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Handling obstetric emergencies: Paramedic, health informatics, and nursing interventions in prehospital care

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***Abstract*---Background:** Maternal mortality rates in the UK have shown only a statistically insignificant decline, highlighting the need for urgent action. Obstetric emergencies remain a critical concern, contributing significantly to maternal mortality. The MBRRACE report underscores the challenges associated with direct and indirect causes of maternal death, particularly emphasizing conditions such as sepsis and hemorrhage. **Aim:** This article aims to explore paramedic and nursing interventions in managing obstetric emergencies during prehospital care, emphasizing the critical nature of timely and effective treatment. **Methods:** A comprehensive review of the existing literature was conducted, focusing on the management of obstetric emergencies, particularly sepsis and hemorrhage. Clinical guidelines were analyzed, highlighting key interventions and outcomes related to maternal care. **Results:** The findings reveal that obstetric emergencies, including sepsis and significant hemorrhage, require immediate and coordinated care from paramedics and nursing staff. Key interventions include early recognition, implementation of the sepsis-3-hour bundle, and effective communication within multidisciplinary teams. **Conclusion:** Enhancing the knowledge and preparedness of paramedic and nursing teams in managing obstetric emergencies is crucial in reducing maternal morbidity and mortality. Further research and continuous training are necessary to ensure that healthcare providers can respond effectively to these critical situations.

***Keywords*---**Maternal mortality, obstetric emergencies, sepsis, hemorrhage, prehospital care, paramedic interventions.

Introduction

The MBRRACE report disseminated in November 2021, which analyzed data from the years 2017 to 2019, revealed a statistically insignificant decline in the overall maternal mortality rate in the UK. This finding indicates that persistent emphasis on the implementation of the recommendations outlined in these reports is essential to achieve a reduction in maternal fatalities. The mortality associated with direct causes has also exhibited a non-significant decrease in the 2017–2019 report compared to its predecessor. Cardiac disorders persist as the predominant singular cause of indirect maternal fatalities, while neurological conditions (such as epilepsy and stroke) rank as the second most prevalent cause of maternal

demise. Thrombosis and thromboembolism continue to be the foremost contributors to direct maternal mortality during or within six weeks following the conclusion of pregnancy. Deaths resulting from obstetric hemorrhage and pregnancy-related sepsis occur with similar frequency, representing the next most common causes of maternal death, succeeded by suicide. Maternal suicide retains its status as the primary cause of direct fatalities occurring within one year post-pregnancy. Fatalities directly attributable to anaesthesia remain exceedingly rare, with only a single death documented during the reporting period. In total, 211 women perished between 2017 and 2019 during or within 42 days after the conclusion of pregnancy in the UK, resulting in a maternal mortality rate of 8.79 per 100,000 maternities, in contrast to 9.71 per 100,000 maternities (95% CI 8.46–11.09) recorded in the period from 2016 to 2018. This article delineates certain etiologies of prevalent obstetric emergencies and underscores critical treatment considerations in their management to enhance outcomes. Significant haemorrhage, pre-eclampsia, and eclampsia are elaborated upon in other articles within this series, as are emergencies specifically associated with anaesthetic practice.

Obstetric emergencies which may present challenges to the anaesthetist:

- Haemorrhage: antepartum and post-partum
- Fetal distress of any cause
- Sepsis
- Emergency caesarean section – for any cause
- Pre-eclampsia and eclampsia
- Uterine rupture
- Thromboembolism
- Uterine inversion
- Amniotic fluid embolism
- Shoulder dystocia
- Maternal cardiorespiratory arrest
- Cord prolapse
- Anaphylaxis
- Emergency cervical cerclage

Maternal Sepsis:

