



Healthcare management strategies: interdisciplinary team factors

Pamela Andreatta and David Marzano

Purpose of review

Interdisciplinary team factors are significant contributors to clinical performance and associated patient outcomes. Quality of care and patient safety initiatives identify human factors associated with team performance as a prime improvement area for clinical patient care.

Recent findings

The majority of references to interdisciplinary teams in obstetrics and gynecology in the literature recommends the use of multidisciplinary approaches when managing complex medical cases. The reviewed literature suggests that interdisciplinary team development is important for achieving optimally efficient and effective performance; however, few reports provide specific recommendations for how to optimally achieve these objectives in the process of providing interdisciplinary care to patients. The absence of these recommendations presents a significant challenge for those tasked with improving team performance in the workplace. The prescribed team development programs cited in the review are principally built around communication strategies and simulation-based training mechanisms. Few reports provide descriptions of optimal team-based competencies in the various contexts of obstetric and gynecology teams. However, team-based evaluation strategies and empirical data documenting the transfer of team training to applied clinical care are increasing in number and quality.

Summary

Our findings suggest that research toward determining team factors that promote optimal performance in applied clinical practice requires definition of specific competencies for the variable teams serving obstetrics and gynecology.

Keywords

competencies, interdisciplinary teams, obstetrics and gynecology, performance evaluation, quality and safety

INTRODUCTION

Interdisciplinary and multidisciplinary team factors are important contributors to clinical performance and clinical outcomes [1]. According to the Joint Commission, failures in teamwork and communication are among the leading causes of adverse obstetric events and sentinel events [2,3]. Governing and regulatory agencies such as the Joint Commission and Agency for Healthcare Research and Quality (AHRQ), professional organizations such as the American College of Obstetricians and Gynecologists (ACOG) and the American College of Nurse Midwives (ACNM), and provider networks such as the California Maternal Quality Care Collaborative (CMQCC) have all presented various mandates toward improving interdisciplinary and multidisciplinary team performance in obstetrics and gynecology [4–6]. This review examines the English language published literature indexed

through *Cochrane* and *Medline* databases from January 2011 through June 2012 using the following key terms: interdisciplinary, multidisciplinary, team, obstetric, gynecology, training and development. Our objective was to consider those team factors that have been identified as contributors to performance and patient outcomes, as well as to ascertain research trends associated with interdisciplinary and multidisciplinary team performance in obstetrics and

Department of Obstetrics and Gynecology, University of Michigan Medical School, Ann Arbor, Michigan, USA

Correspondence to Pamela Andreatta, PhD, Department of Obstetrics & Gynecology, University of Michigan Medical School, L4000 Women's Hospital, 1500 Medical Center Drive, Ann Arbor, MI 48109, USA. Tel: +1 650 585 4023; e-mail: pandreat@umich.edu

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KEY POINTS

- Interdisciplinary team performance is valued for managing complex medical conditions; however, the team-related competencies that lead to optimal team performance are ill defined for the various types of obstetric and gynecology teams.
- Prescribed interdisciplinary team training and evaluation protocols principally rely on team-based communication skills derived from the TeamSTEPPS, CUSP, or similar programs; however, further consideration of other team competencies is merited.
- Simulation-based training remains an active area for team development and associated research, with empirical findings advancing to include performance and clinical outcomes.
- Interdisciplinary teams have led to the identification and resolution of system-based problems that might have gone unnoticed when considered within the context of a single discipline.
- Not all obstetric and gynecology teams have the same contextual challenges; thus, team development efforts should target preidentified team-specific competencies in order to gain the greatest transfer benefit for applied clinical practice.

gynecology. We evaluated 128 articles that met these criteria.

MANAGEMENT OF COMPLEX MEDICAL CONDITIONS

The management of complex medical complications and preexisting conditions that require a multidisciplinary approach during pregnancy was the subject of the majority of publications referencing the importance of interdisciplinary teamwork in obstetrics. Conditions such as fetal anomalies [7–10], maternal drug addiction [11], preexisting or concomitant maternal diseases, congenital abnormalities [12,13[■],14–20], and antenatal and postpartum emergencies [21–23,24[■],25[■],26–28] require significant coordination between obstetricians, neonatologists, and various associated specialty and subspecialty providers to successfully manage the care provided for both mother and baby. Several of the reviewed reports proposed that a multidisciplinary approach and improved interteam communication could lead to better patient outcomes. For example, management of massive postpartum hemorrhage requires a multidisciplinary approach that includes nursing, obstetrics, anesthesia, and the blood bank collaborating in resuscitation efforts [24[■]]; however, the literature

suggests that team development efforts are insufficient to adequately instantiate sustainable improvement in applied clinical practice and few specifics are elucidated for best team-based practices. The reported team development efforts included in this review did not include ancillary support staff, such as unit clerks and technicians, who frequently coordinate patient management issues such as clinician paging or room transfers. These functions are critical for coordinated, team-based patient management.

