

Multidisciplinary Obstetric Emergency Training: Maternal Resuscitation Simulation

Annotated Bibliography

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### **Databases and Key Terms**

A literature search was performed using CINAHL Plus and Science Direct databases. The literature search was conducted to assess simulation-based education as an approach for multidisciplinary obstetric emergency training related to maternal resuscitation. Key terms that were used in the literature search include: (a) pregnancy, (b) pregnancy complications, (c) cardiopulmonary resuscitation, (d) simulation-based training, (e) staff development, (f) education, nursing, (g) obstetric emergencies, (h) continuing medical education, (i) multidisciplinary, and (j) interprofessional learning.

### **Annotated Bibliography**

Alderman, J. T. (2012). Using simulation to teach nursing students and licensed clinicians obstetric emergencies. *The American Journal of Maternal/Child Nursing*, 37(6), 394-400.

Traditionally, each health care discipline is educated separately. This article suggests this type of educational framework contributes to ineffective communication among interdisciplinary team members during complicated, collaborative patient situations. Team training such as obstetric emergency drill training using simulation is recommended by not only Alderman, but also several nursing organizations, the Joint Commission and the Institute of Medicine as an educational method to enhance interdisciplinary communication and teamwork, and ultimately improve patient safety (p. 395). Specifically, this article discusses the development of a shoulder dystocia simulation for both nursing students and licensed clinicians. The simulation focused on the development of participants' teamwork and communication strategies as well as gaining practice in how to manage the obstetric emergency. The article highlights simulation implementation strategies including scenario development, learning objectives and debriefing

points. In addition, the article discusses barriers to implementing simulated obstetric drills in both academic and clinical settings; suggesting time for simulation development, scheduling, and educator training, cost, and interprofessional collaboration are among the biggest barriers.

Ultimately, the article suggests simulated emergency drills are an effective educational method that can be used to enhance participants' knowledge and skill development, as well as interdisciplinary communication and teamwork; skills essential to optimal patient outcomes.

Farinelli, C., & Hameed, A. (2012). Cardiopulmonary resuscitation in pregnancy. *Cardiology Clinics*, 30(3), 453-461.

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Literature indicates that obstetrical staff: obstetricians, midwives, anesthesiologists, and staff nurses possess limited knowledge regarding current recommendations for the treatment of maternal cardiac arrest (Cohen, Andes, & Carvalho, 2008). In their article, Farinelli and Hameed stress the essential need for obstetric health care personnel to increase their theoretical and practical knowledge surrounding cardiopulmonary resuscitation (CPR) in pregnancy. As an educational tool, the article summarizes causes and contributing factors of cardiac arrest in the pregnant woman, physiological changes during pregnancy and labor, and the impact of these changes on CPR for the pregnant patient. The information provided in this article significantly assisted me enhancing my own knowledge regarding maternal CPR modifications. The article was an instructional resource for the development of the maternal resuscitation drill module, specifically the module objectives, lecture material, and case scenarios.

Fisher, N., Eisen, L., Bayya, J., Dulu, A., Bernstein, P., Merkatz, I., & Goffman, D. (2011).

Improved performance of maternal-fetal medicine staff after maternal cardiac arrest simulation-based training. *American Journal Of Obstetrics & Gynecology*, 205(3), 239.e1-5.

In this study, Fisher et al. sought to determine the impact of a simulation-based maternal cardiac arrest educational program on performance, knowledge, and confidence among maternal-fetal medicine (MFM) staff. The authors hypothesized that the implementation of a simulation program would improve MFM staff's performance, knowledge, and confidence in the management of a maternal cardiac arrest. Utilizing a quasi experimental design, the study of the maternal cardiac arrest simulation program consisted of: (1) pre-intervention: initial simulation performances; (2) intervention: based on performance evaluation of initial simulations educational courses and simulation practices were designed and implemented, and (3) post-intervention: evaluative simulation performances. A convenience sample of 19 MFM staff: 12 Attending physicians and 7 fellows participated in the program. All simulations included a multiple-choice cognitive exam focusing on maternal resuscitation modifications, an attitude and confidence survey using a seven-point likert scale, and individualized debriefing. A checklist consisting of 9 maternal resuscitation modifications and 16 critical care tasks was used to score all simulations. Analysis of the data revealed a significant improvement in post-intervention MFM staff performance in maternal critical care management as well as improved MFM staff knowledge and confidence scores when compared with pre-intervention scores. The study demonstrates a simulation-based educational program's ability to improve obstetric staffs' performance in a maternal cardiac arrest. Contributing to the science of nursing education, the study indicates that the improved performance and confidence gained from a simulation training

program assists MFM staff in better managing an actual maternal cardiac arrest promoting improved maternal/fetal outcomes.