Sepsis represents a critical factor contributing to maternal mortality in the UK, with an estimated 8% risk of death across high-income nations. The morbidity experienced by survivors is also considerable, exhibiting an estimated morbidity/mortality ratio of 50:1 [2]. The World Health Organization (WHO) reports that the incidence of puerperal sepsis among live births is 4.4% [2]. In accordance with Sepsis-3, which was published in 2016, new terminologies were introduced for sepsis and septic shock, while previously utilized terms such as severe sepsis and systemic inflammatory response syndrome (SIRS) were eliminated. The current definitions are articulated as follows: Sepsis is characterized as a life-threatening organ dysfunction resulting from a dysregulated host response to infection. Septic shock is defined as sepsis accompanied by the necessity for vasopressors to sustain a mean arterial pressure (MAP) ≥65 mmHg in the absence of hypovolaemia, along with a serum

lactate level >2 mmol/litre. In 2017, the World Health Organization adopted a definition for maternal sepsis, delineating it as a life-threatening condition characterized by organ dysfunction resulting from an infection occurring during pregnancy, childbirth, post-abortion, or in the postpartum period.

Since its publication, bedside tools such as the quick sequential (sepsis-related) organ failure assessment (qSOFA) and the sequential organ failure assessment (SOFA) have been employed to support the prognosis and diagnosis of sepsis. Nonetheless, these tools remain unvalidated in pregnant or puerperal populations, and their direct application is complicated by the physiological distinctions observed in healthy pregnancies [2]. An obstetrically modified SOFA and qSOFA scoring system has been proposed by the Society of Obstetric Medicine of Australia and New Zealand. In the obstetrically modified SOFA score, the scoring criteria include several parameters: for the central nervous system (CNS), a score of 0 indicates alertness, a score of 1 indicates rousable to voice, and a score of 2 indicates rousable to pain. For the cardiovascular system (CVS), a mean arterial pressure greater than 70 mmHg scores 0, less than 70 mmHg scores 1, and the need for vasopressors scores 2. Regarding respiration, a PaO2/FiO2 ratio greater than 400 scores 0, between 300 and 400 scores 1, and less than 300 scores 2. For renal function, a creatinine level less than 90 mmol/litre scores 0, between 91 and 120 scores 1, and greater than 120 scores 2. In terms of liver function, a bilirubin level less than 20 mmol/litre scores 0, between 20 and 32 scores 1, and greater than 32 scores 2. Lastly, for coagulation, a platelet count greater than 150 scores 0, between 100 and 150 scores 1, and less than 100 scores 2.

In the obstetrically modified qSOFA score, the criteria for scoring are as follows: for the CNS, an alert patient scores 0, while a non-alert patient scores 1. In the CVS assessment, a systolic blood pressure greater than 90 mmHg scores 0, while less than 90 mmHg scores 1. The respiration rate also contributes to the score, with fewer than 25 breaths per minute scoring 0 and more than 25 breaths per minute scoring 1. The etiologies of sepsis within an obstetric population can be categorized into obstetric sources (which can be further divided into genital tract and non-genital sources) and non-obstetric sources (e.g., community-acquired pneumonia, cellulitis, etc.). The most significant risk factor for developing sepsis is surgical intervention or trauma affecting the uterus or genital tract, while patient-related factors such as obesity, anaemia, impaired glucose tolerance, and sickle-cell disease or trait may further elevate the risk. Infection of the genital tract by Group A streptococcus has been identified as the most strongly associated risk factor for progression to severe sepsis and septic shock, commonly occurring during early pregnancy and the peripartum period [2]. In the second trimester, the most frequently implicated organism linked to genital tract infection was Escherichia coli [3].

Diagnosing Obstetric Sepsis:

The physiological alterations that occur during pregnancy and labor can obscure or complicate the recognition of sepsis criteria, as signs of critical illness may often be misattributed to the normal processes of pregnancy, labor, and pain. It is common for temperature to rise during labor, with an increase in heart rate by