Of the 128 articles included in this review citing the critical contribution of interdisciplinary teamwork in the successful management of patients with complicating medical factors, only one delineated how the team set about working together to assure the likelihood of optimal outcomes. In their work, Shields *et al.* [25[■]] reported that in addition to physicians and nursing staff reporting improved clinical knowledge and comfort levels responding to a maternal hemorrhage, a comprehensive team-performance protocol for managing postpartum hemorrhage reduced the recognition and response time for clinicians, patient blood loss, the use of blood products given to patients, and the number of patients experiencing life-threatening disseminated intravascular coagulopathy. Still, for the most part, the literature associated with interdisciplinary team factors in obstetrics reports on the value of teamwork, but offers no suggestions for how to ensure optimal team functioning.

We identified similar trends in examining the literature published on team factors in gynecology. The management of female cancer patients was reported to require the coordination of clinical care provided by gynecologists, gynecologic oncologists, plastic and other subspecialty surgeons, anesthesiologists, physiotherapists, pharmacologists, nurses, and social workers [29–33]. Likewise, a team-based approach was reported for the management of ureteral endometriosis [34[■]], ovarian cystadenomas [35[■]], vesicovaginal fistula [36], and provoked vestibulodynia [37[■]] that included the above referenced specialty and subspecialty clinicians, in addition to pelvic floor physiotherapists, psychologists, and sexologists. As with obstetric teams, a multidisciplinary approach and interteam communication are identified as being critical in the gynecologic operating room. Kincey *et al.* [35[■]] described the management of large bilateral cystadenomas, and how all of the team members were critical to the successful management of this patient. From the surgeon and anesthesiologist to the aids that provided transport to the operating room, each team member provided a unique and important role. Although less plentiful than the literature on obstetric teams, the reviewed gynecology literature principally

acknowledges the importance of interdisciplinary and multidisciplinary teamwork toward achieving optimal patient outcomes. However, no specific information was provided about how the teams functioned to achieve those outcomes.

The consensus opinion of these reports is that team development efforts leading to optimal inter-team communication and coordination are essential for improving patient care. The challenges arise when considering what those team development efforts target, how they are facilitated, and how their success is measured. Team development efforts are further complicated by the fact that team members in obstetrics and gynecology may be required to function as a member of an obstetrics team in one context and as a member of a gynecology team in another, often within the same day and sometimes concurrently. For example, a physician may collaborate with a nurse s/he routinely works with to provide care for a laboring patient in one moment, in another, move to the operating room to work with a scrub nurse s/he has never met, and later, be called to the emergency department to consult on a case with no preestablished relationship between either the patient or the other clinical team members. Each of these situations will require different forms of team-based communication and coordination strategies, as well as different approaches to collaborative problem solving. Thus, a one-size-fits-all approach to team development is impractical, and team-specific needs should be considered when devising strategies for optimizing team performance factors. Context is key and identifying a team's situational needs is imperative for the development of programs designed for optimizing team performance. Absent the specificity that helps team members transfer optimal behaviors to their applied practice, it is difficult to gain the measurable and sustainable outcomes team development efforts aspire to. This may provide some insight into why multidisciplinary team training is often referenced in case reports and literature reviews, but specific recommendations are just as often lacking.

PRESCRIBED TEAM DEVELOPMENT MECHANISMS

Several publications prescribed solutions for introducing formal team development mechanisms, principally in obstetrics [38–41,42[■],43,44[■],45–47], but also in gynecology [48[■],49[■],50]. For example, Rosenstein [44[■]] reported the results of a strategic program designed to reduce the occurrence of disruptive behavior and its adverse impact on staff relationships, communication flow, and patient care. Rosenstein identified specific system-based factors

that contribute to this seemingly intractable problem, which is often compounded in obstetrics services because the physician, nurse, and patient may disagree on issues related to timing, convenience, motivation, priorities, clinical interpretation, or roles and responsibilities. Several studies explicated the value of the patient as an integral team member who is often overlooked when considering team-based coordination of care [9,49[■],51[■],52,53[■]]. We found no indexed reports on team development related to ambulatory care contexts.

Many of the reviewed studies reported on the use of protocols and processes for evaluating specific team needs toward achieving desired performance or clinical objectives [54–57,58[■]]. Although most of these protocols were developed by the researchers, those developed by the AHRQ, including Team-STEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) [59] and CUSP (Comprehensive Unit-based Safety Program [60]) were frequently referenced as being advantageous for initiating interdisciplinary team development programs in practice [41,42[■],45–47,56,61,62[■],63[■]]. Several authors described either performance-related or clinical outcomes that were directly attributed to team development efforts [42[■],58[■],64[■]–67[■]]. Of particular note are the outcomes reported by Grunebaum *et al.* [68[■]], who presented the resulting effects of a comprehensive obstetric patient safety program on reducing compensation payments and sentinel adverse events at a tertiary academic referral center with a level 3 neonatal ICU and associated labor and delivery unit performing more than 5000 deliveries per year. The program was initiated in 2009 and retrospectively evaluated from 2003. They report average yearly compensation payments decreased by 91% between 2003–2006 and 2007–2009, and that sentinel events decreased from five in 2000 to none in 2008 and 2009. These findings provide substantive evidence in support of the financial, as well as quality and safety, benefits of investing in interdisciplinary team development.

