

# The Effect of Simulation Activities On Maternal-Newborn Knowledge in a Practical Nursing Course: Implications for Practice

by Kristi Miller, RN OCN MSN

**Abstract:** *Western medicine has created a sense of fear and a lack of confidence in one's ability to give birth. Childbirth educators are challenged to empower women to trust their inner wisdom and make wise choices in birth. Currently, the maternal-infant outcomes in North America are not improving with the increased use of technology during the birth experience; however this article shows childbirth educators how to present a normal birth using technology in a positive way. Simulation technology has been shown to increase knowledge and confidence, with the potential to affect maternal-infant outcomes by empowering women.*

**Keywords:** *simulation, labor and delivery, maternal-newborn, childbirth education*

## The Use of Simulation Technology to Demonstrate a Natural Birth Experience

Imagine a classroom of expectant mothers and their partners watching with rapt attention as a first time mother delivers a healthy baby by vaginal birth naturally. This article describes how to bring the birth experience into the classroom using simulation technology as an innovative teaching strategy. Instruction with simulation offers a risk-free environment where learners can integrate what they have learned in a life-like setting. This is especially useful in childbirth settings, when real-life experiences are minimal.

Studies have shown that simulation can cause an increase in knowledge, self-confidence, satisfaction and skill acquisition (Decker, Sportsman, Puetz & Billings, 2008). Though women's choices in birth are not completely dependent upon childbirth educators' teaching efforts, childbirth education classes exert a strong influence on expectant parents' beliefs and actions during birth. Educators need all the help they can get in presenting natural birth within the current culture of technological births. When educators use effective learning strategies, expectant parents internalize the information and learning becomes an optimal experience. The use of technology in education has the potential to reduce the use of technology during birth, allowing for a natural, healthy childbirth experience.

## Using Simulation to Teach Nursing Students

Simulation has been used in the classroom for many years, but simulations using mannequins with lifelike features and interactions are relatively new. These high-fidelity human simulators are gaining widespread adoption in multiple health care settings for classroom teaching as well as for clinical experience replacement. The National Council of State Boards of Nursing (2005) stated that "clinical experiences...might include innovative teaching strategies that complement clinical experiences for entry into practice competency" (p. 1). The simulation experiences described in this article were originally used with nursing students who were suddenly unable to attend labor and delivery clinical rotations due to policy changes in local hospitals. Providing a well-rounded clinical experience in maternal-newborn care is challenging for many reasons. Finding a patient who will allow students to observe her birth who will also have a baby during clinical hours; finding a patient who will allow a male

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student to assist her in her care; and an overall scarcity of clinical sites contribute to an uneven clinical experience at best.

After the loss of clinical sites, Licensed Practical Nursing (LPN) students at a large southeastern community college were scheduled for 8-16 hours of simulated maternal newborn clinical care each week during their second semester. Simulations were created for a variety of situations and patients including normal labor, Cesarean-section, preterm labor and postpartum care. A description of the preterm labor simulation is included in Figure 1. At the end of the term, students took a standardized, nationally normed exam (Assessment Technologies Institute) on maternal-newborn concepts. Knowledge scores for the students who experienced the simulation showed no statistically significant difference (using an independent t-test,  $p < .05$ ) than those who participated in the traditional clinical experience. In addition, a greater number (10%) of the students who experienced the simulation scored above the national mean on the ATI. These results suggest that simulation is a useful tool for introducing students to maternal-newborn concepts.

### Designing Simulation

Nursing researcher Pamela Jeffries, along with the National League for Nurses (2005), developed a framework for using simulation in nursing education. Using the Jeffries framework ensures that simulations effectively address adult learning needs. Based on adult-learning theory (Chickering & Gamson, 1987), teaching opportunities are successful when they address active learning, prompt feedback, time on task, diverse talents and ways of learning, collaborative learning, high expectations and faculty-student interactions. The framework states that the characteristics of the teacher, student and educational practice interact to influence both the simulation experience and the educational outcomes. Five design characteristics should be included when designing a simulation:

1. Objectives
2. Realism
3. Complexity
4. Cues
5. Debriefing

The preterm labor simulation used with the LPN students included objectives (Figure 1) and a pre-simulation

### Figure 1: Simulation Objectives for LPN Students

By the completion of the simulation activity, the student will be able to:

1. Complete and document a focused patient assessment and note any key changes in the patient assessment during the clinical day.
2. Organize activities and implement care in a safe, effective manner.
3. Demonstrate medication administration utilizing safe practice standards.
4. Identify and delegate tasks throughout the simulation clinical day.
5. Evaluate nursing interventions and report changes to the appropriate member of the health care team.

