

## Using Simulation to Improve Management of a Shoulder Dystocia Delivery by Experienced Nurse Midwives

*Utilisation de la simulation pour améliorer la prise en charge de la dystocie de l'épaule assurée par des infirmières sages-femmes expérimentées*

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### ABSTRACT

*Objective:* To assess the impact of a standardized shoulder dystocia simulation experience on the management of a complicated delivery by experienced midwives at an academic institution.

*Method:* Experienced midwives from a single institution underwent a standardized simulated shoulder dystocia delivery. The simulation was conducted four times for each midwife. The first simulation occurred prior to any educational intervention, and the subsequent three deliveries were performed after a standardized didactic. Performance was scored based on standardized criteria to assess for accuracy and comprehensiveness of the delivery.

*Results:* Seven midwives were included. The lowest and highest scores for the first drill were 11 and 15 respectively, and for the fourth drill, 19 and 21 respectively.

*Conclusion:* Simulation training of experienced midwives with a standardized shoulder dystocia scenario results in improved communication and leadership skills.

### KEY WORDS

*training; midwifery education; labour complication; shoulder dystocia; patient simulation*

*This article has been peer-reviewed.*

### RÉSUMÉ

*Objectif :* Notre étude avait pour but d'évaluer les effets de l'expérience d'une simulation standardisée d'une dystocie de l'épaule sur la prise en charge d'un accouchement compliqué assurée par des sages-femmes expérimentées au sein d'un établissement universitaire.

*Conception :* Une étude mettant en jeu des simulations d'accouchement en présence d'une dystocie de l'épaule

*Milieu :* Établissement universitaire

*Participantes :* Infirmières sages-femmes agréées disposant de plus de 10 ans d'expérience clinique en matière de travail et d'accouchement

*Méthodes :* Des sages-femmes expérimentées issues d'un seul établissement ont pris part à une simulation standardisée d'accouchement en présence d'une dystocie de l'épaule. La simulation a été menée à quatre reprises

pour chacune des sages-femmes : la première simulation a eu lieu avant la tenue de quelque intervention pédagogique que ce soit, tandis que les trois autres se sont déroulées à la suite d'une formation standardisée. Le rendement a été coté en fonction de critères standardisés en vue d'évaluer la précision et l'exhaustivité de l'accouchement.

*Résultats* : Sept sages-femmes ont participé à l'étude. Le score le plus faible et le score le plus élevé pour ce qui est de la première simulation ont été de 11 et de 15, respectivement, tandis qu'ils ont été de 19 et de 21, respectivement, pour ce qui est de la quatrième simulation.

*Conclusion* : La formation des sages-femmes expérimentées au moyen de simulations standardisées de scénarios de dystocie de l'épaule donne lieu à une amélioration des compétences en communication et en leadership.

## **MOTS-CLÉS :**

*Formation; éducation en pratique sage-femme; complications du travail; dystocie de l'épaule; simulation de patiente*

*Cet article a été évalué par des pairs.*

## **BACKGROUND**

A shoulder dystocia (SD) is often defined as a delivery that requires additional obstetrical manoeuvres when gentle downward traction on the fetal head fails to achieve delivery of the fetal shoulders.<sup>1</sup> Most often, it is the anterior fetal shoulder which becomes impacted behind the maternal pubis symphysis; however, the posterior shoulder may also be impeded by the maternal sacral promontory. Although multiple studies have documented risk factors for a SD,<sup>2, 3</sup> this obstetrical emergency remains unpredictable and unpreventable. As such, a skilled provider must always be prepared for the possibility of a complicated delivery to help mitigate the potential for significant maternal and/or neonatal morbidity.

SD occurs in up to 2% of all vaginal births.<sup>4</sup> It is therefore impractical to expect trainees to become not only familiar with, but proficient at, all aspects of a SD through personal experience during the finite years of training. To help bridge this gap, simulation has been widely adopted in obstetrics to educate and train individuals in the management of rare (or relatively rare) clinical events. The benefit of a simulation program for SD has been documented for resident and attending physicians.<sup>5, 6</sup> Data regarding the benefits for certified nurse-midwives in practice is sparse.<sup>7, 8</sup> We performed a study to evaluate the impact

of a simulation training program on the management of a SD by experienced midwives at an academic institution and to evaluate which specific aspects of clinical management are affected most.

## **METHODS**

All midwives who provide inpatient obstetric care at a large university-based hospital participated in a shoulder dystocia simulation exercise. The simulations were conducted from March 2010 through May 2010 and were performed using the PROMPT Birthing Trainer (Limbs and Things Ltd, Bristol, UK) in a standard birthing room on the Labour and Delivery unit. Approval from the University of Southern California institutional review board was obtained.

Three physician-obstetricians in the Department of Obstetrics and Gynecology conducted each of the simulation sessions. Two providers served as actors, playing the roles of the patient and the patient nurse; the third provider observed the simulated deliveries and recorded time. Each session was conducted by the same 3 providers in order to standardize the protocol and minimize investigator bias.