Frengley, R., Weller, J., Torrie, J., Dzendrowskyj, P., Yee, B., Paul, A., & Henderson, K. (2011).

The effect of a simulation-based training intervention on the performance of established critical care unit teams. *Critical Care Medicine*, 39(12), 2605-2611.

Multidisciplinary team training as a means to enhance interprofessional teamwork and communication has been recommended by the Institute of Medicine as a method to improve patient safety and optimal patient outcomes (p. 2605). Simulation has been advocated as a means to develop health professionals' teamwork and communication. In their study, Frengley et al. sought to evaluate the effectiveness of simulation-based team training on improving collaboration in established multidisciplinary critical care teams as well as compare case-based learning (CBL) and simulation-based learning (SBL) in the management of both pulmonary and cardiac emergencies. The study utilized a self-controlled cross over design which allowed all teams to have equivalent time on the simulator and case-based educational experiences. The study sample included 40 critical care teams from eight different regional hospitals. Each team consisted of one doctor and three nurses with varying levels of experience and who had previously worked together on a critical care unit. Four standardized simulations were developed: two cardiac and two pulmonary. Teams were randomly assigned to a cardiac or pulmonary simulation. Each team participated in a pre-intervention simulation and a post-intervention simulation. After participating in the pre-intervention simulation, each team participated in educational teamwork session and cardiopulmonary crisis management skills training. Teams that were randomized to the cardiac SBL completed three pulmonary CBL

discussions and vice versa for the pulmonary SBL. Once the intervention sessions were complete, teams participated in a post-intervention simulation. Both pre- and post-intervention SBL teamwork, leadership, and team coordination were evaluated independently using a previously published Teamwork Behavior Rater (TBR). Paired t-tests were used to measure the impact of the interventions on teamwork behavior as well as the teamwork's impact on clinical management during the simulation. Participants were also surveyed three months after the study day to evaluate key learning points, their confidence in managing subsequent cardiopulmonary crises, and any changes made to their clinical practice after participating in the study's course. Results of the study indicate simulation-based training significantly improves teamwork, leadership, and team coordination as well as management of cardiopulmonary emergencies. However, the study found no significant difference between SBL and CBL training. Overall, the study demonstrates the positive impact simulated emergency drills can have on multidisciplinary teamwork as well as patient care emergency management. The findings of this study can be applied to development of future obstetric staff education. Additionally, the findings of this study indicate the significance and benefit of continued OB staff team training as a means to improve teamwork and ultimately optimal maternal/child outcomes during an obstetric emergency.

Jeejeebhoy, F., Zelop, C., Windrim, R., Carvalho, J., Dorian, P., & Morrison, L. (2011).

Management of cardiac arrest in pregnancy: A systematic review. *Resuscitation*, 82(7), 801-809.

More woman seeking pregnancy at later ages as well as advances in medical care that have led to successful pregnancies in women with serous underlying medical conditions are contributing factors in the rising incidences of cardiac arrest during pregnancy (p. 802). As a means to

develop a consensus on treatment of cardiac arrest during pregnancy, Jeejeebhoy et al. conducted a systematic review of literature to delineate cardiac resuscitation modifications for the pregnant woman. A literature search was performed using a multitude of databases. The inclusion criteria were “pregnancy and cardiac arrest in and out of a hospital, cardiovascular, respiratory, fetal survival, and pharmacology as they relate to cardiac arrest and resuscitation” (p. 802). Literature that was not available in English as well as obstetric literature with no link to resuscitation were excluded. Two of the authors independently evaluated the methodological quality of the selected articles utilizing a previously published quality list. The analysis of literature summarized the two consensual themes for resuscitation during pregnancy: perimortem cesarean section and resuscitation techniques, delineating treatment recommendations for both. Additionally, the systematic review revealed that the management of cardiac arrest associated with pregnancy is an under-developed area of health care with little science to guide treatment recommendations. In an effort to improve obstetric staff management of cardiac arrest during pregnancy, this study demonstrates the need for further research to delineate effective treatment plans so that educational strategies can be better developed and implemented to guide health care professionals based on stronger scientific evidence.

