



Obstetric hemorrhage and surgical emergencies training workshops on fresh cadavers and simulators result in high application in daily practices and decreased patient referral

Taze kadavrular ve simülatörler üzerinde obstetrik kanama ve cerrahi acil durumlar eğitim atölyeleri, günlük pratikte yüksek uygulama ile sonuçlanır ve hasta sevkini azaltır

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Abstract

Objective: In this study, we aimed to evaluate the effects of obstetric emergencies workshops combining theoretical lectures, simulation trainers and fresh cadaver models on daily practices and referrals of obstetrics and gynecology specialists.

Materials and Methods: This is a prospective observational study involving obstetrics and gynecology specialists attending the Turkish Society of Obstetrics and Gynecology endorsed obstetrics hemorrhage management courses held in 2018 and 2019. The training course is an annually organized two-day course, one day allotted to theoretical lectures and the other day to practical training on both simulators and fresh cadavers. Trainees participating in the course was surveyed with an anonymous questionnaire on their motivation to attend the course and their juridical history of obstetric patient management. Attendees were asked to disclose whether they had ever independently performed the procedures stated in the questionnaire or not, before commencing the course and 1 year after attending the course.

Results: Among the attendees 22% (n=32) had at least one obstetrical malpractice lawsuit and 36.1% (n=52) were accused of Health Care Complaints Commission. The main motivation of the attendees for taking this course was Professional development followed by reducing maternal mortality and morbidity and avoiding malpractice. One year after the course, attendees applying uterine devascularization surgery increased by 36.1% (52/144), uterine compression sutures increased by 52.7% (76/144), and ability to apply uterine balloon tamponade increased by 59.7% (86/144). Besides improvement in other obstetric surgical skills an indirect effect seen that the attendees operated on high-risk cases increased in placenta previa (15.3%), placenta accreta spectrum (30.5%), operative deliveries (27.7%), peripartum hysterectomy (24.9%) and relaparotomy for postpartum hemorrhage (34.7%).

Conclusion: Opportunities of attending well organized fresh cadaveric workshops on managing postpartum hemorrhage and other obstetric surgeries, can quickly adapt to daily practice, restore the professional confidence of obstetric and gynecology specialists, and eventually decrease patient referral.

Keywords: Obstetric emergencies, cadaver course, obstetric emergency training

PRECIS: Obstetric hemorrhage and surgical emergencies training workshops.

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Öz

Amaç: Bu çalışmada teorik dersler, simülasyon eğitmenleri ve taze kadavra modellerini bir araya getiren obstetrik acil durum çalıştaylarının kadın hastalıkları ve doğum uzmanlarının günlük uygulamalarına ve sevklerine etkisini değerlendirmeyi amaçladık.

Gereç ve Yöntemler: Türk Kadın Hastalıkları ve Doğum Derneği onaylı obstetrik kanama yönetimi kurslarına devam eden kadın doğum ve kadın hastalıkları uzmanlarının 2018 ve 2019 yıllarında katıldığı prospektif gözlemsel bir çalışmadır. Eğitim kursu, yılda bir kez düzenlenen iki günlük bir kurs olup, bir gün teorik derslere, diğer gün ise hem simülatörler hem de taze kadvralar üzerinde uygulamalı eğitime ayrıldı. Kursa katılan kursiyerlere kursa katılma motivasyonları ve obstetrik hasta yönetimi ile ilgili hukuki geçmişleri hakkında isimsiz bir anket uygulandı. Katılımcılardan kursa başlamadan önce ve kursa katıldıktan 1 yıl sonra ankette belirtilen işlemleri bağımsız olarak yapıp yapmadıkları soruldu.

Bulgular: Katılımcıların %22'si (n=32) en az bir obstetrik malpraktis davasına sahip ve %36,1'i (n=52) Sağlık Şikayet Komisyonu'na şikayet edilmişti. Katılımcıların bu eğitimi almalarının ana motivasyonu, mesleki gelişim, ardından anne ölüm ve hastalık oranlarını azaltmak ve malpraktisten kaçınmaktı. Kurstan bir yıl sonra uterus devaskularizasyon cerrahisi uygulayanların oranı %36,1 (52/144), uterus kompresyon sütürleri %52,7 (76/144) ve uterus balon tamponadı uygulama yeteneği %59,7 (86/144) arttı. Diğer obstetrik cerrahi becerilerindeki gelişmelerin yanı sıra yüksek riskli olgularda ameliyata girenlerde dolaylı bir etki görüldü; plasenta previa (%15,3), plasenta akreata spektrumu (%30,5), operatif doğumlar (%27,7), peripartum histerektomi (%24,9), doğum sonu kanama için relaparotomi (%34,7).

