ORIGINAL ARTICLE

Training and testing of integrated professional skills in management of shoulder dystocia among Malaysian Health Care Providers

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ABSTRACT

Introduction: To evaluate if the Intensive Course in Obstetric Emergencies (ICOE) Shoulder dystocia simulation training module could improve psychomotor and cognitive skills in the management of shoulder dystocia using a Test of Integrated Professional Skills (TIPS).

Materials and Method: This was a prospective observational study involving Malaysian health care professionals participating in ICOE shoulder dystocia simulation, where standardized curriculum was used. Pre and post-test skills assessment were conducted to evaluate the effectiveness of the course content and delivery.

Results: 609 Malaysian health care professionals attended ICOE training; 400 midwives, 128 medical officers, 55 specialist and 26 consultants. Participants were derived from 25 consecutive courses, from 2014 to 2019 and tested on predetermined skills in the management of shoulder dystocia. Their mean TIPS pre-test vs post-test score were (2.55 vs 6.77) midwives, (3.78 vs 7.25) medical officers, (5.16 vs 7.82) specialists & (3.62 vs 6.88) consultants. All four group of participants showed statistically significant improvement (51-165%) in their skills (p<0.001). The mean post test score in noting time of dystocia and call for help were significantly higher among midwives than others. All four groups statistically improved their delivery skills in McRoberts manoeuvre and directed suprapubic pressure. Pre-skills for delivery of the posterior arm was suboptimal and post skills test showed statistically significant improvement in all four groups.

Conclusion: ICOE shoulder dystocia simulation training module improved the psychomotor and cognitive skills in the management of delivery of shoulder dystocia.

KEYWORDS:
Simulation training, obstetric emergency, clinical competence, Shoulder dystocia, Mc Robert's Manoeuvre, Malaysian health care professionals

INTRODUCTION

Shoulder dystocia is a well-documented obstetric emergency, that may result in significant maternal and perinatal morbidity and mortality, when managed by a poorly trained birth attendant. The birth attendants should be adequately trained and competent to reduce the occurrence of adverse events. The Simulation and Fire-drill Evaluation Study, a simulation training of health care professional improved the effectiveness of shoulder dystocia management. This was with the use of high-fidelity mannequins which used traction force monitors, and this resulted in a reduction of the mean traction force used during delivery.[1] Targeted shoulder dystocia training for all maternity staff has been shown to be associated with a reduction in neonatal injury in births complicated by shoulder dystocia.[2]

Intensive Course in Obstetric Emergencies (ICOE) is a simulation-based training program developed, conducted and funded by the Obstetrical and Gynaecological Society of Malaysia (OGSM) since 2014. It is a comprehensive skills-based course conducted over two days to cover various obstetric emergencies. This course is conducted in Malaysia and in Southeast Asian countries by certified principal trainers who require revalidation every three years. In addition to training of birth attendants, it enables them to be revalidated. OGSM developed the curriculum, training methods, testing and mannequins required for the participants and the courses conducted are not-for-profit. Details of the curriculum can be found on the handbook published by the society.[3] This course has received numerous positive feedback from participants and external quality assessors. It is also endorsed by Asia Oceania Federation of Obstetrics and Gynaecology.[4]

Obstetricians and midwives should be competent in performing various manoeuvres to aid delivery when shoulder dystocia is encountered. They must integrate a wide range of technical skills (psychomotor) and non-technical skills (Cognitive) to handle this emergency. Assessment tools to evaluate the efficacy of training to improve these professional skills are limited.[5] Hence, we developed a structured testing tool, which could be applied before and after training. This 'Testing tool the Integrated Professional Skills' (TIPS) to manage shoulder dystocia was used to assess our ICOE course participants improvement of psychomotor and cognitive skills. TIPS is a multi-station, simulation-based assessment that incorporates complex clinical scenarios, technical and non-technical skills (ex. communication skills).

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It comprises a set of assessment matrix used amongst obstetrics and gynaecology residents to evaluate Accreditation Council for Graduate Medical Education competencies. One essential component integrated into this test is the feedback from the faculty.[5] ICOE uses a modified-TIPS approach and expanded this to include a pre and post-test component. It also emphasized the importance of feedback; providing timely, individualized directed learning on gaps which were identified. The objective of this study is to demonstrate that TIPS before and after ICOE shoulder dystocia simulation training module improves the psychomotor and cognitive skills in management.