TEAM EVALUATION STRATEGIES

Several studies described assessment strategies designed to measure progress toward achieving identified performance objectives, from airway management to intraoperative interruptions to communication associated with patient handoffs [65[■],67[■],69–71,72[■],73–75,76[■],77]. Although some of these reports are weakened by relatively poor psychometric properties and the absence of the defined team performance objectives we previously pointed out, several of these studies provide excellent examples of the type of work required to

establish and assess the competencies that will move team-based science in obstetrics and gynecology forward. For example, Morgan *et al.* [72[■]] conducted a rigorous evaluation of the psychometric properties of The Assessment of Obstetric Team Performance (AOTP) and the Global Assessment of Obstetric Team Performance (GAOTP) evaluation tools that were designed to assess human factors associated with multidisciplinary obstetric team performance (nontechnical skills). The AOTP and GAOTP are designed to assess multidisciplinary obstetric team performance in the context of high-fidelity simulation, which distinguishes it from other human factors assessment instruments that target specific disciplines and specialties.

SIMULATION-BASED TEAM TRAINING

The use of simulation-based training remains at the forefront of interdisciplinary activities used for team development in coordinating clinical care during obstetric emergencies [9,42[■],56,58[■],63[■],66[■],68[■],75,78[■],79,80[■],81–83]. Studies in this area have notably moved away from reporting on the acceptance of the training method, incremental performance improvement in the simulated context [42[■],58[■],78[■]], and using simulation to advance clinical practice [84[■]], to evaluate the transfer of performance outcomes to applied clinical practice. Advances in this area of research have led to several published reports directly correlating improved team performance after simulation-based training to improved clinical performance concomitant with favorable clinical outcomes. This is illustrated by separate, but related, research conducted by Lipman *et al.* [64[■]] and Marzano *et al.* [42[■]]. Lipman *et al.* [64[■]] discussed how simulation could be used to compare perimortem cesarean delivery during simulated arrests occurring outside the operating room. Their results suggested that perimortem cesarean delivery during resuscitative efforts for an actual arrest could delay care by more than 5 min and should be performed in the labor room rather than relocating to the operating room. Similarly, Marzano *et al.* [42[■]] reported on team performance and clinical outcomes related to a patient who underwent perimortem cesarean delivery after acutely aspirating and progressing to full cardiopulmonary arrest in her room on a general care floor.

The occurrence of these types of critical events is rare (due to good management and sometimes good luck), and, therefore, accumulating a dataset large enough to demonstrate improved outcomes are directly a result of team training will remain difficult. However, these types of empirical data inform the body of evidence in aggregate and we

recommend that they be reported to the extent possible. Because of the relative rarity and emergent nature of these types of events, it is quite difficult to capture sufficient data to assert a causal relationship between simulation-based training and team performance during emergencies leading to improved clinical outcomes; however, previously published evidence in pediatric medicine showed statistically significant correlation of 0.87 [85]. Assembling a confluence of evidence in this area from multiple institutions over time will be necessary to document the impact of team development drills on managing obstetric emergencies, and the outcomes reported in these publications provide an auspicious beginning.

COLLABORATIVE QUALITY INITIATIVES

Apart from team development toward achieving objectives in the management of a specific patient or clinical event, several articles reported the advantages of interdisciplinary teams identifying system-based problems and devising strategies for resolving process and institutional challenges that impact patient care in general. Some of these challenges include obtaining informed consent from laboring patients who may be compromised by pain during the process [86[■]], devising a framework for evaluating mode of delivery in obstetric care [87[■]], determining essential factors for successfully implementing an interdisciplinary team training program [62[■]], and identifying discrepancies in interdisciplinary policies and procedures that could adversely impact patient care [88[■]]. Perhaps, the most ambitious use of interdisciplinary teamwork toward system-wide problem solving is the CMQCC [89[■]]. The CMQCC OB Hemorrhage Task Force is cochaired by nurse and physician team leaders working together to model the value of teamwork and demonstrate the potential for effective interdisciplinary collaboration to make a difference in the quality of care for women, eliminate preventable maternal death and injury, and promote equitable maternity care in California. The task force identified maternal hemorrhage as a significant quality improvement opportunity and established objectives to implement and evaluate a multilevel strategy that includes an open access toolkit, support-mentoring, county partnerships, and a 30-hospital learning collaborative to improve readiness, recognition, response, and reporting of maternal hemorrhage at birth. This statewide initiative is both comprehensive and ambitious in its aims and the outcomes will likely inform similar programs in other regions.

DISCUSSION

Overall, our review suggests that the preponderance of literature related to interdisciplinary and multi-disciplinary team factors credits clinical management and patient outcomes to successful team-based practice. The reviewed literature provides few, if any, recommendations for how to optimize team behaviors and institutional practices that are documented contributors to team performance in other professions. Examples of these team competencies include leadership, coordination, feedback, planning, communication, assertiveness, common attitudes, situational awareness, decision-making, performance monitoring, information processing, shared expectations, interpersonal relations, adaptability, and team cognition [90–94]. Some of these competencies, such as following communication protocols, are conceptually straightforward and easily evaluated. Others, such as situational awareness or team cognition, are less precise, and therefore, more challenging to define and assess.