Sonuç: Doğum sonu kanama ve diğer obstetrik ameliyatları yönetme konusunda iyi organize edilmiş taze kadavra atölyelerine katılma fırsatları, günlük uygulamaya hızla adapte edilir, doğum ve jinekoloji uzmanının profesyonel güvenini geri kazandırır ve sonunda hasta sevkini azaltır.

Anahtar Kelimeler: Obstetrik aciller, kadavra kursu, obstetrik aciller eğitimi

Introduction

Obstetrical emergencies are a paramount concern in obstetricians' daily practice. The majority of the severe obstetric emergencies occur in otherwise healthy low-risk term pregnancies and complicate approximately 15% of deliveries⁽¹⁾. Peripartum hemorrhage, one of the most prominent of these obstetric emergencies, is the leading cause of maternal mortality in developing countries and is responsible for 27% of maternal deaths worldwide⁽²⁾. The management of obstetric emergencies requires an organized team work that competency of the obstetrician plays the role of a keystone.

The ultimate goal of surgical training is to render physician capable of performing safe independent practice. Nevertheless, the lack of uniformity in obstetrics and gynecology training has the potential to induce undesirable consequences⁽³⁾. Standardization and quality perfection in obstetrics and gynecology training is a widespread concern and efforts to achieve these goals are ongoing⁽⁴⁾. However, substantial variations in the complexity and educational value of operating room cases as well as the experience of individual mentors, place additional difficulties in standardization of training. Therefore, despite all attempts at standardizing and improving the quality of residency training, surgical training could still be seen as a raffle of obtaining adequate tuition from competent instructors in good surgical cases⁽⁵⁾.

Obstetrics is one of the most risky fields in medicine regarding the severity of patient outcomes and related ramifications⁽⁶⁾. Unsatisfactory obstetrics and gynecology training, displays its effects on the daily practices of postgraduate surgeons, curbs professional confidence, engenders circumstances that would end up with litigations against obstetricians and most importantly worsens patient outcomes. Previously, cadaver simulation models have been proposed as a solutions to overcome these problems in various fields of surgery⁽⁷⁻⁹⁾.

Nevertheless data on the efficiency of cadaver simulation training in obstetrical emergencies are lacking.

In this study, we aimed to evaluate the effects of obstetric hemorrhage and surgical emergencies workshops combining theoretical lectures, simulation trainers and fresh cadaver models on the daily practices of obstetrics and gynecology specialists.

Materials and Methods

This is a prospective observational study involving obstetrics and gynecology specialists attending the Turkish Society of Obstetrics and Gynecology endorsed obstetrics hemorrhage management courses held in 2018 and 2019. The training course is an annually organized two-day course, one day is allotted to theoretical lectures and video presentations, the other day to practical training on both simulators and fresh cadavers. One trainee and six attendees were assigned to each cadaver and simulator along with one instructor for each procedure. list of the theoretical and video training procedures and topics were as follows: Surgical and medical management of postpartum hemorrhage, uterine devascularization techniques such as uterine artery ligation, utero-ovarian artery ligation, hypogastric artery ligation, uterine compression sutures, episiotomy, 3rd and 4th degree perineal lacerations, upper 1/3 vaginal tear repair, vaginal hematoma management, postpartum hysterectomy, management of uterine rupture, postpartum re-laparotomy and abdominal packing, and management of bladder injuries.

Practical courses on day two included pelvic anatomy, uterine devascularization surgery such as uterine artery ligation, utero-ovarian artery ligation, hypogastric artery ligation, abdominal packing, uterine compression sutures, perineal laceration repair, upper vaginal anatomy and tear repair, uterine balloon tamponade application on simulators. Trainees were surveyed with an anonymous questionnaire before the course. Attendees

were asked to disclose whether they had ever independently performed the procedures stated in the questionnaire or not. Attendees' age, years in practice, obstetric examinations performed per day, deliveries performed per month, medico-legal histories and motivation to enroll the course were also surveyed in the questionnaire. Motivation of attendance of participants was evaluated with a visual analog scale (VAS). Participants were asked to mark the number extending from 0 to 10 for each statement in the VAS scale that fits themselves most as 10 represents a statement is fully compliant with attendees' motivation and 0 represents no compliance. Participants were asked to complete the questionnaire before commencing the course and 1 year after attending the course. In this study, we included data obtained from two - year courses, held on 7-8 July 2018 and 5-6 July 2019 in Istanbul.