#### Student Guidelines for Simulation

1. Students are expected to behave professionally just as if they were in the clinical environment.
2. Students should arrive at the scheduled time in their clinical uniform (the vest will not be required for simulation). Please bring your stethoscope, scissors, watch with a second hand, drug guide and calculator.
3. Students will be assigned roles for the simulation day. Roles are permanent and cannot be exchanged with other students. Students are expected to perform tasks appropriate to their role.
4. Students will treat each other with respect. All interactions should be professional, and all feedback will promote the goal of improving patient care skills.
5. Students should be prepared to interact with students from a different program to practice delegation skills.
6. Absences will be counted as hours missed. No make-up simulation days are available
7. Students will be expected to treat the mannequins with respect.
8. Students will be expected to communicate clear instructions to the mannequins.
9. Students will be permitted to request a "time out" if the simulation experience has become overwhelming. After a "time out" is called, the group will process how to remedy or improve the situation before resuming the simulation.
10. The student may request a "huddle" that will consist of all the individuals involved with the current scenario. During the huddle the students and faculty can discuss the current situation and make recommendations for changes to the patient care plan. All persons should stay in their role during the huddle.
11. Students will evaluate their own actions and the actions of their peers following completion of the simulation. All evaluations will address actions and not individuals.
12. No student will fail the simulation clinical day.
13. Students should be prepared to have fun.

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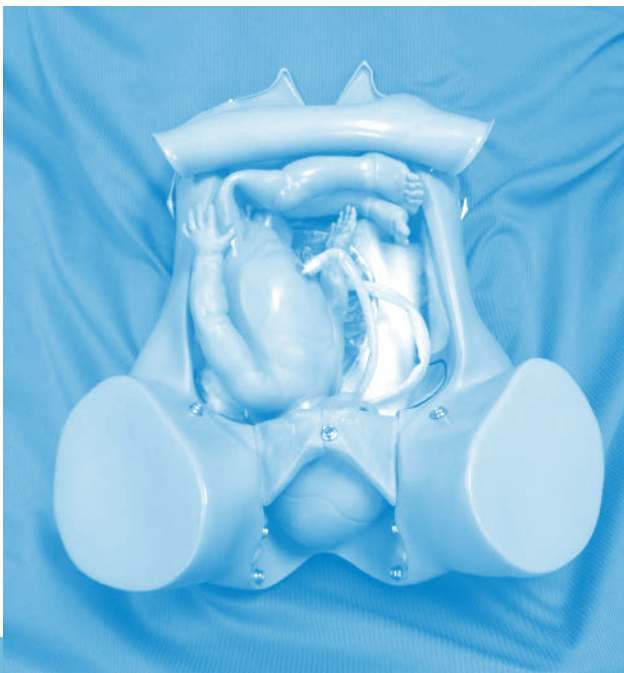
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competency check-list to ensure students came to the simulation prepared to assess a preterm mother, interpret vital signs and lab values and communicate effectively with the health care team. Realism was accomplished by using Laerdal Sim Manikins (Figures 2, 3, & 4) accompanied by simulation software that is controlled by the simulation coordinator. Throughout the simulation, the instructor manipulates vital signs and patient condition based on student input and actions. In addition, the patient is given a voice by the simulation coordinator, who speaks as if she is the patient.

### Figure 2



### Figure 3



### Figure 4



Simulations can be as complex or as simple as the objectives require. In this simulation, a group of four students cared for a patient presenting with preterm labor accompanied by nausea, vomiting, and fever. Proper assessment resulted in discovery of a urinary tract infection. Correct intervention by students resulted in a return of vital signs to normal and the cessation of preterm contractions. Interactions with the patient can be designed to include psychosocial and cultural considerations as well. In the labor scenario a 17-year old Hispanic woman who has had minimal prenatal care presents for triage of labor. Students are required to interact with the father of the baby as well as deal with the patient's increasing anxiety and frustration. The simulation could be expanded to include opportunities for expectant families and childbirth educators to interact with the simulation manikin, student nurses, and the simulation coordinator. Cues involve planned changes in patient status, including vital signs or comments made by the patient. Multiple phases can occur and the status of the patient can improve or decline in response to student actions.

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The final stage of debriefing is considered by Jeffries to be the most integral part of simulation for increasing satisfaction with the learning experience (2005). In a debriefing setting, learners sit together with the instructor to discuss what went well, what they could have done better, and to process any additional learning needs. In this collaborative setting lies an opportunity to correct previous errors and plan for future possible issues in real-life birthing scenarios.