approximately 25%. Additionally, the respiratory rate can elevate to about 15 breaths per minute during pregnancy and further increase to between 22 and 70 breaths per minute during labor. There is also a leukocytosis that can reach up to 15 × 10^9 cells/liter during labor and immediately following delivery. These values are expected to normalize post-delivery; therefore, persistence or a resurgence of abnormal parameters after childbirth should raise concern [5]. The Modified Early Obstetric Warning Score System (MEOWS) serves as a useful tool for identifying ill patients but is known to be notoriously nonspecific, exhibiting a sensitivity of 89% and a specificity of 79% [2]. Research efforts have increasingly focused on biomarkers, particularly procalcitonin, as a means to diagnose sepsis and monitor the response to treatment. Procalcitonin, a pro-peptide of calcitonin, is typically undetectable in healthy individuals, so elevated levels would suggest a bacterial infection, warranting further investigation and prompt treatment. The systemic effects of sepsis in pregnant women, independent of the physiological changes associated with pregnancy, can be summarized as follows:

In terms of the cardiovascular system (CVS), there is myocardial depression leading to cumulative hemodynamic collapse. The respiratory effects include increased pulmonary microvascular pressure and permeability, as well as acute lung injury, which cumulatively heighten susceptibility to pulmonary edema, rapid decreases in oxygenation, acute respiratory distress syndrome (ARDS), and reduced ability to compensate for metabolic acidosis. Renal implications consist of ischemia and vasoconstrictive and cytokine-mediated renal injury, resulting in acute kidney injury. Additionally, coagulation issues emerge from increased microvascular thrombus formation, microcirculation dysregulation, tissue hypoperfusion, and end-organ dysfunction [2].

Management:

Recommendations indicate that all consultant-led delivery suites should incorporate a level 2 high-dependency care area managed by a multidisciplinary team [2]. Management should adhere to the sepsis-3 hour-1 bundle and the sepsis 6 rule [2][4]. The sepsis-3 hour-1 bundle can be summarized as follows: first, baseline lactate levels should be measured and re-evaluated if elevated; second, intravenous (IV) fluid resuscitation should be initiated; third, organ perfusion must be maintained using vasopressors if fluid resuscitation does not achieve adequate results; fourth, blood cultures should be obtained; and finally, empirical IV antibiotics should be started. Each step of the management approach offers insights into addressing sepsis during pregnancy and the postpartum period. For lactate level measurement, if the initial lactate exceeds 2 mmol/liter, it should be remeasured within 2 to 4 hours to guide resuscitation efforts. The objective is to normalize lactate levels, indicating improved tissue hypoperfusion [2][4]. Initial IV fluid resuscitation is suggested at a rate of 30 ml/kg, but the Royal College of Obstetricians and Gynaecologists (RCOG) has modified this to 20 ml/kg due to the increased risk of pulmonary edema in pregnant patients caused by diminished colloid oncotic pressure [2][4]. Crystalloids are the preferred IV fluids, although human albumin may be utilized as a colloid when indicated by a blood lactate level greater than 4 mmol/liter and/or the necessity to achieve a mean arterial pressure (MAP) exceeding 65 mmHg.

Vasopressors should be initiated within the first hour to attain a MAP of ≥65 mmHg if fluid resuscitation is insufficient. In cases of refractory shock, hydrocortisone at a dosage of 200 mg/day may be considered for management of hypotension despite initial fluid resuscitation and vasopressor administration [2][4]. Blood cultures must be obtained before the initiation of antibiotics, with at least two sets required (aerobic and anaerobic) [2][4]. However, the administration of appropriate antibiotic therapy should not be delayed while waiting for blood culture results. Preliminary results from blood cultures may be available after just 24 hours, but full identification of bacteria and their antibiotic sensitivities typically requires 48 hours, at which point antibiotics can be reassessed. Additionally, swabs or samples from all potential source sites, including breast milk, urine, and nasopharyngeal aspirate or throat swabs (for patients exhibiting respiratory symptoms), should be collected. The administration of broad-spectrum antibiotics should commence without delay, implementing immediate, empirical, and comprehensive antibiotic therapy, ideally via intravenous delivery of one or more agents. This protocol must align with local guidelines on antibiotic use and draw on the expertise of microbiologists [2, 3, 4]. It is crucial to note that each hour of postponement in the initiation of antibiotic therapy is associated with an estimated 8% increase in mortality risk [6].