Statistical Analysis

Statistical analyzes were performed using IBM SPSS v20. The distribution of data was assessed by Shapiro-Wilks test. Mean \pm standard deviations were calculated for normally distributed data and median (minimum-maximum) were calculated for non-normally distributed data. Differences between pre-course and post-course answers in the questionnaires were evaluated with McNemar's test. P-value <0.05 is considered significant.

Results

A total of 144 obstetrics and gynecology specialists, with an independent working experience of at least 1 year, attended the course. Mean age of the attendees was 38.6 ± 6.5 years. The number of mean daily obstetric examinations performed by attendees was 36.8 ± 24.6 and mean monthly deliveries were found as 51.2 ± 59.2 . Judicial history of attendees revealed 22.2% (32/144) of them were trialed for obstetrical malpractice at least once in their independent practices. Whilst 18 of them (56.2% of trialed attendees) were acquitted, 14 (43.2% of trialed and 9.7% of all attendees) of them were convicted and imposed judicial punishments, within convicted attendees, 12 of them imposed a fine (8.3% of all attendees) and 2 of them (1.3% of all attendees) were administered a suspended sentence. Demographic characteristics and judicial histories of attendees are given in Table 1. VAS scale assessment revealed that the leading motivation of surgeons in attending the course was professional development, followed by reducing maternal mortality and morbidity and avoiding malpractice (Mean VAS scores: 9.3 ± 1.8 ; 8.4 ± 3.1 ; 7.3 ± 3.7 respectively). Evaluation of the motivations of participants in attending the workshop is shown in Table 2.

Table 1. Demographic characteristics and judicial history regarding medical practice of attendees at the commencement of workshop

| | |
|--------------------------------------------------------------------|------------------------|
| Total number of attendees | 144 |
| Meanage (years) | 38.6 ± 6.5 (28-54) |
| Mean working experience as obs/gyn specialist (years) | 6.4 ± 6.4 (1-21) |
| Mean number of daily obstetric examinations | 36.8 ± 24.6 (3-120) |
| Mean number of monthly deliveries | 51.2 ± 59.2 (5-300) |
| Institution of past residency training | |
| University Hospital n (%) | 74 (51.4) |
| Health Ministry Training and Research Hospital n (%) | 70 (48.6) |
| Attendees with a history of obstetrical malpractice lawsuit (n, %) | 32 (22.2) |
| Acquitted n (%) | 18 (56.2) |
| Judicial punishments n (%) | 14 (43.7) |
| Judicial fine sentences | 12 |
| Suspended sentences | 2 |
| Accusations to Health Care Complaints Comissionn (%) | 52 (36.1) |
| Acquitted | 32 (61.5) |
| Condemned for accusations n (%) | 20 (38.5) |

Table 2. Evaluation of motivation of surgeons to attend to workshop with VAS scale

| | |
|------------------------------------------------------------------------------------------------|--------------|
| Motivation of attending the course; professional development (VAS score 0-10) | 9.3 ± 1.8 |
| Motivation of attending the course; avoiding malpractice (VAS score 0-10) | 7.3 ± 3.7 |
| Motivation of attending the course; reducing maternal mortality and morbidity (VAS score 0-10) | 8.4 ± 3.1 |
| VAS: Visual analog scale | |

The rate of attendees independently performing questioned procedures before and one year after the workshop are summarized in Table 3. As most of the questioned procedures were lifesaving in nature and performed for emergent situations that are nearly impossible to manage without conducting them, attendees who never performed procedures were asked their ways of coping with these emergent occurrences in their daily practice. These attendees described their ways of dealing with emergent circumstances as refraining from risky patients, transferring them to tertiary centers and calling the assistance of a more experienced colleague when surgical measures are inescapably required as their limited surgical inventories usually fall short. One year after the course, number of attendees that independently conducted procedures was found to be significantly higher for every surgical intervention introduced in the workshop compared to the commencement of the course. One year after the course, attendees applying uterine devascularization surgery increased by 36.1% (52/144), uterine compression sutures increased by 52.7% (76/144), and the ability to apply uterine balloon tamponade increased by 59.7% (86/144). The third and fourth degree perineal tear repairing specialist increased by 23.6 and 33.3% respectively. Abdominal packing increased by 55.5%, upper vaginal

laceration repair by 12%, Schirodkar cerclage by 45.8%, Mc Donald cerclage by 20.8% and urinary bladder injury repair by 26.4%.