Each interdisciplinary obstetric or gynecology team consisted of different constituents depending on the clinical contexts and details of the patient, and the team's functional requirements will differ depending on factors such as the amount of time they will work together, their clinical tasks, the urgency of their formation, and the acuity of the clinical need. Therefore, if the frequency of team-based emergency drills correlates with improved team performance and clinical outcomes related to the management of emergencies, similar uses of drills might not improve performance outcomes for a team responsible for collaborative management of patient care on an ongoing basis. The demands of an emergency response team are quite different from those of a team that routinely works together providing nonurgent patient care, or from other teams such as those that collaboratively manage patients with multiple medical or surgical complications. That is, requisite competencies may vary by the type of team, such that what may be perceived as a critical competency for one team may be less important for another team. A typology for healthcare teams describes four primary compositions of clinical teams related to the stability of membership and the role of team members in performing clinical tasks [95]. Teams are classified as having either variable or stable membership, and variable or stable task responsibilities (Fig. 1). Those teams with variable membership and role characteristics, such as emergency response teams, could benefit from cross-training and developing situational awareness, whereas teams with stable membership and role allocation might benefit more from developing shared decision-making and strategic

		Team role	
		Stable	Variable
Team Personnel	Stable	Type S_{RSP}	Type V_{RSP}
	Variable	Type S_{RVP}	Type V_{RVP}

FIGURE 1. The healthcare team typology describes compositional characteristics of interdisciplinary clinical teams. S_{RSP} , stable role, stable personnel; S_{RVP} , stable role, variable personnel; V_{RSP} , variable role, stable personnel; V_{RVP} , variable role, variable personnel. Reproduced with permission from [95].

planning. The healthcare team typology may provide a guide for defining team competencies, selecting targeted team development strategies, and optimizing protocols and training programs for the many types of obstetrics and gynecology teams. It may also provide a framework for designing empirical studies that will provide insight into which factors are most important for specific types of teams.

CONCLUSION

The results of our review confirm that interdisciplinary teams are essential for the successful management of the patients who have complex conditions requiring the expertise of multiple specialties. However, little to no research reported empirical data to inform how such teams optimally function or how high functioning teams optimally improve in different contexts through strategic team development efforts. The value of interdisciplinary team performance is clear. We need to analyze the various types of teams that manage obstetrics and gynecology patients and begin to evaluate how we can optimally develop those teams to efficiently provide superior and safe patient care. We propose to first determine the team type and evaluate the factors that lead to superior team performance for that team. After the relevant performance factors are determined, they can be used to create protocols and performance

standards, and implement team development activities. Finally, it is important to evaluate the impact of those activities on the established performance objectives. Sharing the results of these types of studies with the practice community will further benefit cost-effectiveness, clinical outcomes, and patient safety.

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Conflicts of interest

P.A. and D.M. have no conflicts of interest to disclose.

REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 477).

1. To err is human: building a safer health system. In: Kohn LT, editor. Washington, DC: National Academy Press; 2000.
2. Joint Commission. Sentinel Event Alert #30: preventing infant death & injury in delivery; July 2004.
3. Joint Commission. Sentinel Event Alert #44: preventing maternal death; January 2010.
4. Guise JM. Teamwork in obstetric critical care. *Best Pract Res Clin Obstet Gynecol* 2008; 22:937–951.
5. Merien AER, van de Ven J, Mol BW, *et al*. Multidisciplinary team training in a simulation setting for acute obstetric emergencies: a systematic review. *Obstet Gynecol* 2010; 115:1021–1031.
6. Waldman RN, Kennedy HP. Collaborative practice between obstetricians and midwives. *Obstet Gynecol* 2011; 118:503–504.
7. Berenstein A, Fif JT, Niimi Y, *et al*. Vein of Galen malformations in neonates: new management paradigms for improving outcomes. *Neurosurgery* 2012; 70:1207–1214.
8. Lazar DA, Cass DL, Rodriguez MA, *et al*. Impact of prenatal evaluation and protocol-based perinatal management on congenital diaphragmatic hernia outcomes. *J Pediatr Surg* 2011; 46:808–813.
9. Engelder S, Davies K, Zeilinger T, *et al*. A model program for perinatal palliative services. *Adv Neonatal Care* 2011; 12:28–36.
10. Johnson TS, Malnory ME, Nowak EW, *et al*. Using fetal and infant mortality reviews to improve birth outcomes in an urban community. *J Obstet Gynecol Neonatal Nurs* 2011; 40:86–97.
11. Unger A, Metz V, Fischer G. Opioid dependent and pregnant: what are the best options for mothers and neonates? *Obstet Gynecol Int* 2012; 2012:195954.
12. Chen H, Wang J, Chen YC, *et al*. Identifying with postpartum depression early: integrating perinatal mental healthcare into the obstetric setting. *Obstet Gynecol* 2011; 2011:309189; Published online 2011 September 15. doi: 10.5402/2011/309189.
13. Regitz-Zagrosek V, Lundqvist CB, Borghi C, *et al*. ESC Guidelines on the management of cardiovascular diseases during pregnancy. *Eur Heart J* 2011; 32:3147–3197.

