



To Evaluate the Short Term and Long-Term Effects of Simulation-Based Shoulder Dystocia Drill on Managing the Shoulder Dystocia in Real Time Emergencies

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Abstract

Objective: *The objective of the study was to highlight the importance of the simulation-based training in improving the quality of the care.*

Material and Methods: *It was conducted in the obstetrics and gynecology department of the HMG, Sweidi branch, which is a 350 bedded multidisciplinary hospital. It was a prospective observational study for one year with a retrospective arm of one year for the comparison. So, the duration of the study was two years.*

The primary outcomes were, improvement in the individual skills manifested by the difference of the pretest and the post test score of the participants, to compare the incidence of the shoulder dystocia one year before and after the drill and to compare the most common methods used to manage shoulder dystocia before and after the drill. The secondary out comes were: to evaluate the Improvement in the documentation, to compare the number of fetal complications and to measure the improvement in the confidence level of staff dealing with the emergency after the drill, with the help of the feedback form.

Results: *Fifty participants were followed till the end of the year. The mean pretest score of the participants was 65.24% (32.62/50). After the simulation drill the post test was conducted after 3 months and significant improvement in the mean score was observed. The mean score increased to 84.04% (42.02/50). Which after 12 months dropped to 76% (38/50). The incidence of the shoulder dystocia one year before the drill in the study department was 10.9%. (247/2247) which was reduced to 0.8% (125/3076) after one year of the simulation drill.*

Previously it was observed that the recommended sequence of different maneuvers to manage shoulder dystocia was used by 54%(n=27) of the participants which was significantly increased to 94% (n=47) after one year of the drill. The choice of the recommended sequence of the maneuvers, documentation, reduction in the incidence of the fetal injuries were the sustained long-term effects,

However, the skills and the confidence level of the participants was found to be decreasing after 9-12 months but the difference was statistically insignificant.

Conclusion: *The authors hereby conclude that the simulation-based training is an effective way of improving the quality of the care, however, to get the long-term effects of the emergency obstetric drills, the simulation exercises should be repeated every 9-12 months and should be part of the continuous medical education.*

Key words: *Shoulder dystocia, simulation, brachial plexus injury, competency, medical education.*

Introduction

All the Obstetric emergencies are unpredictable and sudden. Unbefitting management of such events with negligence and by unskilled person can lead to severe maternal and neonatal morbidity and mortality .(1) Usually enough time is available for the diagnosis and the treatment of the pregnant patients having child birth related complications but there are few obstetric complications like post-partum hemorrhage (PPH), eclampsia, shoulder dystocia, cord prolapse, obstetric shock and the maternal collapse, where the prompt diagnosis and the swift action can increase the chances of having successful outcome.(2) Provision of the quality emergency obstetric care (EmOC) is responsible for the reduction in the maternal and neonatal morbidity and mortality. The evidence states that over 50% of the maternal health care programs that have resulted in reduction of the maternal mortality have EmOC training component.(3) Simulation based training not only reforms clinical skills but plays an important part in upgrading the teamwork performance during the management of the obstetric emergencies.(4) The authors agree that there is an emerging evidence that such training also leads to the increase in the self confidence in addition to the improved skills, communication and team work but still solid evidence that can prove that such programs improve the quality of the patient care and clinical outcome is deficient. (5) Shoulder dystocia is an obstetric emergency which is a rare and unpredictable event complicating in 0.2-3% of the pregnancies (8) For the purpose of the study, shoulder dystocia will be labeled when head to body delivery interval is more than 60 seconds or the baby needs ancillary maneuvers to deliver the shoulders irrespective of the time (9)

We planned this study with the aim to evaluate the short term and long-term effects of the obstetric drills on the skills of the participants in managing the shoulder dystocia and its effect on the incidence of the shoulder dystocia and the maternal and fetal injury. The primary outcomes were, improvement in the individual skill manifested by the difference of the pretest and the post test score of the

participants, the post test is repeated at 3 monthly intervals till one year, to compare the incidence of the shoulder dystocia one year before and after the drill and to compare the most common methods used to manage shoulder dystocia before and after the drill.

The secondary outcomes were: to evaluate the improvement in the documentation in pre and post drill period, to compare the number of fetal complications one year before and after the drill and to measure the improvement in the confidence level of staff dealing with the emergency after the drill, with the help of the feedback form.