Besides improvement in other obstetric surgical skills an indirect effect seen that the on high-risk cases increased in placenta previa (15.3%), placenta accreta spectrum (30.5%), operative deliveries (27.7%), peripartum hysterectomy (24.9%) and relaparotomy for postpartum hemorrhage (34.7%). A comparison of the management of other obstetric emergency interventions not included in the practical course one year before and after the course are presented in Table 4. The number of trainees that performed uterine rupture repair increased by 38.9%, vaginal hematoma repair by 16.6%.

Discussion

Emerging studies have demonstrated that training courses of obstetric emergencies are improving health outcomes⁽¹⁰⁾. Simulation is recommended as a method of training to provide competency to professionals, to increase the quality of care and to reduce mortality and morbidity associated with adverse obstetric and gynecological circumstances⁽¹¹⁾. Simulation practice with trainers is shown to improve patient outcomes in obstetric emergencies like postpartum

Table 3. The main procedures applied on cadavers and simulators. Comparison of rate of attendees that never independently performed procedures before and one year after cadaveric courses

| | Trainees that never performed the procedure before the course n (%) | Trainees that never performed the procedure 1 year after the course n (%) | Delta % change | p-value |
|--------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------|----------------|---------|
| Uterine artery ligation | 68 (47.2) | 16 (11.1) | -36.1 | <0.001 |
| Utero-ovarian artery ligation | 80 (55.6) | 22 (15.3) | -40.3 | <0.001 |
| Hypogastric artery ligation | 86 (59.7) | 50 (34.7) | -25 | <0.001 |
| Any devascularisation surgery | 68 (47.2) | 16 (11.1) | -36.1 | <0.001 |
| B-lynch suture | 88 (61) | 24 (16.7) | -44.3 | <0.001 |
| Other compression sutures | 106 (73.6) | 46 (32) | -41.6 | <0.001 |
| Any uterine compression suture | 88 (61) | 12 (8.3) | -52.7 | <0.001 |
| Uterine tamponade with Bakri balloon | 86 (59.7) | 30 (20.8) | -38.9 | <0.001 |
| Uterine tamponade with sengstaken-blakemore tube | 140 (92.7) | 50 (34.7) | -58 | <0.001 |
| Uterine tamponade with foley catheter | 86 (59.7) | 24 (16.7) | -43 | <0.001 |
| Any uterine tamponade | 86 (59.7) | 0 | -59.7 | <0.001 |
| Abdominal packing | 122 (84.7) | 42 (29.2) | -55.5 | <0.001 |
| 3 rd degree tear repair | 40 (27.8) | 6 (4.2) | -23.6 | <0.001 |
| 4 th degree tear repair | 86 (59.7) | 38 (26.4) | -33.3 | <0.001 |
| Repair of lacerations in 1/3 upper vagina | 24 (16.7) | 6 (4.2) | -12.5 | <0.001 |
| Mc Donald cerclage | 52 (36.1) | 22 (15.3) | -20.8 | <0.001 |
| Schirodkar cerclage | 118 (81.9) | 52 (36.1) | -45.8 | <0.001 |
| Repair of bladder injury | 54 (37.5) | 16 (11.1) | -26.4 | <0.001 |

Table 4. Comparison of other obstetric emergency interventions not included in the practical course. Comparison of rate of attendees that never independently performed procedures before and one year after cadaveric courses

| | Trainees that never performed the procedure before the course n (%) | Trainees that never performed the procedure 1 year after the course n (%) | Delta % change | p-value |
|-----------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------|----------------|---------|
| Placenta previa C/S | 36 (25) | 14 (9.7) | -15.3 | <0.001 |
| Placenta invasion anomaly C/S | 72 (50) | 28 (19.5) | -30.5 | <0.001 |
| Vacuum extraction | 46 (31.9) | 26 (4.2) | -27.7 | =0.001 |
| Forceps delivery | 112 (77.8) | 74 (51.4) | -26.4 | <0.001 |
| Re-laparotomy for postpartum hemorrhage | 68 (47.2) | 18 (12.5) | -34.7 | <0.001 |
| Peripartum hysterectomy | 46 (31.9) | 10 (7) | -24.9 | <0.001 |
| Repair of uterine rupture | 70 (48.6) | 14 (9.7) | -38.9 | <0.001 |
| Vaginal hematoma drainage | 28 (19.4) | 4 (2.8) | -16.6 | <0.001 |