The authors share the results from a multidisciplinary team that prepared a comprehensive assembly of guidelines for best practices and strategies in the management of obstetric patients with cardiovascular diseases.

14. Simpson LL. Maternal cardiac disease: update for the clinician. *Obstet Gynecol* 2012; 119:345–359.
15. Wan Ahmad WA, Khanon M, Yaakob ZH. Heart failure in pregnancy: an overview. *Int J Clin Pract* 2011; 65:848–851.
16. Bauer ME, Bauer ST, Rabbani AB, *et al*. Peripartum management of dual antiplatelet therapy and neuraxial labor analgesia after bare metal stent insertion for acute myocardial infarction. *Anesth Analg* 2012 [Epub ahead of print].
17. Howard J, Oteng-Ntim E. The obstetric management of sickle cell disease. *Best Pract Res Clin Obstet Gynaecol* 2012; 26:25–36.
18. Hezelgrave NL, Oteng-Ntim E. Pregnancy after bariatric surgery: a review. *J Obes* 2011; 2011:501939. doi:10.1155/2011/501939.
19. Kizer NT, Powell MA. Surgery in the pregnant patient. *Clin Obstet Gynecol* 2011; 54:633–641.

20. Stubbs BM, Desai A, Singh S, *et al*. Gastrointestinal stromal tumour in pregnancy. *BMJ Case Rep* 2011. doi: 10.1135/bcr.01.2011.3737.
21. Romero VC, Pearlman M. Maternal mortality due to trauma. *Semin Perinatol* 2012; 36:60–67.
22. Goswami D, Kochhar PK, Suri T, *et al*. Obstetric and gynecological outcome in a patient with traumatic pelvic fracture and perineal injuries. *J Obstet Gynaecol Res* 2012. doi: 10.1111/j.1447-0756.2011.01838.x.
23. Allahdin S, Voigt S, Htwe TT. Management of placenta praevia and accrete. *J Obstet Gynaecol* 2011; 31:1–6.
24. Ruth Kennedy J. Acute volume resuscitation following obstetric hemorrhage. ■ *Perinat Neonatal Nurs* 2011; 25:253–260.

Identified factors associated with successful treatment of a hemorrhaging pregnant woman, including early communication among providers, clinical status triggers, and the value of multidisciplinary simulated drills for team members.

25. Shields LE, Smalarz K, Reffigee L. Comprehensive maternal hemorrhage ■■ protocols improve patient safety and reduce utilization of blood products. *Am J Obstet Gynecol* 2011; 205:368e1–3688e.

The study reports the impact of an interdisciplinary focused protocol and associated training on measurable clinical and institutional outcomes associated with the management of maternal hemorrhage.

26. Su CW. Postpartum hemorrhage. *Prim Care* 2012; 39:167–187.
27. Mehta SH, Gonik B. Neonatal brachial plexus injury: obstetrical factors and neonatal management. *J Pediatr Rehabil Med* 2001; 4:113–118.
28. Chen CH, Huang MC, Liu HC, *et al*. Increased risk of preterm birth among women with mitral valve prolapse: a nationwide, population-based study. *Ann Epidemiol* 2011; 21:391–398.
29. Hartmann S, Reimer T, Gerber B. Management of early invasive breast cancer in very young women (<35). *Clin Breast Cancer* 2011; 11:196–203.
30. McCluggage WG. Ten problematical issues identified by pathology review for multidisciplinary gynaecological oncology meetings. *J Clin Pathol* 2012; 65:293–301.
31. Mandato VD, Formisano D, Pirillo D, *et al*. Province wide clinical governance network for clinical audit for quality improvement in endometrial cancer management. *Int J Gynecol Cancer* 2012; 22:94–100.
32. Radwany SM, Von Gruenigen VE. Palliative and end-of-life care for patients with ovarian cancer. *Clin Obstet Gynecol* 2012; 55:173–184.
33. Trotter K, Frazier A, Hendricks CK, *et al*. Innovation in survivor care: group visits. *Clin J Oncol Nurs* 2011; 15:E24–E33.
34. Soriano D, Schonman R, Nadu A, *et al*. Multidisciplinary team approach to ■ management of severe endometriosis affecting the ureter: long-term outcome data and treatment algorithm. *J Minim Invasive Gynecol* 2011; 18:483–488.

The study describes how a multidisciplinary team approach that included preoperative, operative, and postoperative collaborative management contributed to favorable outcomes for patients with ureteral endometriosis.

35. Kincey J, Westin SN, Zhao B, *et al*. Multidisciplinary surgery for gigantic ■■ masses. *J Obstet Gynecol* 2011; 117 (2 pt 2):508–512.

The study describes the interdisciplinary team processes leading to the successful management of a patient with a gigantic abdominal mass (ovarian cystadenoma) that required comprehensive and integrated preoperative, operative, and postoperative coordination of care.

36. Capes T, Ascher-Walsh C, Abdoulaye I, *et al*. Obstetric fistula in low and middle income countries. *Mt Sinai J Med* 2011; 78:352–361.
37. Spoelstra SK, Dijkstra JR, van Driel MF, *et al*. Long-term results of an ■ individualized, multifaceted, and multidisciplinary therapeutic approach to provoked vestibulodynia. *J Sex Med* 2011; 8:489–496; doi: 10.1111/j.1743-6109.2010.01941.x.