Jeffries, P., Bambini, D., Hensel, D., Moorman, M., & Washburn, J. (2009). Constructing maternal-child learning experiences using clinical simulations. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 38(5), 613-623.

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In maternal/child health, clinical simulation is used as an educational pedagogy to promote knowledge and skill development of nursing and midwifery students as well as nursing staff.

“Clinical simulations have the potential to bridge learning gaps and provide learners an opportunity to prepare for real-world clinical situations” (p. 615). After conducting an extensive literature review, the authors found in maternal/child health, simulations have been used: (a) to promote faculty development and to ensure skills and competencies in the maternal-child area; (b) to promote staff development in improving communication and patient safety during high-risk , low frequency events; (c) for new nurses as a retention strategy to improve confidence in critical thinking and decision making as well as provide social support and a sense of wellbeing; and (d) for nursing and midwifery students for a comprehensive maternal/child education. The article indicates an evidence of positive learning outcomes using simulation as in an educational strategy. Additionally, the article highlights the need for more research in the area of maternal simulations to explore best practices and teaching.

Kim, H., Ko, E., & Lee, E. (2012). Effects of simulation-based education on communication skill and clinical competence in maternity nursing practicum . *Korean Journal of Women Health Nursing, 18*(4), 312-320.

doi:<http://dx.doi.org.ezproxy.sunyit.edu/10.4069/kjwhn.2012.18.4.312>

Simulation-based education designed to mimic real-life situations, provides opportunities for health care professionals and students to critically think and perform clinical decision making without generating risks to patients (p. 313). Simulation-based education provides students and health care professionals a standardized curriculum with learning opportunities that may not arise due to in frequency of occurrences on a labor and delivery unit. Maternal/child nursing requires students and nurses to have effective communication skills as well as clinical competence based on the contextual understanding of the labor process. The aim of this study was to determine the

effect of simulation-based education on the communication skill and clinical competence of nursing students in a maternity nursing practicum. The study was designed as a quasi-experimental study, using a nonequivalent control group and pretest-posttest design. Participants enrolled in the study were junior nursing students who had previously completed a theoretical course in maternal/child nursing. Participants were divided into two groups an experimental and a control group, each group consisted of 35 students. Students who were willing to participate in simulation-based education were enrolled in the experimental group. The first year of the study, the experimental group participated in three weeks of simulated-based education. The students were then placed on a labor and delivery unit to complete their practicum (two weeks). The following academic year the control group participated in the study. This group was given conventional pre-clinical practice orientation prior to completing five weeks of clinical on a labor and delivery unit; this group did not participate in any simulation-based education. Two tools were used for data collection each completed before and after the nursing practicum. The first, a communication skill instrument consisting of five questions with a five-point scale measured students' professional attitude and ability to sufficiently explain maternal/child nursing concepts. The second, a clinical competence tool consisting of 19 items with a five-point scale measured students' nursing process skills. Analysis of the data revealed students who received simulation-based training demonstrated significantly higher communication skill and clinical competence. The study demonstrates the significance in simulation-based education's ability to improve critical thinking and clinical decision making as well as communication abilities with interdisciplinary health care team and patients.

Lipman, S. S., Daniels, K. I., Carvalho, B., Arahef, J., Harney, K., Puck, A., ... Druzin, M. (2010). Deficits in the provision of cardiopulmonary resuscitation during simulated obstetric crises. *American Journal of Obstetrics & Gynecology*, 203, 179.e1-5.