### Implications

Use of simulation for childbirth education has widespread implications. Though results of studies that measure gains in knowledge with simulation use have been mixed, studies measuring self-confidence gains have been consistent in showing a positive effect (Cant & Cooper, 2009). Regardless of student preference for learning collaboratively or in a solitary setting, students report high levels of satisfaction with simulation education (Fountain & Alfred, 2009). In addition, simulation can be tailored to the learning needs of the group. The training of childbirth educators using simulation has the potential to have an effect on patient outcomes. An integrative review by Shearer (2013) reports that with the use of simulation medication errors may decrease, and knowledge and attitudes toward safety may increase. A simulation for a group of first time mothers might look very different from simulation designed to train childcare educators. Further research is needed to determine the effects of a simulation experience on those enrolled in a childbirth class. The question of how collaboration between a local school of nursing, and child-birthing center could provide unique learning opportunities needs to be addressed. There is the potential to decrease the anxiety of expectant families, empower women and their health care providers, improve satisfaction with the birth experience, and ultimately improve patient outcomes. Figure 5 shows how the scenario could be modified for expecting families in an interdisciplinary setting.

### Conclusion

Literature supports the use of simulation as a valuable teaching modality that can provide real-life responses for learners in a safe environment without the invasion of privacy or potential detrimental effects for the patient when teaching nursing students (Cant & Cooper, 2009; Decker et al., 2008). Utilizing the technology and resources such as those available in a school simulation lab in combination with the practical knowledge of childbirth class educators has the potential to promote a natural, healthy childbirth experience. Childbirth educators, clinicians and nurse educators are encouraged to make connections for the purpose of using simulation for skills training. As demonstrated above, simulation technology could offer significant value to the childbearing family education component as well. The simulation experience outlined in this article presents opportunities for learners to review supportive information relevant to the care of the childbearing woman and to better understand a natural childbirth experience that does not rely on technology for optimal outcomes.

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## Figure 5. Preterm Labor Simulation for Expecting Families

### Objectives

1. Participants will take part in an interdisciplinary care team in a labor and delivery setting.
2. Participants will verbalize understanding of the different goals of each member of the care team.
3. Participants will advocate effectively for their own perspectives and goals to optimize patient outcomes.

### Realism

Patient Name: Shondra Washington	Diagnosis: Preterm Labor
DOB: 5/14/92	MR: 3453446
Age: 20	Gender: Female
Height: 5'7"	Weight: 142
Allergies: PCN and ASA	Past Medical History: sickle cell trait, Hx of preterm delivery
Medications: PNV, Macrobid 100mg daily (prophylactic for her sickle cell trait)	

Date	Time	Physician Order and Signature
		Admit to L&D for observation Diagnosis: preterm labor @ 32 wks IUP VS Q1 hour Keep NPO Continuous EFM Labs: CBC, Chem panel, cath UA C&S Start IV with NS@ 150mL/hr x 1 liter, then D5 1/2NS @ 125mL/hr Monitor I/O BPP daily Notify CNM of temp >100.4 or increasing ctx's or ROM Ancef 1gm IVPB now Tylenol 2 tabs prn fever or headache Zofran 4mg IVP Q 4hours prn Ambien 5mg PO QHS prn Betamethasone 12 mg IM for 2 days  <i>Jackie Midwife, CNM</i>

### Complexity

#### Customized Mannequin Initial settings

Vital signs temp 101.3, BP 100/50, pulse 124, resp 18  
 Heart Sinus Rhythm, tachy @ 124  
 Lungs: Clear  
 Bowels: BS x 4 quadrants  
 Positive Fetal movement, denies bleeding, leaking, ROM

#### Equipment Needed

IV- NS 1liter, follow with D5 ½ NS 1liter, IVPB Ancef 1gm  
 Hat for urine output  
 Fetal monitor  
 Vital Sign equipment  
 Straight cath and specimen container

### Cues

System change	When	New setting
1. BP and pulse	IV fluids	BP 110/60, pulse 116
2. temp	IVPB	Temp 100.2
3. contractions-cervical exam is long, closed, thick cervix (reassuring, no dilation)	After IV/IVPB for a time	Contractions cease, patients c/o dysuria ceases
4. Complaint of nausea		"I feel nauseated"
5. BP and pulse, decrease in nausea	After anti emetic administration	BP 116/66, pulse 109

### Debriefing

Begin debriefing as an interdisciplinary group and then break into health care team and family/childbirth educator's teams to discuss:

- What went well?
- What didn't go so well?
- What would you do differently next time?
- What support or information would you need to achieve an optimal outcome?

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