The study reports the superior impact of a multidisciplinary team approach on long-term treatment outcomes for patients with provoked vestibulodynia.

38. Johnson SN, Khalid S, Varadkar S, *et al*. Quality of care in the management of major obstetric haemorrhage. *Ir Med J* 2011; 104:119–121.
39. Lyndon A, Zlatnik MG, Wachter RM. Effective physician-nurse communication: a patient safety essential for labor and delivery. *Am J Obstet Gynecol* 2011; 205:91–96.
40. Knox GE, Simpson KR. Perinatal high reliability. *Am J Obstet Gynecol* 2011; 204:373–377.
41. Kaplan HC, Ballard J. Changing practice to improve patient safety and quality of care in perinatal medicine. *Am J Perinatol* 2012; 29:35–42.
42. Marzano DA, Smith Boblick S, Frankel JM, *et al*. Simulation-based training ■ transfers to applied clinical management of an obstetric emergency. *Simul Healthcare: J Soc Simul Healthcare* 2011; 6:364–369; doi: 10.1097/SIH.0b013e318228630b.

The study provides details associated with a simulation-based training scenario that contributed to the successful perimortem cesarean delivery of a preterm infant with maternal cardiopulmonary arrest by an interdisciplinary team.

43. Simpson KR. Better care. *MCN Am J Matern Child Nurs* 2011; 36:144.
44. Rosenstein AH. Managing disruptive behaviors in the healthcare setting: ■■ focus on obstetrics services. *AM J Obstet Gynecol* 2011; 204:187–192.

Proposed institutional strategies for success in reducing disruptive behaviors that significantly impact staff relationships, communication, quality of task completion, team collaboration, and ultimately patient safety and care outcomes.

45. Raab C, Palmer-Byfield R. The perinatal safety nurse: exemplar of transformational leadership. *MCN Am J Matern Child Nurs* 2011; 36:280–287.