The anatomical and physiologic changes of pregnancy and the challenges associated with the care of two patients, mother and fetus, requires the coordination of a multidisciplinary team and aggressive resuscitative effort. In an effort to assess actual performance, this study was designed to “evaluate the quality of obstetric advanced cardiac life support (ACLS) performed during the management of a simulated cardiac arrest in a term gravid patient” (p. 179.e1). In this study, Lipman et al. reviewed and analyzed video recordings of 18 ObSim course maternal cardiac arrest simulations. The ObSim course is a labor and delivery team training program developed at a pediatric and prenatal education center at a Californian hospital. The study population consisted of a multidisciplinary team including labor and delivery nurses, anesthesiologists, and obstetricians all with varying degrees of experience. Each team participated in a maternal cardiac simulation; they were oriented to the simulation room and equipment, but not to the scenario. Data for this study was collected using a checklist of 10 basic ACLS and pregnancy-appropriate interventions. Analysis of the data revealed striking deficiencies in the team’s performance of essential ACLS and pregnancy-appropriate interventions during a maternal cardiac arrest. This behavioral study demonstrates that substantial skill is lost over time, and because obstetrical staff do not often practice ACLS skills there is an inadequate cognitive and practical knowledge of cardiopulmonary resuscitation for pregnant women. In order to improve staffs performance during an actual maternal cardiac arrest, the article supports the development and implementation of a learning module that utilizes educational strategies such as a maternal

resuscitation drill program that will develop staffs' knowledge and skills related maternal cardiac arrest.

Robertson, J., & Bandali, K. (2008). Bridging the gap: enhancing interprofessional education using simulation. *Journal of Interprofessional Care*, 22(5), 499-508.

Patient-centered care has come to the forefront in our health care delivery system. This shift in focus calls for a curriculum metamorphosis for multidisciplinary health care professional (HCP) education. An integrated interprofessional education (IPE) and simulated learning model may be the key to enhancing HCP education and improve patient outcomes. Robertson and Bandali completed a conceptual analysis of literature to explore IPE and simulation learning and to highlight key linkages between the two models. Separately, IPE and simulation have been shown to improve patient care and safety. The authors argue that both health care and education can be advanced through HCP curriculum changes “by enhancing IPE with the use of simulation, all in the benefit of improved patient care and safety” (p. 502). However because most HCPs are educated in separate educational programs, a shift from a traditional-institutional-based curriculum model to a model that embraces IPE using simulations poses significant challenges to current educational practices. In order to shift from a traditional education model to one embracing IPE and simulation, Robertson and Bandali call for an organizational cultural shift as well as the “establishment of strong partnerships and collaborations amongst academic and health care educators and institutions” (p. 503). The authors acknowledge the need for evidence-based research pertaining to IPE using simulation educational practices as well as this educational model's impact on patient care and safety. In relation to obstetric staff education, the article can be used to advocate and justify the need for interprofessional (intrapartum,

antepartum and neonatal nurses; obstetric physicians, and anesthesiologists) simulated education as a means to promote the knowledge and skill development as well as communication and teamwork of an interdisciplinary team.

Suresh, M., Mason, C., & Munnur, U. (2010). Cardiopulmonary resuscitation and the parturient.

*Best Practice & Research: Clinical Obstetrics & Gynecology*, 24(3), 383-400.

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A high risk, low frequency event, cardiac arrest during pregnancy provides unique challenges for health care professionals and holds profound implications for both fetal and maternal outcomes. The speed of the response to the arrest and attention to pregnancy-specific interventions and cardiopulmonary resuscitation (CPR) modifications are crucial to maternal/child outcomes. The article provides an overview of causes of cardiac arrest during pregnancy including: hemorrhage, pregnancy induced hypertension, idiopathic peripartum complication, maternal cardiac disease, as well as anesthetic complications. In addition, the article highlights principles and guidelines for CPR modifications during pregnancy; specifically (a) prompt airway management, (b) lateral displacement of the uterus and avoidance of aortocaval compression, (c) effective chest compressions in the lateral tilt position, and (d) early consideration of perimortem caesarean delivery to optimize CPR and survival of mother and infant. Recent research reports indicate obstetric health care professionals lack knowledge about the differences in resuscitation methods for pregnant patients. To have the best outcome for mother and infant, Suresh, LaToya, and Munnur strongly recommend the implementation of rapid response multidisciplinary team training in maternal cardiac resuscitation. As an instructional resource, this article assisted me in

the development of the maternal resuscitation drill; it was a useful tool for creating cognitive teaching strategies as well as simulation learning objectives.

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