Participants were notified in advance that they would be asked to manage a simulated obstetrical emergency; however, they were not made aware of the nature of

the exercise. During a scheduled clinical shift, the on-call midwife was called urgently into a labour and delivery room (LDR) for an emergency. Upon arrival to the LDR, subjects were given a brief introduction to the simulation exercise and instructed to treat the experience as if it were a real clinical situation and manage the simulated model as they would clinically manage a true patient. They were then given a standardized description of the scenario and asked to perform the delivery. Assistance with maternal and/or fetal manoeuvres would only be provided by the physician-actor if specifically requested by the midwife and if the request specified

how to perform the manoeuvre(s) in question. For example, a request for “the McRobert’s manoeuvre” would not be considered sufficient for assistance to be provided; the participant would have to ask for the patient’s hips to be “hyperflexed” or “pulled back.” Similarly, in order for suprapubic pressure to be administered by the physician role-playing the nurse, the midwife would have to specify the side of the patient from which the pressure should be exerted. Delivery was mechanically delayed by the physician role-playing the patient until successful delivery of the posterior arm. Midwife performance was recorded immediately upon completion of the simulated delivery on a standardized checklist (Figure 1) in order to ascertain completion of the necessary steps in a shoulder dystocia delivery. A “yes” was noted only with the consensus of at least two out of the three supervising physicians. The checklist was modified from previously published SD checklists and was approved by an expert panel of three staff physicians.

The drill was conducted a total of four times per midwife. The first attempt was performed, prior to any educational instruction. After the initial simulated delivery, a brief training/de-briefing session was provided by the supervising physicians. The instruction included both verbal feedback regarding the midwife’s performance as well as training on the requisite steps of a shoulder dystocia delivery, the latter of which included a demonstration of a simulated delivery. The midwife then performed the simulated delivery three additional times under the same simulated conditions. Performance was recorded for each drill on a separate, but identical, standardized checklist. Because the simulation exercise was part of a quality improvement program in which midwives were trained in a standardized approach

**Table 1.** Standardized checklist for recording midwife performance of simulated delivery complicated by shoulder dystocia

<b>Diagnosis and Leadership Skills</b>		
Identifies risk factors and anticipates possibility of shoulder dystocia	Y	N
Applies gentle downward traction	Y	N
Recognizes shoulder dystocia	Y	N
Begins time-keeping	Y	N
Calls for nursing help	Y	N
Calls for resident and/or attending obstetrician	Y	N
Calls for pediatrics/NICU team	Y	N
Calls for anesthesiology	Y	N
Alerts staff and patient about condition	Y	N
Assumes leadership role and directs staff	Y	N
Discontinues maternal pushing	Y	N
Positions patient at end of bed	Y	N
<b>Technical Skills: Maternal Manoeuvres</b>		
Abducts and flexes maternal hips (McRobert’s manoeuvre)	Y	N
Asks assistant on side of fetal back to perform supra-pubic pressure	Y	N
Reattempts delivery with gentle downward traction	Y	N
Assesses for episiotomy	Y	N
<b>Technical Skills: Fetal Manoeuvres</b>		
Attempts a first rotational manoeuvre (Rubin’s or Woodscrew)	Y	N
Attempts a second rotational manoeuvre (Rubin’s or Woodscrew)	Y	N
Attempts delivery of posterior arm	Y	N
<b>Postpartum Assessments and Communications</b>		
Assesses whether neonate moving all extremities	Y	N
Informs patient and family about occurrence of shoulder dystocia	Y	N

to managing a shoulder dystocia, the midwives were expected to perform at least one maternal manoeuvre and at least two fetal rotational manoeuvres prior to attempt at delivery of the posterior arm. This criterion was only applied, however, to the second, third, and fourth delivery, as the first drill was conducted prior to standardized instruction and thus served as an individualized control for each midwife.

The completed checklists were collected for each midwife and scores were calculated both for overall performance (the total score) and for performance in each of the four sub-categories (leadership skills, maternal manoeuvres, fetal manoeuvres, and postpartum assessment). Scores from the first drill (the control drill) and the fourth drill were then compared using Wilcoxon signed rank test. P-value <0.05 was considered significant.

## RESULTS

Seven certified nurse midwives met inclusion criteria and completed the simulation exercise. All midwives were full-time employees at the time of the intervention and had been practicing clinical obstetrics for greater than 10 years at our academic, teaching institution. Ages of the midwives ranged from 42 to 66. Four of the women were African American, and three were Caucasian.

The total possible score for each simulated delivery was 21, with possible scores of 12, 4, 3, and 2 for the sub-categories of communication and leadership skills, maternal manoeuvres, fetal manoeuvres, and postpartum assessment respectively. The lowest total score for the first (control) drill was 11, and the highest score was 15. For the fourth drill, the lowest and highest scores were 19 and 21 respectively, with 43% of the participants scoring a perfect score. Performance deficiencies in the first drill were most commonly in the area of communication and leadership skills. On average, participants scored 7.6 (out of 12) in this sub-category on the first drill. The most frequently missed element was requesting the discontinuation of maternal pushing followed by instructing the “patient” and the “nurse” to help position the patient at the end of the LDR bed. By the fourth drill, the average score

for the communication and leadership sub-category was 11.6 (out of 12).