For instance, co-amoxiclav does not provide coverage for meticillin-resistant Staphylococcus aureus (MRSA) or Pseudomonas, and there are concerns about the potential heightened risk of necrotizing enterocolitis in neonates exposed to this antibiotic in utero. Metronidazole is limited to anaerobic coverage, while clindamycin effectively targets a broad range of streptococci and staphylococci, including many strains of MRSA, and it inhibits exotoxin production, which has been associated with a significant reduction in mortality rates; importantly, it is neither renally excreted nor nephrotoxic. Piperacillin-tazobactam (Tazocin) and carbapenems cover all pathogens except MRSA and are renal-sparing, unlike aminoglycosides. Gentamicin can be administered as a single dose of 3–5 mg/kg without concern for normal renal function, but careful monitoring of serum levels is necessary for regular dosing.

Additionally, several factors are vital to the comprehensive management of sepsis during the puerperium. The use of prophylactic measures, including compression stockings, intermittent lower limb compression, and either low-molecular-weight or unfractionated heparin, is advisable [2, 4]. In cases of severe invasive streptococcal or staphylococcal infections that do not respond to other treatments, the use of intravenous immunoglobulin is recommended due to its immunomodulatory properties [2, 4]. The choice between delivering the fetus and maintaining the pregnancy is influenced by various considerations, including the patient's health status, gestational age, fetal condition, presence of chorioamnionitis, and the onset of labor [2, 4]. This decision is best made collaboratively with a multidisciplinary team.

In terms of anesthesia, general anesthesia (GA) is generally preferred over regional anesthesia for cesarean sections in septic hypotensive patients, as these individuals may struggle with the sympathetic block and vasodilation resulting from spinal anesthesia. Furthermore, the risk of coagulopathy or thrombocytopenia can lead to complications such as epidural hematoma,

abscess, or meningitis [2, 4]. During the management of critically ill patients, it is important to aim for oxygen saturations of 94% or higher, with a target mixed venous oxygen saturation (SvO2) of 65% or a central venous oxygen saturation (ScvO2) of 70% [2, 4]. In a healthy pregnancy's final trimester, the SvO2 typically hovers around 80%, although there is currently insufficient evidence to establish the optimal SvO2 in critically ill pregnant patients [2, 4]. Appropriate imaging, such as chest X-rays or pelvic/abdominal ultrasound or CT scans, is also critical in diagnosing the suspected source of complications.

Regarding maternal collapse and resuscitation, cardiac arrest during pregnancy occurs in approximately 1 in every 34,000 women [7]. The increasing frequency of such events is believed to correlate with rising maternal age and morbidity rates. Given the rarity of cardiac arrests in this demographic, maternity personnel may be less familiar with cardiopulmonary resuscitation (CPR) protocols, underscoring the need for routine simulation training and drills. Maternal CPR presents distinct challenges and diverges from standard adult resuscitation guidelines. The Resuscitation Council UK categorizes the causes of maternal collapse into the "4 H's" and "4 T's" for easier recall, with additional factors such as eclampsia and intracranial hemorrhage specifically noted for pregnant individuals. The most frequent causes of maternal collapse encompass hemorrhage, thromboembolism, amniotic fluid embolism, cardiovascular diseases, sepsis, drug toxicity and overdose, eclampsia, intracranial hemorrhage, and anaphylaxis [8].

Management:

Maternal collapse resuscitation should adhere to the Resuscitation Council UK guidelines by utilizing the standard ABCDE protocol, albeit with specific adjustments to accommodate maternal physiology, particularly in alleviating aortocaval compression [8] published by The Resuscitation Council UK (www.resus.org.uk). It is crucial to recognize that challenges and variations exist compared to a standard adult population. Primarily, maternal patients face an elevated risk of both aspiration and difficult intubation. Consequently, securing an airway can be more problematic for anaesthetists, and having access to difficult airway adjuncts and techniques is advantageous. This issue is exacerbated by an increase in oxygen consumption during the later stages of pregnancy, which can rise by up to 25%, significantly shortening the time from apnoea to desaturation. The gravid uterus causes aortocaval compression as it transitions from the pelvis into the abdominal cavity as early as the 20th week of gestation; this phenomenon is amplified in cases of multiple pregnancies and polyhydramnios. Approximately 50% of the cardiac output (CO) returns via the inferior vena cava, thus aortocaval compression can markedly diminish CO and reduce the likelihood of achieving return of spontaneous circulation (ROSC). The presence of any concurrent regional sympathetic block may further complicate this situation. Manual lateral displacement of the uterus is preferred, as effective chest compressions are hindered when a wedged lateral tilt is employed, unless the patient is already positioned on a tilting table, considering that even a tilt of 30° can still result in significant aortic compression [9].

Similarities and differences between standard adult resuscitation and resuscitation in a pregnant patient

- Identical to ALS guidelines Relevant differences
- Rate/rhythm/depth of compressions Airway difficulties
- Drugs used and doses Shorter apnoea to desaturation time
- Energies for defibrillation Aortocaval compression
- Time cycles Different causes (Mg2+ overdose, LA toxicity)
- 30:2 ratios Peri-mortem caesarean section
- ALS, advanced life support; LA, local anaesthetic.

The practice of peri-mortem caesarean section (PMCS) has been long established in maternal cardiopulmonary resuscitation (CPR), significantly enhancing maternal resuscitation and potentially improving fetal survival. Recommendations suggest initiating a PMCS in women over 20 weeks' gestation who remain in cardiac arrest without ROSC after 4 minutes, aiming to deliver the fetus and placenta within 1 minute [2]. However, it is also important to note that there is no requirement to delay the procedure, as women can die with intact uterine contents. Resuscitation trolleys should be equipped with a scalpel blade and cord clamps to facilitate PMCS without necessitating a transfer to the operating room. The primary goal of PMCS is to enhance maternal survival, and it is not advisable to postpone the decision to perform PMCS in order to verify fetal viability [2]. Performing PMCS necessitates that a surgeon or emergency medicine physician is readily available to execute this procedure promptly [9].

In some instances, cardiac arrest may result from iatrogenic causes, thus requiring specific interventions and antidotes. For instance, treating pre-eclampsia with magnesium sulfate can lead to magnesium overload and toxicity. In such cases, magnesium administration should be halted, and intravenous administration of 1 gram of calcium (either 10 milliliters of 10% calcium chloride or 30 milliliters of 10% calcium gluconate) should be implemented [9]. Local anaesthetic (LA) toxicity is another recognized cause of unresponsive cardiac arrest, which may occur due to inadvertent administration via the incorrect route or systemic absorption. In addition to stopping any LA infusion, treatment should involve early administration of 20% intralipid, administered as a 1.5 ml/kg bolus over 1 minute (with the possibility of up to two additional boluses after 5 minutes) and a continuous infusion of 15 ml/kg/hr (increased to 30 ml/kg/hr if no improvement or if the condition deteriorates), with a maximum cumulative dosage of 12 ml/kg (Association of Anaesthetists of Great Britain and Ireland guidelines) [10]. CPR itself may need to be sustained for an extended period, and where available, cardiopulmonary bypass may be required.

Amniotic fluid embolus (AFE):

Amniotic fluid embolus (AFE) is a rare but severe complication associated with pregnancy that entails significant morbidity and mortality. It ranks as the sixth most common cause of direct maternal death, with an incidence rate exceeding 0.3 per 100,000 maternities, as documented in the 2017–19 report [1]. Between 2005 and 2014, the UK Obstetric Surveillance System (UKOSS) recorded 120 confirmed cases of AFE, leading to an incidence rate of 1.7 per 100,000

maternities and a case fatality rate of 19%. The occurrence of AFE was notably associated with the induction of labor and multiple pregnancies, with an increased risk also observed among older ethnic minority women. Caesarean delivery has also been linked to postnatal amniotic fluid embolism. AFE can manifest at any point during pregnancy, although 70% of cases arise during labor [11]. Various risk factors have been identified, the most prevalent of which include advanced maternal age, multiparity, induction of labor, and rapid or hyper-stimulation of the uterus [11].