MATERIALS AND METHODS

Health care providers (HCP) staff-nurses, midwives, medical officers, specialists and consultants from Malaysia enrolled for the ICOE course were sent a welcome note informing them about the pre and post training test using TIPS. The ICOE Handbook of Obstetric Emergencies were sent electronically or provided as hard copy and given a week before as part of the course reading material.

Participants of this study were from 25 courses from 2014 till 2019 – over a 5-year period. After completion of the knowledge test, participants underwent TIPS, where each participant spent two minutes to assess the predetermined skills listed below in the management of shoulder dystocia. The skills tests were assessed by the ICOE trainers assigned before and after the course. ICOE trainers are specialist who have undergone the Intensive Course in Obstetric Emergencies followed by Training of the Trainer Course (TOT). They are credentialled and revalidated every three years to test the skills of participants.

Four essential components were tested on the management of shoulder dystocia which were basic skills required by the practicing health care professional to successfully accomplish safe delivery.[6]

1. **Note the time and call for help:** Health care professional notes the time when the incident occurs, which helps to determine the delay in head to shoulder delivery interval, this duration is an essential component that predicts perinatal morbidity. Call for help to involve other health care professionals for multidisciplinary team management (paediatrician, anaesthetist, consultant and other birth attendants) to accomplish safe childbirth.
2. **McRobert's manoeuvre:** With the help of two assistants, both knees should be flexed, hips hyperflexed, abducted and externally rotated over the maternal abdomen. This manoeuvre causes cephalad rotation of the pelvis relieving the anterior shoulder obstruction.
3. **Directed suprapubic pressure:** With both hands applying pressure just above the symphysis pubis over the fetal back towards the face to adduct and rotate the shoulders to the oblique diameter of the pelvis.
4. **Delivery of the posterior arm:** Identify (Right or Left) the posterior arm of the baby, insert the cupped (Right Hand for Right Arm / Left Hand for Left Arm) into the hollow of the sacrum. If the fetal arm is extended the participant should flex the cubital fossa and grasp the wrist and deliver the posterior arm. This manoeuvre reduces the bi-acromial diameter to a shorter axillo-acromial diameter that facilitates delivery. This manoeuvre has been recommended over other manoeuvre by the American college of Obstetricians and Gynaecologists.[7]

The test was limited to the above manoeuvres as these have a high success rate in accomplishing the delivery of the fetus. Therefore, other internal rotational manoeuvres were not tested. The Marking scheme is shown in Table I.

Manikins and equipment

Sim-Mom and baby Model (Laerdal) was used to assess the skills.

Simulation training

All participants were given a short lecture and shown a demonstration video of shoulder dystocia skills during the course. Participants were then divided into three groups of 6-8 participants per station and spent twenty-five minutes rotating between various skills station. The skills were initially demonstrated by ICOE trainers and they were given time to practice their skills consisting of the above manoeuvres in twenty-five minutes. In each station, participants are expected to acquire, adopt or refine their knowledge and technique on a predefined skill. This may occur via one of several processes including demonstration, deconstruction of manoeuvres or small group discussions moderated by a member of the faculty. Each station ends with a summary of salient points and/or frequent errors committed during an obstetric emergency. After twenty-five minutes, the participants will move on to the next station, for example on vaginal breech delivery or cord prolapse. Upon completion of the course, they were tested by the designated ICOE trainer.

Statistical analysis

Statistical Package for Social Sciences XXI was used to analyse the data, descriptive statistics and categorical data were analysed as percentages. The mean pre and post skills score were compared and p values calculated. To compare the mean scores between subgroups Wilcoxon and Kruskal Wallis test were employed due to non- normal distribution. Each category of HCPs improvement percentage was analysed using the formula, improvement score/pre skills score x 100.

