

# Quality & Safety

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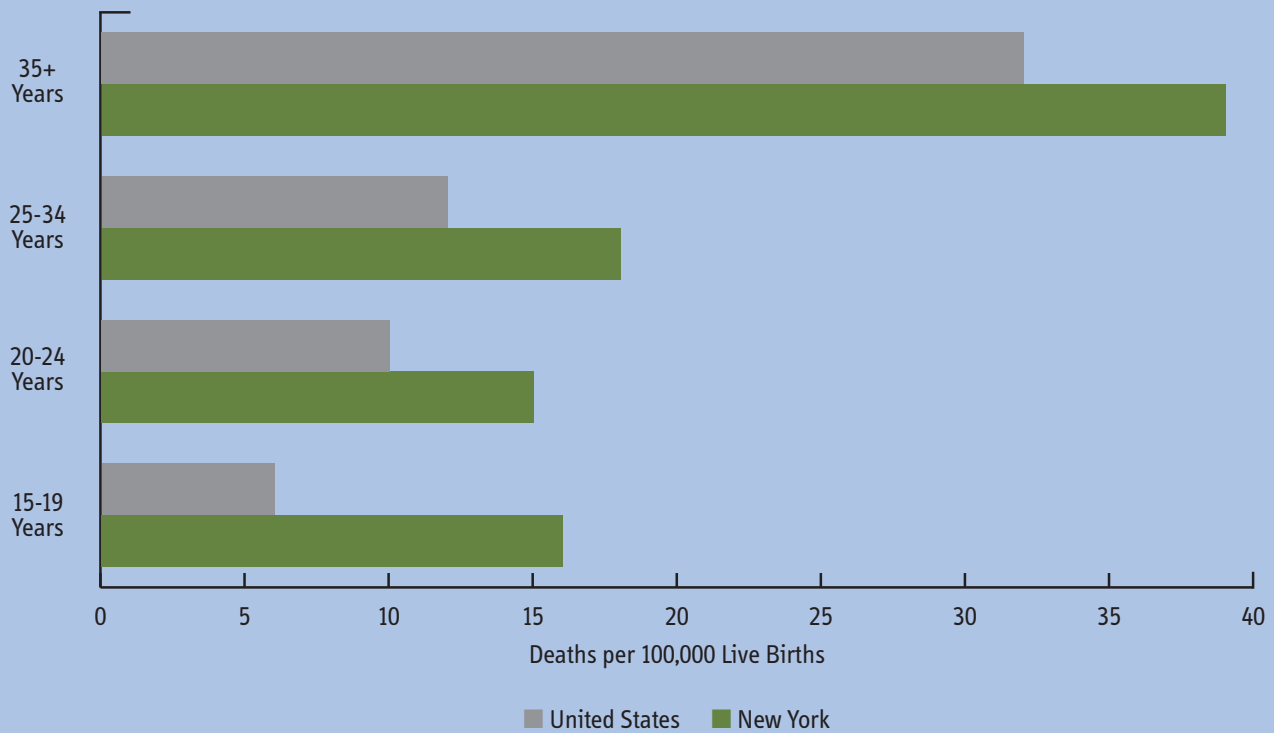