hemorrhage, perimortem cesarean section, shoulder dystocia and umbilical cord prolapse⁽¹¹⁾. Cadaver simulation models have demonstrated to increase the competency of trainees in the fields of general surgery, urology, gynecology and vascular surgery in previous studies⁽¹²⁻¹⁴⁾. A recent study by Soler-Silva et al.⁽⁸⁾ described the thiel cadaver simulation model as the most realistic surgical simulation and found thiel cadavers superior to any other simulation model in terms of precising surgical skills and enhancing trainees' confidence. Although obstetric emergencies, particularly the peripartum hemorrhages, are the most problematic scenarios of daily obstetric practice, information regarding the efficacy of courses including cadaver simulation models for obstetrics emergencies is lacking.

In our study the rate of surgeons independently performing critical interventions is significantly increased for all the procedures introduced in the workshop. Courses including cadaver simulation models are shown to be effective in improving daily practices of obstetricians regarding obstetric emergencies, particularly in the management of peripartum hemorrhages.

Hypogastric artery ligation is a life-saving and fertility preserving procedure used in controlling peripartum hemorrhages and it is advised to be taught to all pelvic surgeons⁽¹⁵⁾. Owing to close anatomical relationships of the internal iliac artery with some important structures, serious complications may arise in the hands of incompetent surgeons. Despite its value, ligating the internal iliac artery is a skill that are not usually acquired in residency training mostly due to the infrequency of cases that require hypogastric artery ligation. Recently, Mahale et al.⁽¹⁶⁾ demonstrated the effectiveness of cadaver simulations on practicing hypogastric artery ligation and gaining the necessary skills to perform the procedure. Supporting their findings, we found that a significantly higher number of attendees were performing the procedure 1 year after the workshop along with other measures against postpartum hemorrhage. Therefore,

fresh cadaver models combined with theoretical lectures and simulators appear effective in excelling on procedures where only assisting a mentor is inadequate due to the low number of cases and hands on training is necessary, such as hypogastric artery ligation.

Studies indicated declining rates of vaginal deliveries and forceps deliveries and vacuum extractions in the last two decades⁽¹⁷⁾. Availability of better techniques increased legal liabilities, or lack of technical proficiency of obstetricians may all contribute to this trend. In spite of the advances in obstetric techniques, there are still cases in which operative delivery is preferable over cesarean section. However expertise of forceps delivery is diminishing in educational institutions. A low volume of patients requiring a forceps delivery is described as one of the major obstacles to transferring these skills from mentors to trainees⁽¹⁸⁾. Although contemporarily most obstetricians prefer vacuum extraction over forceps in operative deliveries due to ease of use, the application of vacuum extraction also requires competent training. In our study, we found that a significantly higher number of attendees started to apply forceps deliveries and vacuum extractions one year after the course although operative deliveries were not part of the course. This increase in the willingness to perform operative deliveries can be explained by the surgeons increased ability to manage hemorrhage, vaginal tears and perineal tears after the course, which are common complications of obstetric deliveries and are included in the course program.

As mentioned in the introduction section, the incompetency of the surgical skills of obstetricians could be caused by cumulative effects of multiple factors extending through their residency training periods. As recommended in a collaborative publication named "Quality Patient Care on Labor and Delivery: A Call to Action," simulation models could be incorporated into obstetrics and gynecology residency training to ameliorate the educational deficiencies of residents⁽¹⁹⁾.

Conclusion

Opportunities of attending well organized fresh cadaveric workshops on managing postpartum hemorrhage and other obstetric surgeries, can quickly adapt to daily practice, restore the professional confidence of obstetric and gynecology specialists, and eventually decrease patient referral.

Ethics

Ethics Committee Approval: The study was approved by the Alanya Alaaddin Keykubat University Ethics Committee (approval number: 12, date: 25.05.2022).

Informed Consent: Written consent from all participants were obtained.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: E.Ç., Design: B.A., Y.C., Data Collection or Processing: A.K., E.K., Analysis or Interpretation: A.K., E.K., Literature Search: B.A., Writing: B.A., Y.C., E.Ç.

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