Two primary theories have been proposed to elucidate the mechanism behind AFE: mechanical (anaphylactoid) and immune-mediated processes. Each theory alone does not adequately clarify the pathogenesis; however, when considered together, they provide a more comprehensive understanding [11]. AFE can be characterized by a biphasic response, consisting of two phases. Phase 1: This phase lasts approximately 30 minutes and is believed to occur following the initial introduction of amniotic fluid into the circulatory system. It is marked by an increase in pulmonary artery pressure and right ventricular failure, subsequently leading to microvascular injury and hypotension [11]. Phase 2: For patients who survive Phase 1, this phase is characterized by left ventricular failure, endothelial activation and leakage, uterine atony, and disseminated intravascular coagulation [11]. The quantity of fetal debris necessary to trigger this sequence of events and syndrome can vary and may involve only minute amounts.

Diagnosis:

The diagnosis of amniotic fluid embolism (AFE) primarily relies on clinical evaluation and is considered a diagnosis of exclusion. A wide range of potential obstetric and non-obstetric differential diagnoses must be contemplated prior to confirming AFE. The UK Obstetric Surveillance System (UKOSS) has established specific diagnostic criteria for national registry purposes. Although various laboratory tests were considered, none were found to be sufficiently specific for this condition.

Clinical Presentation:

When AFE presents before labor, the most frequent signs and symptoms are hypotension and acute fetal distress, with an incidence approaching 100%. Other symptoms can include pulmonary edema and acute respiratory distress syndrome (93%), cardiopulmonary arrest (87%), cyanosis (83%), coagulopathy (83%), shortness of breath (49%), seizures (48%), uterine atony (23%), and bronchospasm (15%). In critical care scenarios, patients may exhibit multi-organ dysfunction.

Management:

The management of AFE is entirely supportive and tailored to the clinical presentation. It involves collaboration among senior clinicians, including obstetricians, anaesthetists, haematologists, intensivists, senior midwives, and neonatologists. An urgent decision regarding fetal delivery may be necessary, alongside prompt critical care support. Utilizing a systematic approach (ABCDE)

based on Adult Advanced Life Support guidelines is fundamental in managing AFE.

Emergency Caesarean Section (C/S):

Since the initiation of the maternal confidential inquiry in 1952, there has been a notable increase in both elective and emergency C/S procedures in the UK. Many emergency C/S can be anticipated, allowing adequate time for planning and ensuring expert help is available. Effective ongoing communication within the multidisciplinary team is crucial to keep the anaesthetist informed of emerging issues in the delivery unit, facilitating timely action plans. Nonetheless, some cases remain unpredictable and necessitate the resident team's skills and timely interventions to achieve favorable outcomes for both mother and infant. There exists a wide array of reasons for requesting an emergency C/S. Regardless of the justification, the urgency must be categorized according to the Royal College of Obstetricians and Gynaecologists (RCOG) good practice guidelines established in 2010. These guidelines emphasize a spectrum of urgency, acknowledging that situations may rapidly evolve, necessitating a reassessment of urgency once the patient is in the operating room. For example, measures taken to improve cardiotocography (CTG) status may alleviate bradycardia, affecting anesthesia choices and enhancing safety and maternal satisfaction during a stressful situation.

Table 1. Classification of Urgency in Relation to Maternal or Fetal Compromise

Definition	Category
Immediate threat to life of woman or fetus	1
No immediate threat to life; requires early delivery	2
No maternal or fetal compromise	3
Timing at the convenience of the woman and maternity services	4

The administration of general anaesthesia (GA) for emergency C/S has faced challenges since the onset of the COVID-19 pandemic due to personal protective equipment (PPE) protocols and the risk of COVID-19 transmission or exacerbation of symptoms in infected mothers. According to the latest RCOG guidelines for managing COVID-19 in pregnancy, published in January 2022, pregnant patients with COVID-19 should be offered early epidural analgesia during labor to minimize risks associated with GA and spinal anesthesia during emergency C/S, with GA reserved for specific indications. When a category 1 C/S is deemed necessary, the patient should be transferred to the operating room as quickly as possible. In cases of apparent fetal distress, intrauterine resuscitation should be initiated while preparations for C/S are underway, which may reduce the urgency of the procedure.