46. Puck AL, Oakeson AM, Morales-Clark A, *et al.* Obstetric life support. *J Perinat Neonatal Nurs* 2012; 26:126–135.
47. Posmontier B, Montgomery K, Glasgow MES, *et al.* Transdisciplinary teamwork simulation in obstetrics-gynecology healthcare education. *J Nurs Educ* 2012; 51:176–179.
48. Provonost PJ, Holzmüller CG, Ennen CS, *et al.* Overview of progress in patient safety. *Am J Obstet Gynecol* 2011; 204:5–10.
The study describes efforts to identify causes or factors that contribute to adverse outcomes, to develop measures of quality and safety, to make patient care improvements, and to provide a framework for organizing patient safety research and improvement in obstetrics and gynecology.
49. Lindquist R, Boucher JL, Grey EZ, *et al.* Eliminating untimely deaths of women from heart disease: highlights from the Minnesota Women's Heart Summit. *Am Heart J* 2012; 163:39–48e1.
The authors report the results of a multidisciplinary summit convened to identify strategies for eliminating premature deaths of women from heart disease, including sex-related cardiovascular issues, reporting protocols, and increased attention to underserved and high-risk women.
50. Johnson HL, Kimsey D. Patient safety: break the silence. *AORN J* 2012; 95:591–601.
51. Chin GSM, Warren N, Korman L, *et al.* Patients' perceptions of safety and quality of maternity clinical handover. *BMC Preg Childbirth* 2011; 11:58.
The study reports the results of a mixed-methods study examining the perceptions of postnatal patients on how maternity handover contributed to the quality and safety of their maternity care.
52. Quality patient care in labor and delivery: a call to action. *J Midwifery Womens Health* 2012; 57:112–113. doi: 10.1111/j.1542-2011.2011.00163.x.
53. Grant R, Green D. The healthcare home model: primary healthcare meeting public health goals. *Am J Public Health* 2012; 102:1096–1103.
The authors summarize the elements of the 'healthcare home' or 'medical home' model proposed for primary care toward increased access to care, reduction of health disparities, and optimal integration of health services and public health systems, as well as discuss the multidisciplinary challenges associated with the model.
54. Berglund S, Norman M. Neonatal resuscitation assessment: documentation and early paging must be improved! *Arch Dis Child Fetal Neonatal Ed* 2012; 97:F204–F208.
55. Berglund S. Every case of asphyxia can be used as a learning example: conclusions from an analysis of substandard obstetrical care. *J Perinat Med* 2012; 40:9–18.
56. Deering S, Johnston LC, Colacchio K. Multidisciplinary teamwork and communication training. *Semin Perinatol* 2011; 35:89–96.
57. Eppich W, Howard V, Vozenilek J, *et al.* Simulation-based team training in healthcare. *Simul Healthcare: J Soc Simul Healthcare* 2011; 6 (Supplement, Monographs from the First Research Consensus Summit of the Society for Simulation in Healthcare):S14–S19.
58. Fisher N, Eisen LA, Bayya JV, *et al.* Improved performance of maternal–fetal medicine staff after maternal cardiac arrest simulation based training. *Am J Obstet Gynecol* 2011; 205:239.e1–239.e5.
The study described the outcomes attributed to simulation-based maternal cardiac arrest training on the knowledge, skills, and confidence of maternal fetal medicine staff to manage a catastrophic obstetric event.
59. Agency for Healthcare Research and Quality. Team-STEPPS: National implementation. <http://teamstepps.ahrq.gov>. [Accessed 30 June 2012].
60. Provonost P, Weast B, Rosenstein B, *et al.* Implementing and validating a comprehensive unit-based safety program. *J Patient Safety* 2005; 1:33–40.
61. Carbo AR, Tess AV, Roy C, *et al.* Developing a high-performance team training framework for internal medicine residents: the ABC's of teamwork. *J Patient Safety* 2011; 7:72–76.
62. Contratti F, Ng G, Deeb J. Interdisciplinary team training: five lessons learned. *AJN* 2012; 112:47–52.
The authors identified five factors they believe are essential for successful implementation of team training programs: senior management support, dynamic leadership, inclusive of staff participation, plan for overcoming resistance, and plan for program sustainability.
63. Lipman SS, Daniels KI, Arafeh J, *et al.* The case for OBLS: a simulation-based obstetric life support program. *Semin Perinatol* 2011; 35:74–79.
The authors propose a multidisciplinary, simulation-based, training course that includes neonatal resuscitation program and obstetric life support program to improve labor and delivery team performance and patient outcomes associated with cardiopulmonary arrest.
64. Lipman S, Daniels K, Cohen SE, *et al.* Labor room setting compared with the operating room for simulated perimortem cesarean delivery: a randomized controlled trial. *Obstet Gynecol* 2011; 118:1090–1094.
The study described the process and associated outcomes of comparing labor room-based and operating room-based perimortem cesarean delivery during simulated maternal arrests occurring outside the operative room.
65. Pettiker CM, Thung SF, Raab CA, *et al.* A comprehensive obstetrics patient safety program improves safety climate and culture. *Am J Obstet Gynecol* 2011; 204:216.e1–216.e6.
The study reported outcomes related to an obstetrics patient safety program on staff safety culture, including teamwork and safety culture, job satisfaction, working conditions, stress recognition, and perceptions of management.
66. Vencken PM, van Hooff MH, van der Weiden RM. Improved performance of maternal-fetal medicine staff after maternal cardiac arrest simulation-based training. doi: 10.1016/j.ajog.2011.11.015.
It describes how interdisciplinary teamwork, supported by a simulation-based training program, contributed to the successful perimortem cesarean delivery of an infant during maternal cardiac arrest.
67. Phipps MG, Lindquist DG, McConaughy E, *et al.* Outcomes from a labor and delivery team training program with simulation component. *Am J Obstet Gynecol* 2012; 206:3–9.
The study documented the favorable implementation and impact of a labor and delivery team training program on patient outcomes and perceptions of patient safety over 18 months.
68. Grunebaum A, Chervenak F, Skupski D. Effect of a comprehensive obstetric patient safety program on compensation payments and sentinel events. *Am J Obstet Gynecol* 2011; 204:97–105.
The authors describe a comprehensive obstetric patient safety program and its significant effect on reducing compensation payments and sentinel adverse events over a 7-year period.
69. Sutton G, Liao J, Jimmieson NL, *et al.* Measuring multidisciplinary team effectiveness in a ward-based healthcare setting: development of the team functioning assessment tool. *J Healthcare Qual* 2011; 33:10–24.
70. Strausmire JM. Interdisciplinary development of an adult intubation procedural checklist. *Fam Med* 2011; 43:272–274.
71. Gillespie BM, Chaboyer W, Fairweather N. Interruptions and miscommunications in surgery: an observational study. *AORN J* 2012; 95:576–590.
72. Morgan PJ, Tregunno D, Pittini R, *et al.* Determination of the psychometric properties of a behavioural marking system for obstetrical team training using high-fidelity simulation. *BMJ Qual Saf* 2012; 21:78–82; doi:10.1136/bmjqs-2011-000296.
The authors present the evaluation process and outcomes related to the psychometric integrity of two assessment instruments designed for measuring obstetric team performance.
73. Minehart R, Pian-Smith M, Walzer TB, *et al.* Speaking across the drapes: communication strategies of anesthesiologists and obstetricians during a simulated maternal crisis. *Simul Healthcare: J Soc Simul Healthcare* 2012; 7:166–170.
74. Siassakos D, Bristow K, Draycott T, *et al.* Clinical efficiency in a simulated emergency and relationship to team behaviours: a multisite cross-sectional study. *BJOG* 2011; 118:596–607.
75. Riley W, David S, Miller K, *et al.* Didactic and simulation nontechnical skills team training improve perinatal patient outcomes in a community hospital. *J Comm J Qual Patient Saf* 2011; 37:356–364.
76. Wagner B, Meirowitz N, Shah J, *et al.* Comprehensive perinatal safety initiatives reduce adverse obstetric events. *J Healthcare Qual* 2011; 34:6–15.
The study reported the significant and favorable impact of a comprehensive perinatal safety initiative on 11 Modified Indicators of the Adverse Outcome Index (MAOI) at a large tertiary medical center.
77. Mudumbai SC, Gaba DM, Boulet JR, *et al.* External validation of simulation-based assessments with other performance measures of third-year anesthesiology residents. *Simul Healthcare: J Soc Simul Healthcare* 2012; 7:73–80; doi: 10.1097/SIH.0b013e31823d018a.
78. Merien AE, van de Ven J, Mol BW, *et al.* Multidisciplinary team training in a simulation setting for acute obstetric emergencies: a systematic review. *Obstet Anesth Digest* 2011; 31:83–84.
A systematic review of the literature on the effectiveness of multidisciplinary simulation-based team training toward improving performance outcomes related to the clinical management of acute obstetric emergencies.
79. Berendzen JA, van Nes JB, Howard BC, *et al.* Fire in labor and delivery: simulation case scenario. *Simul Healthcare: J Soc Simul Healthcare* 2011; 6:55–61; doi: 10.1097/SIH.0b013e318201351b.
80. Burden AR, Carr ZJ, Staman GW, *et al.* Does every code need a 'reader'? Improvement of rare event management with a cognitive aid 'reader' during a simulated emergency: a pilot study. *Simul Healthcare: J Soc Simul Healthcare* 2012; 7:1–9; doi: 10.1097/SIH.0b013e31822c0f20.
The authors report the outcomes of a study designed to evaluate the use of a cognitive aid consisting of a resuscitation protocol printed on a card and read as needed during the management of a simulated crisis event.
81. Pratt SD. Recent trends in simulation for obstetric anesthesia. *Curr Opin Anesthesiol* 2012; 25:271–276.
82. Van de ven J. Effectiveness of multidisciplinary team training in obstetric emergencies: a randomized controlled trial. *Am J Obstet Gynecol* 2012; 206 (2 Suppl):S68.
83. Stevens LM, Cooper JB, Raemer DB, *et al.* Educational program in crisis management for cardiac surgery teams including high realism simulation. *J Thorac Cardiovasc Surg* 2012; 144:17–24.
84. Andreatta P, Perosky J, Johnson TRB. Two-provider technique for bimanual uterine compression to control postpartum hemorrhage. *J Midwifery Womens Health* 2012; 57:371–375.
The study demonstrated how superior use of team-based methods for performing an obstetric emergency procedure (bimanual uterine compression) in a simulated context could inform clinical practice standards.

