

The Ohio Pregnancy Associated Mortality Review: The Use of Simulation Training to Prepare for Obstetric Emergencies

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BACKGROUND

Pregnancy-associated deaths are those that occur during pregnancy or within one year of the end of pregnancy, regardless of the cause. A sub-set of those are pregnancy-related deaths that occur during pregnancy or within one year of the end of pregnancy who have a cause that is considered to be directly related to the pregnancy. In the United States, pregnancy-related deaths rose significantly from 7.2 per 100,000 live births in 1987 to 17.8 per 100,000 live births in 2009. However, this number does not take into account severe complications that result in near-deaths, which are estimated to have increased by 2% from 1998 to 2005.

Cardiovascular conditions account for most pregnancy-related maternal deaths in the United States. The next most common causes, in order of frequency, are infection, non-cardiovascular medical conditions, cardiomyopathy, hemorrhage, embolism—thrombotic, pulmonary or other, and hypertensive disorders.

With the exception of 2008, Ohio's pregnancy-related mortality rate is either at or slightly higher than the national rate. Ohio's rates are significantly higher than the Healthy People 2020 goal of 11.9/100,000 live births. In 2013, Ohio's Pregnancy Associated Mortality Review (PAMR) surveyed all 116 maternity units in Ohio to assess the status of patient safety initiatives for maternal mortality. Complete responses were received from 83 of 112 eligible hospitals (74% response rate).

In Ohio, maternity units are classified as Level I, II, or III. Level III units provide the highest level of neonatal support (i.e. subspecialty newborn care), and tend to be large academic centers. Level I units are smaller nurseries with

TITLE V/MCH BLOCK GRANT MEASURES ADDRESSED
2: Percent of cesarean deliveries among low-risk first births

fewer resources (i.e. basic newborn care), and comprise 55% of Ohio's maternity units. Level II units fall in between and are equipped for advanced newborn care.

Hospital preferences for how information relating to the PAMR should be disseminated were assessed. The two most popular responses were teaching cases or case studies (58%) and simulation training (54%). Level I centers were more likely than Level II and III centers to use low fidelity (non-programmable) mannequins. These are more rudimentary than high fidelity systems but can still be useful learning tools. High fidelity simulators, however, present a situation closer to an actual clinical environment.

Simulations allow medical professionals and teams to learn from their mistakes without conferring harm to a patient. Respondents felt simulation training was more likely to happen if an outside entity, such as PAMR, provided assistance than when compared attempting such training without PAMR support, 83% vs. 51% respectively (PAMR Eval 2008-2010). Thus, a PAMR-assisted program is more likely to increase the use of simulation training.

PROGRAM OBJECTIVES

The overall goals of this project were:

1. To prepare maternity departments to participate in patient safety initiatives
2. To provide education on common clinical issues -- postpartum hemorrhage (PPH), maternal code, and hypertensive urgency -- to obstetrical care providers

3. To improve access to training programs for low-resource birthing centers.

TARGET POPULATION SERVED

Staff (medical and nursing) who:

- Attend deliveries in Ohio's birthing facilities
- Care for pregnant women
- Care for post-partum women

Emphasis: smaller (level I) birthing facilities who are thought to have the most limited resources

PROGRAM ACTIVITIES

Based on the results of the patient safety needs assessment survey, simulation training for Level I/II maternity units was identified as a need and three clinical scenarios were developed based on causes of death identified through mortality review: postpartum hemorrhage (PPH), cardiomyopathy, and pre-eclampsia/hypertensive urgency.

Simulation trainings occurred onsite at three pilot sites between Fall 2014 and Spring 2015. Participants included healthcare providers routinely involved with deliveries. Provider confidence and knowledge were assessed through a series of three tests disseminated to participants before, immediately following, and one month after the training. This training program is remarkable because it targeted low-resource birthing centers, bringing the supplies and personnel needed for simulation trainings directly to sites.

PROGRAM OUTCOMES/EVALUATION DATA

Maternal mortality is rare, so provider knowledge, experience, and confidence were used as proxies for program success. A pretest, posttest, and one-month follow-up test were administered to assess these measures. Each test was administered to 122 participants across the three pilot sites.

Core questions for each test included:

- Basic information o e.g. What is your position at your institution? How many years of experience do you have?
- Questions to assess staff's knowledge of management of obstetric emergencies o e.g. Which of the following medications may be used to treat hypertensive urgency in pregnancy? Which of the following are indications to initiate a massive transfusion protocol?

The pre-test was administered just prior to the training. The post-test was administered immediately after the training. In addition to the core questions, the test began by asking what roles the provider played during the first, second, and third training session. The follow-up test was either mailed or

distributed electronically via Survey Monkey, one month post-training. The post-test and follow up test included three additional questions. These questions used a scale to indicate level of confidence in handling cases of post-partum hemorrhage, maternal code, and hypertensive urgency. The pre-test included only the core questions.

A total of 122 health care professionals representing nine Level I and five Level II hospitals participated in the training at three sites. Nurses comprised about 90% of participants. The most commonly reported hospital departments were labor and delivery and postpartum; other departments included OB education and nursery. Of those 89 (72.9%) participants who completed all three tests, average test scores increased. There were significant improvements in knowledge from both pre-test to post-test and pre-test to one-month follow-up ($p < 0.0001$).