The patient should be positioned on her left side to alleviate any aortocaval compression, and 100% oxygen should be provided via a tightly fitting face mask or high-flow nasal cannula if available. If intravenous syntocinon is being administered, it should be stopped to prevent accidental bolus during transfer or in the operating room. Intravenous fluid resuscitation should commence with

500–1000 ml of crystalloid (if not contraindicated, such as in pre-eclamptic patients). If the blood pressure is low, appropriate vasopressor boluses (50–100 micrograms of phenylephrine) should be used to restore blood pressure to within 10% of the patient's baseline. In cases of uterine hyperstimulation, tocolysis may be beneficial, achieved through either two sprays of sublingual glyceryl trinitrate or 250 micrograms of terbutaline subcutaneously.

Upon reaching the operating room, the mother and fetus should be reassessed to confirm their status, allowing for a well-informed decision regarding the mode of anesthesia. If fetal distress or bradycardia persists, GA may be warranted, but this must be weighed against the increased risks associated with GA. In cases where significant airway concerns exist, such as in morbidly obese patients, senior assistance may be necessary for administering GA. The Difficult Airway Society and Obstetric Anaesthetists' Association have developed algorithms that include risk assessment tables to guide anaesthetists in managing potential airway difficulties. To minimize errors, a pre-intubation checklist can be employed to ensure no critical steps are overlooked during the high-pressure nature of GA sections. In pre-eclamptic patients with uncontrolled hypertension, GA should not be initiated without adequate blood pressure management and modulation of the pressor response to intubation. If the CTG normalizes, there may be sufficient time for spinal anesthesia. Rapid sequence spinal anesthesia has been described as effective but necessitates strict adherence to time limits to prevent multiple attempts that may jeopardize maternal or fetal well-being. Maternal pre-oxygenation should be maintained during this period. An epidural top-up may also be feasible, administering 15–20 milliliters of 0.75% ropivacaine for rapid and effective blockage. However, the functionality of the epidural during labor must be confirmed, ensuring no recent low-dose top-up has been given that could hinder further administration in the operating room, and adequate time must be available for the block to take effect. If time is critical, it may be preferable to forgo the epidural in favor of spinal anesthesia or, in cases of extreme urgency, GA.

Multidisciplinary Obstetric Emergency Simulation:

Despite the skill and expertise in handling most obstetric emergencies, a minority result in tragic outcomes, including maternal or fetal loss. Evidence suggests that certain obstetric emergencies may suffer from mismanagement. Reports by the Institute of Medicine indicate that team training and the implementation of "team behaviors" could significantly reduce medical errors and enhance patient safety, particularly in obstetrics, which is conducive to multidisciplinary team training. The adoption of simulators in medicine is rapidly expanding, with anesthesia leading in both the usage and research of simulators. Numerous studies have evaluated simulator training in obstetrics, although they vary in design and training methods (ranging from low to high fidelity) and outcome measurements. A consistent finding across studies is that team training improves the recognition of intrapartum complications, leading to timely interventions that enhance maternal and neonatal outcomes. This training may particularly improve the response time from the decision for delivery to the actual birth .

Many local and national courses, such as PROMPT (www.promptmaternity.org) and MOET (www.alsg.org/uk/MOET), facilitate team training in a secure

environment, allowing practice of communication and clinical skills relevant to various emergencies. While conducting regular skills drills in-house can be challenging due to the busy nature of labor wards, it remains more accessible, providing frequent exposure and updates. Moreover, such training is essential for local clinical negligence management. Currently, there is no evidence to suggest additional benefits from training conducted in a simulation center.