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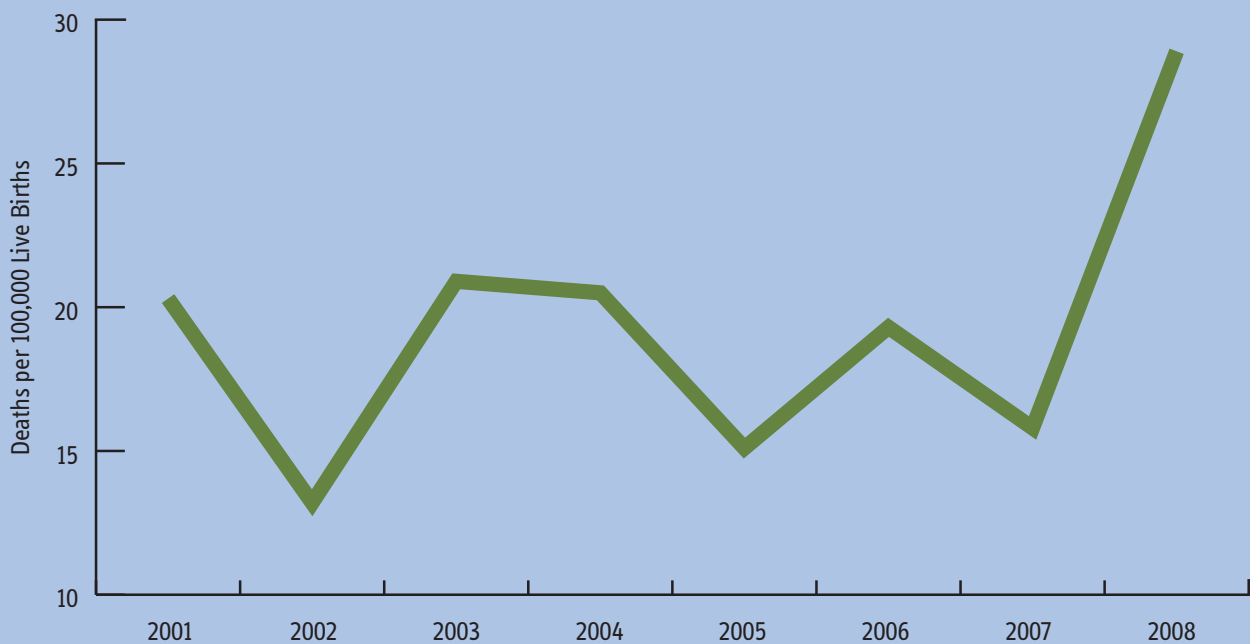
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## Maternal Mortality Dashboard

Maternal Mortality by Age of Mother,  
New York State, 2003-2006



Maternal Mortality by Year,  
New York State, 2001-2008



## The Tragedy of Moms Who Don't Go Home

*Maternal mortality and permanent severe morbidity in New York State, with a focus on mothers with pre-existing medical conditions*

### INTRODUCTION

Those happy words “mother and baby are doing fine” are by far the most common outcome for women admitted to the hospital in labor, with close to 99% of the quarter of million live births in New York resulting in a discharge of mother and baby to home. But every instance of a mother who dies or suffers severe permanent harm is a profound family tragedy. According to hospital discharge data, from 2006 to 2008, 128 women admitted for pregnancy died while in the hospital, 16 were discharged to hospice, and 178 were discharged to a skilled nursing facility. Further, these numbers don't reflect women who have remained in acute care or were discharged to home care but had significant functional deficits that may have left them unable to care for themselves and their children.

In January 2010, The Joint Commission issued a *Sentinel Event Alert Preventing Maternal Deaths*.<sup>1</sup> The alert underscored the fact that while maternal deaths are a heterogeneous group, there are overarching efforts that hospitals can make to improve outcomes. For example, the Joint Commission's National Patient Safety Goal 16 is to recognize and respond to changes in a patient's condition. This is particularly relevant for women who have pre-existing conditions that place them at higher risk for difficulties in labor, delivery, and postpartum.



The Sentinel Alert outlined six actions that hospitals could make to improve outcomes. This newsletter highlights these six actions with examples from the New York Patient Occurrence Reporting and Tracking System (NYPORTS). We have selected NYPORTS reports of maternal deaths or severe permanent morbidity for mothers with underlying medical conditions, because this appears to be a growing challenge to care providers. Since any one facility in the state may experience only a small number of these types of occurrences, we feel it is important to share the stories of these women so that all facilities can benefit from the lessons learned and strive to improve patient care.