For the purpose of the study, the asphyxia was defined as arterial umbilical cord pH less than 7.05 and/or Apgar score less than 7 after 5 minutes. Neonatal trauma was defined as humeral and clavicle fractures documented by the radiographs and brachial plexus palsy. The diagnosis of the brachial plexus injury will be based on the diagnosis of the attending neonatologist. (12)

Material and Methods:

All the consultants, specialists, interns, midwives and the nurses working in the LDR were included in the study. The staff who has attended ALSO (Advanced life support in Obstetrics) in the last 3 months was excluded.

It was conducted in the obstetrics and gynecology department of the HMG, Sweidi branch, which is a 350 bedded multidisciplinary hospital. It was a prospective study for one year which was conducted from 30th June 2021 till 29th June 2022 with a retrospective arm of one year for the comparison. So, the duration of the study was two years.

After getting the ethical approval via approval number HAP-01-R-082, the enrolment process was started. Fifty-one participants were registered to the trial after application of the inclusion and exclusion criteria. Small groups comprising of 7 members each, were made. Each group had pretest, which was marked out of fifty according to the score card, designed by the authors as per the international and local protocols. After the pretest, demonstration on the low fidelity mannequin was given by the trainers and the group was allowed to do supervised practice. The handouts of the protocol were also given to all the participants. After 3 months the post-test was taken. The pre and posttest was demonstration of the skills on the mannequin evaluated by the predetermined score card, as mentioned earlier. The data was collected with the help of the predesigned proforma prospectively. The feedback form was given to them after each posttest for their own self-assessment. The post test was repeated

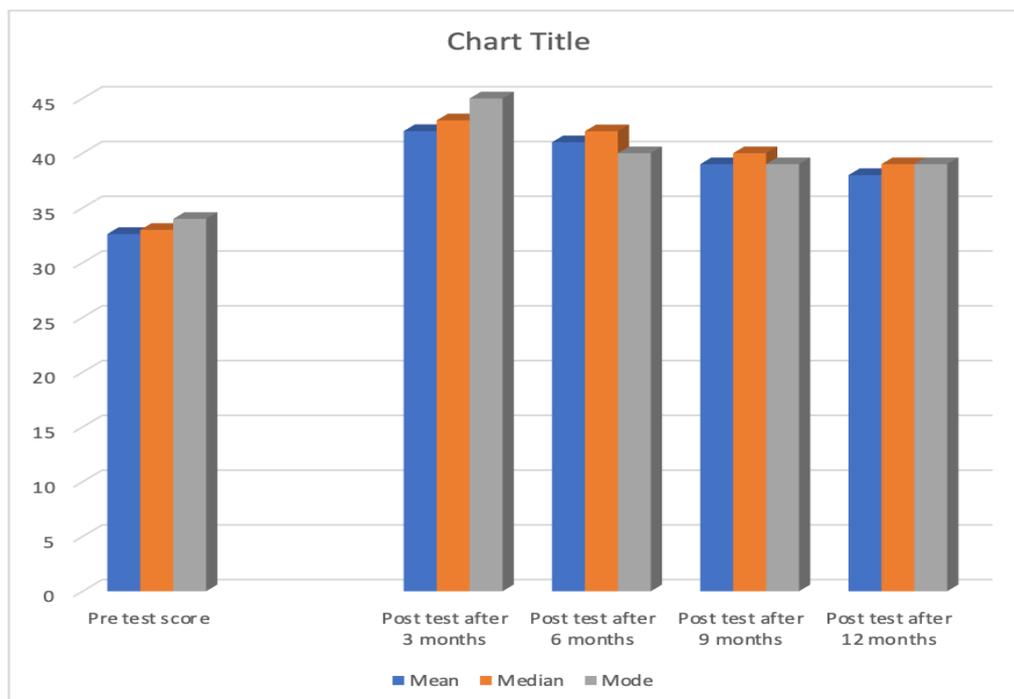
periodically after 3, 6, 9 and 12 months without the refresher course to evaluate the duration of effectiveness of the drill to assess the timing of its repetition.

After one year of the drill the data was collected to detect the incidence of shoulder dystocia, effect on the maternal and neonatal injuries and the maneuvers used and was compared to the data collected retrospectively for the year prior to the drill.

Once the data was collected it was entered in the SPSS program version 26 for the analysis. The qualitative data was analyzed by using the CHISQUARE TEST while STUDENT T test was applied to the quantitative data. The P- value of 0.05 was considered as significant.

Results

Fifty-one participants were enrolled to the trial, out of which one person left before the completion of the year so the total number of the participants followed till the end of the year were 50. The mean pretest score of the participants was 65.24% (32.62/50). After the simulation drill the post test was conducted after 3 months and significant improvement in the mean score was observed. The mean score increased to 84.04% (42.02/50) after 3 months. After applying the T-Test the P-Value was found to be 0.00 which shows that the difference was statistically significant. The mean score of the participants dropped gradually over one year as depicted in graph 1.