Conclusion

The management of obstetric emergencies is a significant challenge within the healthcare system, particularly regarding the urgent care provided by paramedics and nurses in prehospital settings. As evidenced by the MBRRACE report, the UK continues to face persistent maternal mortality rates, underscoring the need for improved interventions and strategies to manage these critical situations effectively. Obstetric emergencies, such as sepsis and severe hemorrhage, require a multifaceted approach to care. The complexity of these emergencies is compounded by the physiological changes that occur during pregnancy, which can obscure the signs and symptoms of critical illness. As such, early identification and treatment are paramount. The implementation of standardized protocols, such as the sepsis-3-hour bundle, facilitates prompt intervention, thereby significantly improving outcomes for mothers facing life-threatening conditions. Furthermore, the integration of paramedic and nursing teams into a collaborative care model enhances the delivery of care during obstetric emergencies. Continuous training and education for these healthcare providers are essential to ensure they are equipped with the necessary skills and knowledge to respond effectively. By emphasizing teamwork and communication, healthcare systems can create a more robust support network for managing obstetric emergencies, ultimately improving maternal health outcomes. Additionally, future research should focus on the development and validation of diagnostic tools tailored for obstetric populations, such as modified scoring systems for sepsis. These innovations could lead to more accurate assessments of maternal health and facilitate timely interventions. Overall, a commitment to enhancing the training and resources available to paramedics and nurses is vital to reducing maternal mortality and morbidity associated with obstetric emergencies. By prioritizing these areas, we can move closer to achieving optimal maternal health outcomes and ensuring that all mothers receive the high-quality care they deserve during critical moments.

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التعامل مع الطوارئ التوليدية: تدخلات خدمات الطوارئ، والمعلومات الصحية، والتمريض في الرعاية ما قبل المستشفى

الملخص:

الخلفية :أظهرت معدلات وفيات الأمهات في المملكة المتحدة انخفاضًا غير ذي دلالة إحصائية، مما يبرز الحاجة إلى اتخاذ إجراءات عاجلة. تظل الطوارئ التوليدية قضية حرجة، تساهم بشكل كبير في وفيات الأمهات. تؤكد تقرير MBRRACE على التحديات المرتبطة بالأسباب المباشرة وغير المباشرة لوفيات الأمهات، مع التركيز بشكل خاص على حالات مثل الإنتان والنزيف.

الهدف :يهدف هذا المقال إلى استكشاف تدخلات خدمات الطوارئ والتمريض في إدارة الطوارئ التوليدية خلال الرعاية ما قبل المستشفى، مع التأكيد على الطبيعة الحرجة للعلاج الفوري والفعال.

الأساليب :تم إجراء مراجعة شاملة للأدبيات الموجودة، مع التركيز على إدارة الطوارئ التوليدية، وخاصة الإنتان والنزيف. تم تحليل الإرشادات السريرية، مع تسليط الضوء على التدخلات الرئيسية والنتائج المتعلقة بالرعاية الأمومية.

النتائج :تكشف النتائج أن الطوارئ التوليدية، بما في ذلك الإنتان والنزيف الحاد، تتطلب رعاية فورية ومنسقة من خدمات الطوارئ والتمريض. تشمل التدخلات الرئيسية التعرف المبكر، وتنفيذ حزمة الثلاث ساعات للإنتان، والتواصل الفعال ضمن الفرق متعددة التخصصات.

الخاتمة :إن تعزيز المعرفة واستعداد فرق خدمات الطوارئ والتمريض في إدارة الطوارئ التوليدية أمر بالغ الأهمية في تقليل الممراضة والوفيات بين الأمهات. هناك حاجة لمزيد من الأبحاث والتدريب المستمر لضمان قدرة مقدمي الرعاية الصحية على الاستجابة بشكل فعال لهذه الحالات الحرجة.

الكلمات المفتاحية :وفيات الأمهات، الطوارئ التوليدية، الإنتان، النزيف، الرعاية ما قبل المستشفى، تدخلات خدمات الطوارئ.