### THEIR STORIES

**Summary of Occurrence:** Jill,\* an extremely morbidly obese woman

(BMI  $\geq$  60) in her mid-30s with a term pregnancy, was admitted with complaint of back pain. Her medical history included hypothyroidism, mild gestational diabetes, and previous preterm delivery secondary to preeclampsia. Her vital signs were BP 131/79, pulse 88, respirations 18, temperature 98.4, fetal heart rate 150. After admission to the Labor and Delivery Unit, Jill complained of abdominal pain and vomited twice. Her blood pressure was noted to be 163/116. IV fluids were started. The decision was made to start pitocin induction. About 20 minutes following the epidural catheter placement, Jill complained of dizziness and became unresponsive. ACLS was initiated and Jill was immediately intubated and resuscitated. The baby was ultimately delivered by Cesarean section

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\*To protect patient confidentiality, the patients' real names have not been used and details of several similar events have been combined.

## The Tragedy of Moms Who Don't Go Home *(continued)*

(C-section). Jill experienced a second cardiac arrest immediately after the surgery and was again resuscitated, but both Jill and her baby experienced anoxic brain injury. The infant died shortly after birth. Jill remains comatose and was transferred to a skilled nursing facility.

**Review Findings:** This occurrence underwent extensive review during the facility's root cause analysis (RCA) process as well as peer review. The facility analyzed the management of obese obstetrical patients, the decision to induce labor, the manner of induction, the decision to use an epidural, the technical aspects of the epidural, and the management of her cardiac arrest and subsequent C-section. The facility concluded that Jill experienced a complication of epidural anesthesia which was exacerbated by her obesity and term pregnancy. Her extreme body size also made it difficult to perform the resuscitation as well as to affect a rapid delivery of the baby. Both internal and peer review concluded that the standard of care was met in this instance and was unable to



recommend or identify changes in the system to prevent such an occurrence from happening again.

**Discussion:** The American College of Obstetricians and Gynecologists (ACOG) recommends that obese patients receive preconception counseling and education about possible complications as well as encouragement to undertake weight reduction prior to conception. Publications are available on the New York State Health Department web site concerning obesity in pregnancy (<http://www.nyhealth.gov/publication/s/2025/>) and preconception care (<http://www.nyhealth.gov/publication/s/2026/>). In addition to the anesthesia complications experienced by Jill, obesity is associated with increased risk of preeclampsia, gestational diabetes, pulmonary embolism, and infection in the mother as well as birth defects and birth injury, macrosomia, and stillbirth or neonatal death in the infant. Given the outcome of Jill's previous labor and her extreme

obesity, this pregnancy represented significant risk to both her and her infant. While only a few NYPORTS reports specifically mentioned preconception counseling, a large proportion of the deaths reported were among mothers with significant pre-existing conditions that predisposed them to adverse outcomes. Electronic systems to support diagnosis and decision making are often available with electronic medical record systems and could assist all providers in evaluating maternal risk and establishing appropriate plans of care.

**Summary of Occurrence:** Jessica, a 37-year-old primigravida at 27 weeks gestation is admitted to the facility with nausea and right upper quadrant pain. On admission, her vital signs were temperature 97.8 degrees, heart rate 62, blood pressure 127/77, respirations 18 and O<sub>2</sub> saturation 96%. Her liver enzymes were found

### Joint Commission Sentinel Event Alert Action 1

*Educate physicians and other clinicians who care for women with underlying medical conditions about the additional risks that could be imposed if pregnancy were added; how to discuss these risks with patients; the use of appropriate and acceptable contraception; and pre-conceptual care and counseling. Communicate identified pregnancy risks to all members of the health care delivery team.*

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to be elevated (AST 186, ALT 204, normal values AST 7-60, ALT 10-40). The plan was to monitor her for signs and symptoms of preeclampsia and HELLP (Hemolytic anemia, Elevated Liver enzymes and Low Platelet count) and initiate steroids for fetal lung maturity. Over the course of her first day in the hospital, her pain resolved and her liver function tests were trending downward. On the third day after admission, her condition worsened with elevated blood pressure and increased epigastric pain. Magnesium sulfate was started and Jessica was moved to Labor and Delivery (L&D). Prior to arrival at L&D, Jessica suffered a seizure and was taken for an emergency C-section. Perioperative liver function tests indicated AST 2728, ALT 2100. Worsening mental status was noted shortly after the operation was completed. The rapid response team was called. Jessica was intubated and transferred to the Intensive Care Unit (ICU). The computed tomography (CT) scan

noted diffuse cerebral edema. She was declared brain dead and removed from life support after delivery of the neonate.