Graph 1: Effect of simulation on the score

The incidence of the shoulder dystocia one year before the drill in the study department was 10.9%. (247/2247) which then reduced to 0.8% (125/3076) after one year of the simulation drill. The incidence was found to be significantly reduced as depicted by the significant P-Value. The reason for the high incidence of the shoulder dystocia before the drill was found to be the over diagnosis of the shoulder dystocia.

Previously it was observed that the recommended sequence of different maneuvers to manage shoulder dystocia was used by 54%(n=27) of the participants which was increased to 94% (n=47) after one year of the drill. The difference was found to be statistically significant as shown in Table 1.

Most common order of maneuvers	Suprapubic pressure Roberts, enter maneuvers	Mc Roberts, suprapubic pressure, enter maneuvers	Irregular sequence	Total
Before the drill	22%(n=11)	54%(n=27)	24% (n=12)	(n=50)
One year After the drill	04%(n=02)	94%(n=47)	02%(n=01)	(n=50)

Table 1: To compare the most common methods used one year before and after the drill.

The P-Value showed significant improvement in the documentation after 3 months of the drill. The documentation was found complete in 20%(n=10) of the subjects which increased to 84% (n=42) after 3 months, as shown in table 2 and it is obvious from the data depicted in the table 2 that this drill has sustained effect after 9 and 12 months, i.e., 80% (n=40). this showed that the improvement in the documentation has both short and long-term effect.

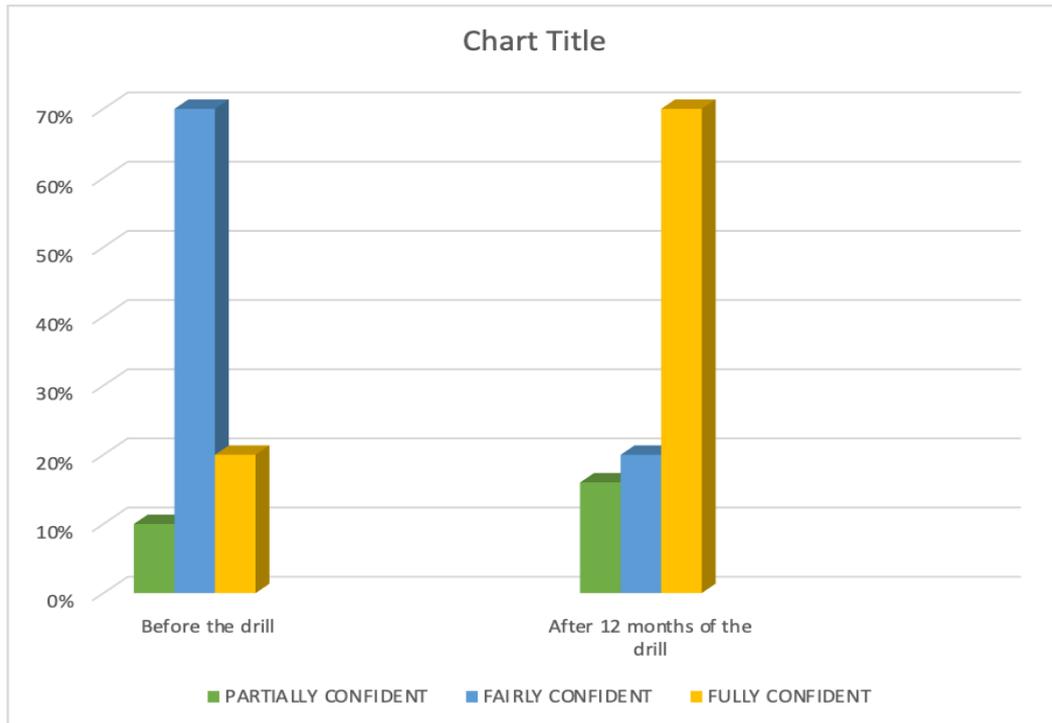
	LEVEL OF DOCUMENTATION			Total
	Poor (less than 50%)	Incomplete (50-70%)	Complete (More than 80%)	
Before the drill	40% (n=20)	40% (n=20)	20% (n=10)	100% (n=50)
After 3 months of the drill	04% (n=02)	12% (n=06)	84% (n=42)	100% (n=50)
After 6 months of the drill	06% (n=03)	16% (n=08)	78% (n=39)	100% (n=50)
After 9 months of the drill	10% (n=05)	(10% n=05)	80% (n=40)	100% (n=50)
After 12 months of the drill	08% (n=04)	12% (n=06)	80% (n=40)	100% (n=50)

Table 2: To compare the level of documentation before and after the drill

The significant P-Value showed the marked improvement in the confidence level of the participants increasing from 20% (n=10) till 80% (n=40) after 3 months of the simulation drill. Though the number of the participants who felt fully confident in managing the shoulder dystocia decreased over the year but the difference was not found to be statistically significant, as shown in table 3.