Overall, there was strong agreement that the training utilized effective teaching methods and realistic scenarios. Participants noted training impacts as a gain in valuable knowledge, risk assessment skills, and awareness to detect early stages of signs and symptoms. Since the pre and post-tests were administered on the day of the training session, differences in scores could only be attributed to program. The one month follow up test was designed to evaluate retention of information and skills obtained at the training.

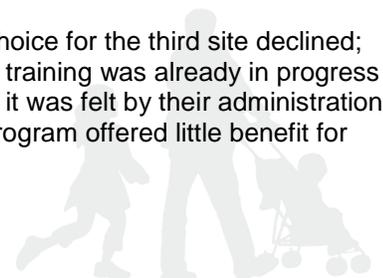
PROGRAM COST

We collaborated with The Ohio State University's Clinical Skills and Education Assessment Center (CSEAC) to conduct these patient simulation trainings. Pre-training preparation including development of three clinical scenarios with debriefing tools and supply lists cost about \$2400 in staff time. Two sites involved overnight expenses (hotel/meals). Five staff were present at each training (project administrator, physician facilitator, nurse facilitator, simulationist, and IT support). Cost was also incurred for van rental to all three sites. These costs plus staff time totaled \$7600 per site. The total cost of the project was \$25,200. The cost per participant was \$205.

CHALLENGES

Logistics (delay between the second and third trainings):.

- The Simulation Center had a busy schedule which led to delays in setting the date for the third training.
- Difficulty in identification of the third site
 - The first choice for the third site declined; simulation training was already in progress there, and it was felt by their administration that this program offered little benefit for them.



- The second choice had ongoing renovations; delays in completion ensued and ultimately they could not comply with the timeline required for the project.

Evaluation:

- Test instrument not piloted
- Test completion errors
- Change in test instrument between trainings at Site 1 and Site 2
- Loss to follow-up from post-test to one-month follow-up test

LESSONS LEARNED

- Prior to the training the level of participants' clinical experience was unknown (one group consisted almost entirely of nurses who had less than one year of experience). The session could have been tailored to the level if known beforehand.
- It would have been beneficial to have conducted multi-disciplinary trainings. The majority of participants were nurses, it is difficult for physicians to adjust their clinical schedules to attend. Involving other team members such as anesthesiology would have been beneficial. Moreover, the cost of providing credit for medical education was prohibitive.
- The evaluation instruments, such as the pre, post, and follow-up tests, were created for these pilot trainings. The evaluations tools were not validated, nor were re-researched conducted on other tools used in similar settings. This was a weakness of the overall evaluation.
- The pilots occurred outside of the participants' clinical care units. The best simulations are done onsite with the people, facilities, and supplies where patient care occurs. This allowed team members to identify unit-specific issues and customize process changes.

FUTURE STEPS:

“Train the Trainer” course

- Two day long sessions held October 12th and 19th, 2015 at The Ohio State University Wexner Medical Center's Clinical Skills Education and Assessment Center.
- Target: OB clinical nurse educators from Level I and II birthing centers across Ohio (Attendees: Total N=47).
- Goal: Attendees will learn how to independently deliver effective simulation training to their own obstetrics nursing staff in their own facility.

- Funding: Title V Maternal and Child Health Block Grant (MCHBG).

Training Components:

- Didactic sessions
 - Team communication
 - Curriculum development
 - Skills building sessions included: how to use available resources in a low tech way, how to use the Bakri balloon for uterine atony, and how to make fake blood.
 - Simulations: participants ran three clinical training scenarios—one as a participant, one as an observer/debriefer, and one as the .
 - Raffle: Fourteen Mama Natalie—low technology simulators (\$800 value) were raffled off to participants
 - Evaluation: Sequential surveys re practice implementation to be conducted over one year.

COLLABORATIONS

This program involved collaboration between The Clinical Skills and Education Assessment Center (CSEAC) Simulation Center at The Ohio State University Wexner Medical Center, the Ohio Department of Health, and three pilot sites: St. Rita's Medical Center, Union Hospital, and Fairfield Medical Center.

PEER REVIEW & REPLICATION

This program was presented both locally and nationally:

- Council of State and Territorial Epidemiologists Conference 2014: Surveillance System Evaluation of PAMR (Poster)
- CityMatCH Conference 2014: Surveillance System Evaluation of PAMR (Oral)
- Association of Maternal Child Health Programs 2015: 1. Obstetric Simulation Project (Poster); 2. Ohio Action Learning Collaborative Activities / Simulation Project (Oral)
- American College of Obstetricians and Gynecologists Clinical and Scientific Meeting 2015: Obstetric Simulation Project (Poster)
- Every Mother Initiative Action Learning Collaborative Cohort II Kickoff: Ohio Action Learning Collaborative Activities/Simulation Project (Oral)
- Ohio Hospital Association Quality Summit 2015: Obstetric Simulation Project (Poster)

Although states have expressed interest in replication, this program was not been replicated at the time of submission.



RESOURCES PROVIDED

- Ohio PAMR program fact sheet
<https://www.odh.ohio.gov/~media/ODH/ASSETS/Files/cfhs/Infant%20Mortality/PAMR%20Fact%20Sheet%2082815.pdf>

Key words: Women/Maternal Health, Workforce & Leadership Development

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