RESULTS

Descriptive analysis

A total of 609 participants attended courses as shown in Table II, the HCPs were categorized into four groups as Midwives, Medical officers (doctors and residents in specialist training programme), Specialists (Obstetrician with postgraduate qualification with less than five years of working experience) and consultants, (Obstetricians with postgraduate qualification with more than 5 years' working experience). The age range in years of the ICOE participants as shown in Table III.

Comparison of the mean TIPS scores, improvement percentage and p values between pre and post shoulder dystocia skills training are shown in the Table IV.

Table I: The marking scheme

NO	ACTION	MARKS
1	**Time and call for help:**	
	- Note the time of diagnosis and call for help	1
2	**McRobert manoeuvre:**	
	- McRoberts Position: Lie flat, flex the knee and hip	1
	- Abduct and externally rotate the hips	1
3	**Directed suprapubic pressure:**	
	- Note position of fetal back / face	1
	- Proper direction and two hand technique. Continuous pressure	1
4	**Delivery of the posterior arm:**	
	- Use the correct hand (right or left) depending on the fetal shoulder	1
	- Cupping of the hand to insert into hollow of pelvis	1
	- Flexing of the elbow	1
	- Delivering of the posterior shoulder by pulling on the wrist	1

Table II: Category of health care professionals

Category HCP	n=609	%
Midwives	400	65
Medical Officers	128	21
Specialists	55	9
Consultants	26	4.2

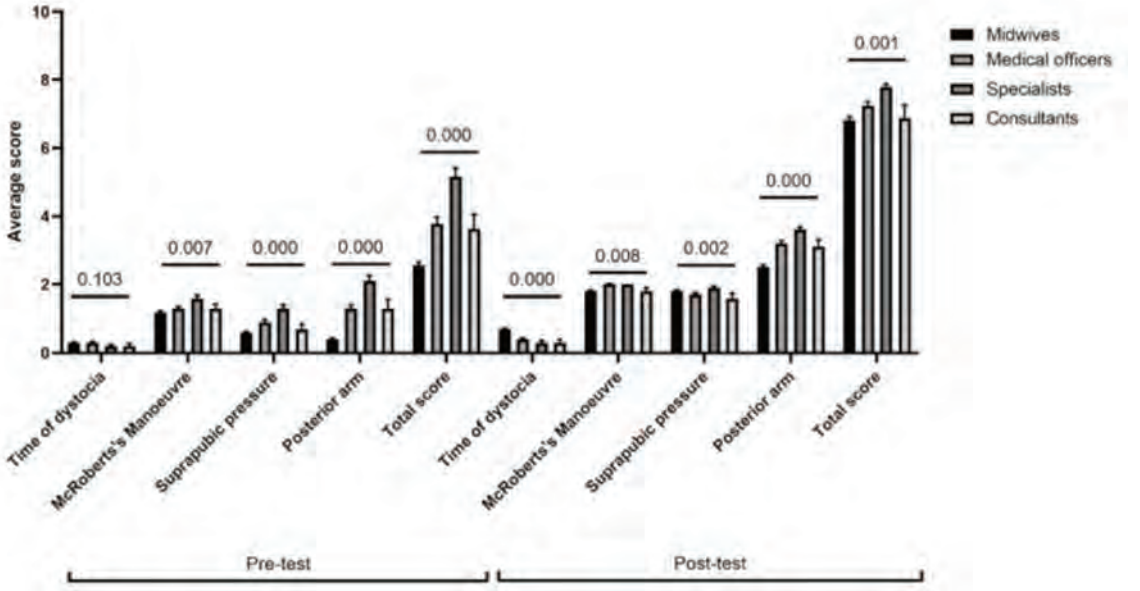
Table III: Age in years

Category HCP	n=609	Age in years
Midwives	400	23-45
Medical Officers	128	28-35
Specialists	55	32-40
Consultants	26	45-56