**Review Findings:** The Root Cause Analysis team determined that several system issues contributed to the outcome. They included issues with monitoring her condition and laboratory values prior to surgery. One issue identified was that elevated liver function tests were not included in the hospital's critical value protocol, and the policy change implemented was to develop obstetrical panic values and to notify clinician of values for the HELLP panel regardless of the values. They also added a HELLP Panel to their Computerized Physician Order Entry (CPOE) order sets. They developed a Rapid Recognition Obstetrical Triggers for physician notification and escalation, implemented Situation-Background-Assessment-Recommendation (SBAR) for hand-offs and communication of changes in patient condition, evaluated clinical guidelines for

## Joint Commission Sentinel Event Alert Action 2

*Identify specific triggers for responding to changes in the mother's vital signs and clinical condition and develop and use protocols and drills for responding to changes, such as hemorrhage and preeclampsia. Use the drills to train staff in the protocols, to refine local protocols, and to identify and fix systems problems that would prevent optimal care.*

plan of care in the obstetric service, and recommend consultation with hepatobiliary specialists for all suspected HELLP patients.

**Discussion:** Half (55 out of 119) of the NYPORTS reports involving maternal deaths from 2006 to 2009 included root cause statements related to underappreciation of the patient's condition, breakdowns in triage, communication, hand-offs, referrals, or delays in diagnosis or treatment. These system factors are common root causes for safety events throughout the health care system, but the obstetrics service, where illness is the exception rather than the rule, requires additional focus on monitoring patient condition, particularly for higher risk mothers. Several RCA teams discussed the pros and cons of admitting high risk maternity patients to obstetrics versus medical services. Obstetric services, while geared towards recognizing and responding to obstetric events such as hemorrhage or eclampsia, may be less well equipped to handle the more diverse medical needs of high risk patients. One facility that cited lack of cardiac telemetry capacity on the



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## The Tragedy of Moms Who Don't Go Home *(continued)*

labor and delivery post anesthesia care unit (PACU) as a contributing factor in an adverse event formed a work group to evaluate the equipment, staffing, and policy and procedures in their L&D PACU compared to their general surgical PACU, and suggested changes related to anesthesiologist staffing and guidelines.

**Summary of Occurrence:** Amanda, a 39-year-old with an estimated gestational age of 33 weeks, was brought to the emergency department (ED) by ambulance with a chief complaint of a syncopal episode resulting in a fall at home. Her history was significant for noncompliance with prenatal care visits, uncontrolled chronic hypertension, and morbid obesity (BMI > 40). Her highest recorded blood pressure in the prenatal care clinic was 160/103. Emergency medical services (EMS) documented her blood pressure at 280/160. Amanda was triaged in the ED, was found to be alert and oriented with no sign of seizure but



the nurse was unable to obtain a blood pressure reading due to Amanda's discomfort with the blood pressure cuff. The triage nurse presented her case to the ED attending, who recommended transfer to L&D. Amanda was taken to L&D triage 25 minutes after arrival in the ED. Her BP was 170/107, pulse 115, respiratory rate 16, O<sub>2</sub> saturation was 50%. She was observed to have tonic-clonic movements followed by loss of urine. She was taken to the operating room within a few minutes of arrival in L&D. She became pulseless and unresponsive and a code was called. She was immediately intubated and chest compressions were started. The code team responded and she was resuscitated. A C-section was performed. Following the delivery, she was transferred to the Medical Intensive Care Unit, but never regained consciousness.

