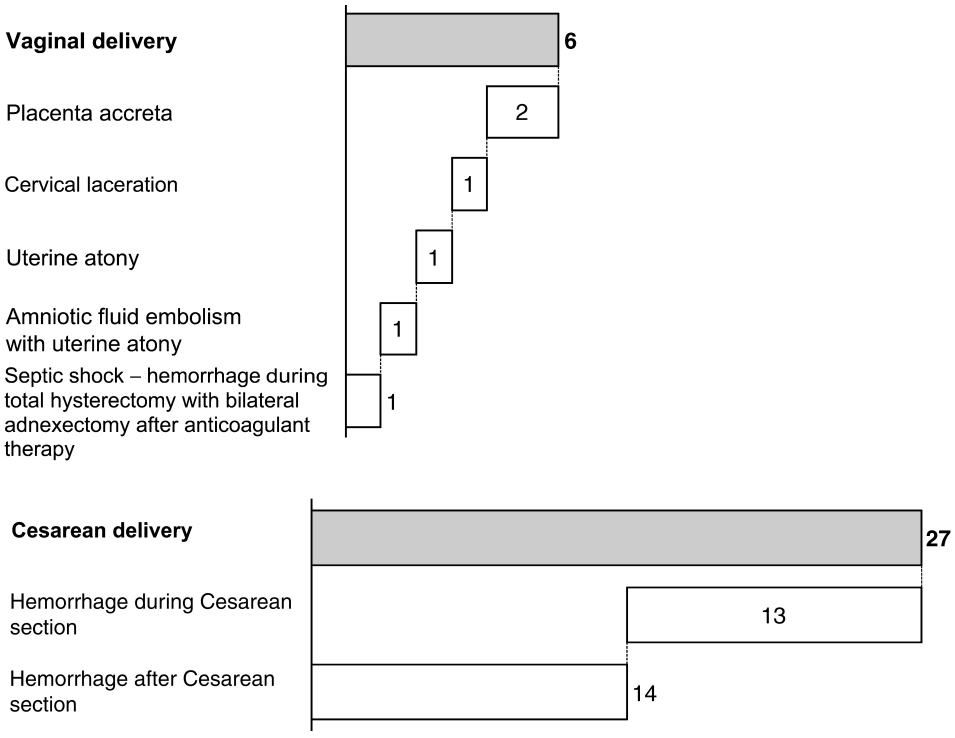

Figure 2 Underlying pathology in the 33 cases of severe postpartum hemorrhage between 2003 and 2006 in the Lublin Province

Table 2 Management approaches in the 33 cases of severe postpartum hemorrhage in Lublin Province between 2003 and 2006

Management approach	*Number of cases*
Laparotomy	3
Repeat laparotomy	9
Total hysterectomy	14
Cervical stump excision after supracervical hysterectomy	1
Unilateral adnexectomy due to bleeding or hematoma	4
Bilateral adnexectomy due to septic shock (with total hysterectomy)	1
Retroperitoneal hematoma evacuation	2
Uterine artery ligation	8
Ligation of the uterine branches of ovarian arteries	8
Bilateral hypogastric artery (internal iliac) ligation	20
Unilateral hypogastric artery ligation	1
Repair of cervical laceration	1
B-Lynch suture	1
Hayman suture	1
NovoSeven	7
Uterus saved	8

transport was not possible, it was critical that an appropriately trained senior obstetrician from the perinatal center be taken to the patient at the remote location, along with specialist supplies that the local hospital did not have. In order to provide appropriate coverage at all times every day of the year, a team of highly trained and skilled obstetricians is ready and available in the perinatal center (a postpartum hemorrhage SWAT team). Because severe postpartum hemorrhage is rare, every member of the postpartum hemorrhage SWAT team should take every opportunity to observe and/or perform most, if not all, of these operations as well as the simpler interventions to get the appropriate training and familiarity with the surgical technique.

With regard to management approaches, a number of methods were used, including a combination of the well-known surgical ligation methods of the uterine artery, uterine branch of the ovarian artery and the hypogastric artery. The latter method should, however, only be performed by the highest skilled surgeons who are comfortable with retroperitoneal space surgery, as these approaches carry a high risk of vascular or ureteral complications. For example, in one of the cases, the hypogastric vein was damaged and subsequently required suture closure. In addition, if these conservative surgical methods are not successful, hysterectomy is the method of choice, and it is critical to time this decision appropriately. In such cases, the uterus is excised with the cervix (total hysterectomy) but without the adnexa.

We see two potential risks with our approach and potential replicas of our approach elsewhere: reimbursement and legal/malpractice. In Poland, reimbursement is on a quasi-DRG (diagnosis-related groups) basis, but the full payment goes to the admitting hospital, without specific breakdown of doctor fees from hospital fees. Thus, our entire system is essentially performed on a *pro bono* basis by the postpartum hemorrhage SWAT team. Unfortunately, this is not sustainable for the long term, and the hospital administration of the perinatal center is currently negotiating appropriate remuneration for these services with the Polish national payor. Legal/malpractice is another risk. In Poland, physicians are covered by a hospital malpractice insurance contract, but theoretically this covers services provided only within the premises of the hospital. Thus, our postpartum hemorrhage SWAT team is not covered by malpractice insurance while performing the intervention in a remote location. Again, this is not sustainable on a long-term basis, as these cases are the most difficult ones and legal proceedings are more likely than after a physiologic delivery. Attempts are now being made to resolve this issue and introduce a malpractice insurance scheme similar to that of the ambulance services or the Good Samaritan Act in the United States.

CONCLUSIONS

(1) It is possible to 'eradicate' maternal mortality from postpartum hemorrhage in a large population.

(2) Programs aiming to 'eradicate' maternal mortality from postpartum hemorrhage in

large populations should encompass the following:

- medical staff – one to several highly experienced surgeons
- Availability at all times every day of the year of an ambulance or other means of medical transport.
- Therapeutic aids – recombinant Factor VIIa (e.g. NovoSeven®) and faster absorption profile sutures for the B-Lynch operation in a ready 'Post-partum hemorrhage kit'.
- Appropriate support – reimbursement contract and malpractice.

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