- 85.** Andreatta PB, Saxton E, Thompson M, *et al.* Simulation-based mock codes improve pediatric patient survival rates. *Pediatr Crit Care Med* 2011; 12:33–38.
- 86.** Broaddus BM, Chandrasekhar S. Informed consent in obstetric anesthesia. ■ *Int Anesth Res Soc* 2011; 112:912–915.
The authors discuss the interdisciplinary aspects associated with obtaining informed consent from obstetric patients, including the challenges associated with maternal capacity during active labor, maternal–fetal conflict, and the care of pregnant minors.
- 87.** Wu JM, Viswanathan M, Ivy JS. Conceptual framework for future research on ■ mode of delivery. *Matern Child Health J* 2012. doi: 10.1007/s10995-011-0910-x.
An interdisciplinary team used the Delphi process to create a conceptual framework illustrating the causal pathway for mode of delivery and the complex interactions between maternal, fetal, family, provider, cultural and social factors that merit additional research.
- 88.** Andreatta P, Frankel JM, Bullough AS, *et al.* Interdisciplinary team training ■ identifies discrepancies in institutional policies and practices. *Am J Obstet Gynecol* 2011. doi:10.1016/j.ajog.2011.02.022.
The authors describe how routine interdisciplinary team training in the management of obstetric emergencies revealed numerous institutional policies, protocols, and practices that were inconsistent and variable among the constituent groups comprising the interdisciplinary teams.
- 89.** Bingham D, Lyndon A, Lagrew D, *et al.* A state-wide obstetric hemorrhage ■ quality improvement initiative. *MCN Am J Matern Child Nurs* 2011; 36:297–304.
A comprehensive description of the California Maternal Quality Care Collaborative program for reducing maternal hemorrhage, including processes, methods, protocols, guidelines, implications, and preliminary outcomes.
- 90.** Baker D, Gustafson S, Beaubien J, *et al.* Medical teamwork and patient safety: the evidence-based relation. Washington, DC: American Institutes for Research; 2003.
- 91.** Morey J, Simon R, Jay G, *et al.* Error reduction and performance improvement in the emergency department through teamwork training: evaluation results of the MedTeams project. *Health Serv Res* 2002; 37:1553–1581.
- 92.** Dunnington G, Williams R. Addressing the new competencies for residents' surgical training. *Acad Med* 2003; 78:14.
- 93.** Howard S, Gaba D, Fish K, *et al.* Anesthesia crisis resource management training: teaching anesthesiologists to handle critical incidents. *Aviat Space Environ Med* 1992; 63:763–770.
- 94.** Shortell S, Zimmerman J, Rousseau D, *et al.* The performance of intensive care units: does good management make a difference? *Med Care* 1994; 32:508–525.
- 95.** Andreatta PB. A typology for healthcare teams. *Healthcare Manage Rev* 2010; 35:345–354.