**Review Findings:** The facility's investigation revealed that the significance of Amanda's elevated blood pressure was not fully appreciated

by the ED triage nurse upon presentation to the ED. The RCA team identified deficits in orientation and triage policy specifically in relation to evaluation and management of obstetrical patients. The triage sheet did not include specific triggers such as abnormal vital signs which would prompt evaluation by an attending. The orientation of ED triage nurses did not stress physiologic factors such as pregnancy. The RCA team determined that, ultimately, the lack of prenatal care and untreated pre-eclampsia significantly reduced the potential that any intervention could have changed the course of events on the day Amanda presented to the ED. The RCA process, however, allowed the facility to recognize and address systematic communication, training, and policy issues.

**Discussion:** Just under half (52 out of 119) of the 2006-2009 maternal mortality reports in NYPORTS mentioned that the mother presented to the ED at some point during pregnancy, during labor and delivery,

### Joint Commission Sentinel Event Alert Action 3

*Educate emergency room personnel about the possibility that a woman, whatever her presenting symptoms, may be pregnant or may have recently been pregnant. Many maternal deaths occur before the woman is hospitalized or after she delivers and is discharged. These deaths may occur in another hospital, away from the woman's usual prenatal or obstetric care givers. Knowledge of pregnancy may affect the diagnosis or appropriate treatment.*

or postpartum, with eight of the deaths occurring in the ED itself. Several root cause analysis statements included issues related to appropriate triage and assessment in either the ER or on labor and delivery. Also noted of significance by several facilities was the occurrence of cardiac arrest, seizure, hemorrhage, or other critical events outside of L&D as a contributing factor in the maternal death. Examples of some reported issues include lack of a restraint protocol specific to pregnant women in psychiatry service, lack of appropriate blood product order forms in radiology service, and difficulty in responding to cardiac arrest in the magnetic resonance imaging suite.

**Summary of Occurrence:** Karen was a 30-year-old primigravida at 36

weeks gestation who presented to the facility with a presumed viral syndrome (malaise, severe cough, nausea, and vomiting, absence of fever). Her past medical history is significant for previous C-section and the development of peripartum cardiomyopathy. She was followed during her pregnancy by a high risk Maternal Fetal Medicine (MFM) attending and a cardiologist. On admission she was found to be dehydrated with HCT of 45% and K<sup>+</sup> of 6.6. Cardiology was notified that a pregnant patient with a history of cardiomyopathy was admitted and required a stat echo. A clinical indication for the echocardiogram was not provided. Upon evaluation, a cardiology fellow determined Karen was asymptomatic, with no findings of cardiac dysfunction, and recommended a routine echo

### Joint Commission Sentinel Event Alert Action 4

*Refer high-risk patients to the care of experienced prenatal care providers with access to a broad range of specialized services.*

in the morning. Several hours after admission, Karen underwent an urgent C-section due to non-reassuring fetal tracing. Echocardiogram in the operating room (OR) revealed poor right atrial function and a Pulmonary Artery catheter confirmed pulmonary hypertension. Shortly after delivery, Karen became hypotensive and coded. She was initially resuscitated, but developed multi-organ failure, and expired five days after delivery.

**Review Findings:** Although Karen was being followed by a MFM attending and a cardiologist, there was not a multidisciplinary coordinated delivery plan in place at the time of delivery. The MFM attending was on duty at a second, different facility and coverage had not been pre-arranged. The L&D attending attempted to reach the cardiologist, but the cardiologist was only available by cell phone and the telecommunications protocol was a barrier to effective communication. The cardiology fellow who performed the evaluation after admission was unfamiliar with the case and underappreciated Karen's risk. Neither a MFM attending nor a cardiologist was present at delivery. The care team attributed Karen's condition to dehydration rather than congestive heart failure and pulmonary hypertension secondary to her cardiomyopathy.