Table IV: Comparison of TIPS pre- and post-test score

	TIPS		Pre-Test	Post-Test	Improvement Score (%)	p-value
1	Time of dystocia to call for Help	Midwives	0.313	0.738	136.23	<0.001
	(1 mark)	Medical officers	0.266	0.445	67.65	<0.001
		Specialists	0.164	0.291	77.78	0.02
		Consultant	0.231	0.346	50.0	NS
2	McRoberts's manoeuvre	Midwives	1.21	1.83	51.55	<0.001
	(2 marks)	Medical officers	1.31	1.95	48.81	<0.001
		Specialists	1.56	2	27.91	<0.001
		Consultant	1.34	1.84	37.1	<0.001
3	Suprapubic pressure	Midwives	0.59	1.77	198.32	<0.001
	(2 marks)	Medical officers	0.91	1.68	84.62	<0.001
		Specialists	1.30	1.92	47.22	<0.001
		Consultants	0.69	1.65	139.1	<0.001
4	Delivery of the posterior arm	Midwives	0.433	2.46	467.15	<0.001
	(4 marks)	Medical officers	1.289	3.164	145.45	<0.001
		Specialists	2.12	3.6	69.23	<0.001
		Consultants	1.34	3.07	133.3	<0.001
5	Total Score	Midwives	2.55	6.77	165.51	<0.001
	(9 marks)	Medical officers	3.78	7.25	91.73	<0.001
		Specialists	5.16	7.82	51.41	<0.001
		Consultants	3.62	6.88	90.43	<0.001

NS- Not significant.



The data are expressed as the median ± SME (standard error of the mean). Data were compared by Kruskal-Wallis test. P-value < 0.05 considered significant.

Fig. 1: Comparisons of TIPS pre- and post-score among groups

There was statistically significant improvement of post-test TIPS score seen in all four groups of HCWs in all the skills assessed.

The percentage of improvement scores (Table IV) showed that cognitive skill for the noting of time and call for help component, midwives showed TIPS improvement score (136 %). This is the highest improvement after training among all four groups whereas consultants showed least improvement of (50 %). In psychomotor skills of directed suprapubic pressure component, midwives and consultants group showed improvement of (198%) and (139%). In component of delivering the posterior arm, midwives showed TIPS improvement score of (467%), medical officers (145%) and consultants (133%) and specialist (69%). Overall, the total score the specialists showed least improvement of (51%) followed by consultants and medical officers (90%) and (91%) and midwives highest (165 %).

Analysis and comparison between various groups is shown in Figure 1, all scores for TIPS components, with the exception of note the time of dystocia before TIPS, were significantly different across all four groups. In noting the time of dystocia post TIPS, midwives significantly did better compared to medical officers, specialists and consultants. For McRobers Manoeuvre, scores for midwives were significantly lower compared with medical officers and specialists post TIPS and there was improvement after training but there was no significant difference among all groups. Pre-score and post score for suprapubic pressure in specialist was significantly higher as compared to the other groups.

For posterior arm component, the scores were significantly higher in specialists in pre- and post-TIPS as compared to other groups. There is a considerable difference in the pre-test score between specialist and the midwives because the specialists were trained in the residency training programme on complicated deliveries. However, from the midwifery perspective, their professional training largely centres on management of uncomplicated or low risk deliveries. Although shoulder dystocia is part of most midwifery curricula, the emphasis is significantly less compared to doctors in their residency training. Total TIPS score improved significantly among midwives, medical officers and consultants followed by specialists.

DISCUSSION

Shoulder dystocia is unpredictable and unpreventable and therefore all obstetric healthcare professional should undergo training in the management of shoulder dystocia. The Royal College of Obstetricians and Gynaecologist & Royal College of Midwives recommends all birth attendants to undergo annual shoulder dystocia skills-drills to prevent clinical negligence suits as a maternity standard. In accordance with that, we have shown that simulated shoulder dystocia training would improve the knowledge, confidence and management of health care providers in managing this emergency.[7-10,11-12]

Simulation lab and mannequins are mostly available in the Malaysian universities where undergraduate and postgraduates undergo training. This is not accessible to general health care providers who may be faced with this emergency. The Ministry of Health Malaysia has invested in obstetric emergencies simulation training which are minimal where Malaysian midwives and Ministry of health doctors undergo training few times a year. ICOE is a structured, standardized and validated course conducted by OGSM in Kuala Lumpur, regularly since 2014. Our dataset addresses the current gap in the current literature where most researchers have tested participants in the training

programme or the resident physicians practicing in the universities but not the general maternity HCP.[9-11] Hence, our objective was to assess the ICOE course participants psychomotor and cognitive skills in management of shoulder dystocia module using TIPS pre-test and post-test score after a short simulation training.