	LEVEL OF CONFIDENCE			Total
	PARTIALLY CONFIDENT	FAIRLY CONFIDENT	FULLY CONFIDENT	
Before the drill	10% (n=05)	70% (n=35)	20% (n=10)	100% (n=50)
After 3 months of the drill	04% (n=02)	16% (n=08)	80% (n=40)	100% (n=50)
After 6 months of the drill	16% (n=03)	10% (n=05)	84% (n=42)	16% (n=08)
After 9 months of the drill	16% (n=05)	14% (n=07)	76% (n=38)	16% (n=08)
After 12 months of the drill	16% (n=05)	20% (n=10)	70% (n=35)	16% (n=08)

Table 3: To compare the level of confidence before and after the drill at regular intervals



The significant improvement in the confidence level before and after one year of the drill is presented in the graph 2.

No significant difference was observed in the rate of the asphyxia or birth of the babies with low Apgar score before and after the drill. The significant reduction in the fetal injuries was observed as the posterior arm extraction was the preferred method by some of the participants before the simulation exercise which was associated with hair line humerus fracture and the clavicular fracture in couple of patients which reduced to nil after one year of the drill. However no significant difference in the incidence of brachial plexus injury was observed before and after the drill as demonstrated by the insignificant P-Value.

Discussion

In recent years, the training in emergency obstetric skills has moved from the traditional clinical teaching in the labor ward to specific, targeted skills and scenario-based courses utilizing mannequins and simulators (6) there is no doubt that the simulation-based training is the important step towards improving the competence, enthusiasm and team work of the health care provider resulting in an improved quality of care (7). In a patient having normal delivery the team is very small comprising of the mid wife and the patient, but as soon as any complication develops the team grows in number and

effective communication and management can protect the team from having devastating consequences. (10)

The improvement in the recorded incidence of shoulder dystocia over the period of year was comparable to the international statistics (8), the reason of the high incidence recorded prior to the exercise was the overdiagnosis of the shoulder dystocia.

It has been reported in the RCT(randomized controlled trial) that not only the medical technical skills improve after the training but significant improvement is noticed in overall team performance as well.(11) van de VEN J and colleagues also discovered that obstetric training interventions in a simulation setting potentially prevents errors, when the same situation is faced in the real time and therefore improve patient safety in acute obstetrics.(12) Dhalberg J and colleagues have determined that introduction of the shoulder dystocia training program for delivery staff decreases the number of the infants born after shoulder dystocia with brachial plexus injury and the fracture of the clavicle and the humerus, this was consistent with the results of the study under discussion, which concludes significant reduction in the humerus and clavicular fractures, however contrary to Dhalberg and colleagues no significant difference was found in the brachial plexus injury.(10) The finding of significant elevation of the confidence of the staff to handle the shoulder dystocia if it may arise was also noted by them which was consistent with the results of this study (10) The study results were also supported by van de Ven J and colleagues who noticed a decreasing trend of fetal injuries due to shoulder dystocia when simulation team training was introduced in their unit for the purpose. (12)

The study showed significant improvement in the knowledge and skills of the participants which was supported by Kordi M and colleagues who concluded that training increased the skills of management of the shoulder dystocia in midwives. (13) The same results were found in a study done in Liverpool. It was found that competency is increased with statistically significant improvement in the knowledge and skills of the majority of the staff attending the training sessions. (3) The same finding is supported by the results of the study done by Manandhar R and colleagues who also observed significant improvement in the post training score of the Objective structured clinical examination (OSCE). Marked improvement in the teamwork performance was also observed by them. (14)

In addition to the improvement in the competency level, significant increase in the confidence level was observed in the labor and delivery staff treating the obstetric emergencies after the training. (7), which also supports the observations done in the current study. Kumar A, reported an improvement of both clinical and non-clinical skills including principles of teamwork, communication, leadership and prioritization in an emergency situation. (15)

Conclusion

The authors hereby conclude on the basis of the results of the primary and secondary outcomes that the simulation-based drills have significant short- and long-term effects, and is an effective way of improving the quality of the care, however to get the long-term persistent effects of the emergency obstetric drills, the simulation exercises should be repeated every 9-12 months and should be part of the continuous medical education.

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