Comparison of the total scores from the first and fourth drills for each midwife using the Wilcoxon signed rank test noted a statistically significant increase in performance scores. ( $p=0.02$ ) When each sub-category was independently evaluated, this increase was found to be secondary to improvements in the specific area of communication and leadership skills, with non-significant changes in each of the other sub-categories.

## DISCUSSION

Simulation is widely used in many industries and has gained increasing popularity in the arena of medical education. Multiple studies have noted improvement after shoulder dystocia simulation training for physicians and nursing students; however, limited data is available for experienced midwives.<sup>5, 8, 9</sup> Furthermore, most studies evaluating simulation training of a SD have primarily focused on evaluating medical knowledge and manual delivery skills. Although these are critical components of the skilled management of a SD, other non-technical aspects of a management algorithm, such as communication and leadership skills, are of crucial importance. In our study these non-technical skills were noted to contribute the most to improved performance with the use of our simulation model.

To our knowledge, our study is the first to specifically assess the performance of experienced midwives after a simulated SD delivery. Previous studies have independently evaluated resident physicians and nursing students on the utility of SD simulation training,<sup>5-8</sup> but the use of simulation as part of a continuing-education exercise for experienced midwives is novel to our study. Given the years of experience of the participants in our study, it is not surprising that our results noted a significant improvement in communication and leadership skills rather than technical skills as a result of the simulation exercise. It is likely that midwives who have provided obstetric care for thousands of women over the courses of their individual careers are proficient in the

technical delivery skills required for management of a relatively rare obstetrical emergency. Communication and leadership skills, however, are more subjective and may be more amenable to continuous improvement, even for seasoned practitioners.

We specifically compared the first and fourth drill for each midwife in order to detect the maximum impact of the simulation experience. Because the first drill occurred prior to the educational intervention, performance in that drill served as the individual control for each participant. As the final drill in the exercise, the fourth simulated delivery was performed not only after the educational instruction but also after the midwife had the opportunity to fully acclimate to the simulation environment. We presumed that the fourth drill would therefore best reflect the skills gained from the simulation experience and best approximate the participants' performance in a true clinical situation.

Some earlier studies have used video recordings of the simulated deliveries in order to evaluate participant performance.<sup>6,10</sup> We elected to use direct observation because we felt it could more accurately and consistently assess the delivery. Recorded simulations are often unable to fully appreciate the subtle manoeuvres performed within the maternal pelvis, necessary for alleviating a SD. Although we recognize that this evaluation system introduces the potential for observation bias, we attempted to minimize this bias by using standardized objective checklists and by requiring the consensus of two evaluators.

#### *Limitations*

The primary limitation of our study is the small sample size. Our participants, however, were a homogeneous group, with similar years of clinical experience at the same institution and thus similar methods of clinical practice and similar exposures to delivery complications. We believe that the homogeneity of our study population provides sufficient strength to our findings that warrants further investigation in a larger-scale study. We hope to conduct further studies at our affiliate institutions to help confirm

our study results. Additional limitations include the common limitations found in all simulation-based investigations. A simulated delivery experience may not be fully representative of a real-life delivery experience. The inherent difference between these two environments may be more pronounced with non-technical skills, such as communication or leadership, compared to technical skills, such as the performance of specific delivery manoeuvres. Participants may be less likely to converse with a simulator or physician-actors even if they are comfortable performing a simulated delivery. It is possible, then, that the improvement in communication and leadership skills seen in our study may be related to the midwives' increasing comfort with the simulated environment over the course of their four drills rather than a true improvement in performance.

#### **CONCLUSIONS**

While the management of any obstetrical emergency, including shoulder dystocia, requires the interaction of several members of the obstetric team, our study did not specifically evaluate team dynamics or the ability of simulation to assist in team training. Our observed improvement in midwives' communication and leadership skills which are important prerequisites for effective teamwork, support the increased emphasis upon communication training by The Joint Commission, the American College of Obstetricians and Gynecologists (ACOG), and the Society of Obstetricians and Gynaecologists of Canada (SOGC).<sup>11,12</sup> Though several potential impediments to optimal team functioning during an obstetrical emergency have been previously identified,<sup>13,14</sup> the expanded use of simulation models in the training of attending physicians and midwives may be an effective intervention in improving communication and coordination within obstetrical teams. Our study suggests that the use of simulation is beneficial for all providers, even experienced providers, and not just for students or trainees. Further investigation should continue to document sustained communication improvement as well as evaluation of team coordination.

In conclusion, we found that simulation training of experienced midwives with a standardized shoulder dystocia scenario results in improvement in performance, specifically in communication and leadership skills. This highlights the importance of incorporating training exercises, such as simulation, for all providers, not just for trainees. Communication and leadership are imperative in clinical practice and vital to the safe management of an obstetrical emergency. Simulation may be a useful tool to provide continuing education for current obstetrical providers to practice and maintain important clinical skills.

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