This study of shoulder dystocia skills training module and testing among Malaysian HCPs demonstrated there was a significant improvement of individual post-test skills after short simulation training using high fidelity mannequins. The pre-test TIPS score among all groups were sub optimal to manage this emergency due to an inadequate training and perception of the clinical emergency. The consultant group was generally expected to perform better due to long working clinical experience. We noted their pre-test score were generally suboptimal due to the lack of routine practice of these psychomotor and cognitive skills. Similarly, other studies also have demonstrated this improvement in the management of shoulder dystocia skills and neonatal outcomes after simulation training.[1,2,6,9,13]

As part of the communication skill assessment, which is noting the time of dystocia and calling for help, the consultant group did not show much improvement after training. The consultant group were the senior HCP often called by junior HCP during emergency and this group lacked the skill of involving multidisciplinary team. The midwives improved the most as this emergency is often encountered and practiced by them. For communication scores Goffman et al found junior attending physicians scored significantly higher than senior attending physicians pre training but both groups improved in communication score post training. However, the same group assessed and noted that there was no improvement of documentation of time and date in the delivery notes after training similar to our finding.[10,11]

All four groups improved their TIPS scores in directed suprapubic pressure and Mc Roberts manoeuvre but in the delivery of the posterior arm, midwives improved the most 467%, followed by medical officers 145% and consultants 133%. For midwives this was the new skill trained, hence the marked improvement. Medical officers and consultants performed similarly in this internal manoeuvre, which demonstrated that consultants even though they are qualified and experienced can improve their skill further. This skill is often lost due to lack of practice and rare occurrence. On the contrary, Goffman et al found no significant difference between junior and senior attending physicians pre and post simulation training.[10]

In comparison of total score among the four groups, specialist pre-training skills were better compared to consultants and medical officers, but they showed marginal improvement after training which is due to lack of clinical practice.

We acknowledge the limitations of this observational study where convenient sampling was used. The participants who attended the ICOE training were only assessed, hence there is non- normal distribution of data, the consultant group was small consisting of only 4.2% of study sample. There were different pathways of training for each HCP who have different knowledge and different work settings. During the two days of intensive training, multiple breakout stations were simulated and tested. Apart from shoulder dystocia, TIPS for other skills were also conducted simultaneously, this permitted only limited duration. Hence, delivery of posterior arm was only assessed and other internal rotational manoeuvre like the Wood Screw and reverse Wood's screw manoeuvre were omitted. These manoeuvres had success rate of 72% with less fracture humerus and brachial plexus injury.[13-15] Assessment for complications like obstetric anal sphincter injury and postpartum haemorrhage were taught but not tested.

Malaysian HCPs TIPS pre-test management of shoulder dystocia score is below average. These similar findings have been reported by others; hence our findings clearly illustrate that the management of shoulder dystocia could be improved in all HCPs when presented with such simulation training at regular intervals. National training recommendations in shoulder dystocia skills needs to be revisited. This is to determine the need for further training of all healthcare professionals dealing with this emergency and there by developing a more comprehensive timed skills training in obstetrics emergencies utilizing all available resources in the country.[16-17] Pre-training of TIPS in the management of shoulder dystocia emergency among participants of ICOE were suboptimal. Simulation based skills training in the management of shoulder dystocia improved TIPS of all participants i.e., Malaysian Health care Professionals. Midwives benefited the most followed by medical officers and Consultants. However, Specialist also required to attend and improve their technical and non-technical skills. Simulation based training is a valuable educational tool allowing hands on practice with appreciation of correct technique in the management of shoulder dystocia manoeuvres. It is important to evaluate whether the trained HCPs retain their knowledge and skills in 6 and 12 months and whether such training resulted in reduction of fetal and neonatal morbidity in the centres where the training was introduced. We believe the current study is the first step and this would be followed by assessment of retention of knowledge and skills and whether this resulted in better clinical outcome.

CONCLUSION

ICOE shoulder dystocia simulation module training improved the psychomotor and cognitive skills in the management of delivery of shoulder dystocia.

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