*(continued)*



## The Tragedy of Moms Who Don't Go Home *(continued)*

**Discussion:** As mentioned above, many RCA teams identify under-appreciation of patient's (young woman's) condition during the course of their admission. Karen's case illustrates the need to recognize and appropriately address underlying risk and plan for coverage and communication. In her case, the RCA team pointed out that for some women, the high risk is limited to the course of the pregnancy, while for other women, the risk extends to delivery and postpartum. About 1 out of 10 maternal deaths reported to NYPORTS involved significant cardiovascular disease in the mother.

**Summary of Occurrence:** Mary Claire presented to the facility at 40+ weeks gestation for pitocin induction for post-dates pregnancy. Her history is significant for multiple prior pregnancies, morbid obesity with bariatric surgery two years prior (current BMI about 50). Pitocin was discontinued and a C-section was performed due to non-reassuring fetal monitoring. The placenta was



delivered manually and adequate hemostasis was achieved. She was transferred to the post anesthesia care unit (PACU), then to the Mother-Baby Unit. The morning of the first post-delivery day, morning care was given, her foley catheter was removed, and Mary Claire was attempting to move to a chair with the assistance of a nurse and patient care attendant when she complained of dizziness and shortness of breath. She was noted to be pale and diaphoretic, and became unresponsive as she was assisted back to bed. The Medical Emergency Team was summoned and Mary Claire was immediately intubated. Her vital signs were heart rate 164, blood pressure 113/67. She became asystolic and advance cardiac life support (ACLS) was initiated. Resuscitation was unsuccessful. The Medical Examiners report confirmed pulmonary embolism.

**Review Findings:** The Root Cause Analysis team determined that there was not a specific policy in place for deep vein thrombosis (DVT)

prophylaxis in the Labor and Delivery or Post-Partum units. They also found that appropriately sized anti-embolism compression stockings were not uniformly available. The Nursing team reported that because measuring tapes were provided one per box for many pairs of stockings, they were sometimes difficult to find. The facility used the RCA process to do a complete reassessment of thromboembolism prophylaxis in their Obstetrics service and develop an evidence-based standardized policy and procedure for thromboembolism prophylaxis. Among the measures they instituted were 1) assuring the availability of measuring tapes in every patient room; 2) increase the on hand stock of anti-embolism hose and sequential compression devices (SCD) in both regular and larger sizes; 3) increase the availability of SCD pumps in the OR, PACU and floor; 4) create a policy for checking stock and restocking of mechanical devices; 5) add risk assessment to the pre-printed

### Joint Commission Sentinel Event Alert Action 5

*Make pneumatic compression devices available for patients undergoing Cesarean section who are at high risk for pulmonary embolism.*

### Joint Commission Sentinel Event Alert Action 6

*Evaluate patients who are at high risk for thromboembolism for low molecular weight heparin for postpartum care.*



post-operative C-section order form; and 6) add orders for use of SCD to the pre-printed admissions form.

**Discussion:** About 12% (14 out of 119) of the maternal deaths reported to NYPORTS were believed to have been due to pulmonary embolism. After hemorrhage, pulmonary embolism was the most frequently occurring cause of death. Pregnancy itself is a risk factor for thrombosis, as is surgery. Relative to the postpartum period, the patient related risk factors that indicate higher risk include prior history of thrombosis, thrombophilic conditions, obesity, family history of thrombosis, antepartum immobilization, postpartum infection or hemorrhage, preeclampsia, intrauterine growth retardation, and emergency C-section.<sup>2</sup> Some studies have also indicated that older maternal age, smoking, and multiple

fetuses are risk factors. There are also risk factors, such as heart disease, spinal cord injury, lupus, and active cancer, that are associated with increased risk of thrombosis events in general and which also increase maternal risk adverse outcomes beyond pulmonary embolism.

### CONCLUSIONS

There have been several recent news reports concerning the increases in maternal mortality in the United States. This increase has been attributed in part to increases in the prevalence of high risk pregnancies. The upward trend in obesity in the general population also translates to a high proportion of pregnant women who are morbidly obese. There also appears to be a general trend towards older maternal age and pregnancies among women with underlying medical conditions, aided by wider

availability of assisted reproductive technologies.

These trends appear to have a significant impact on the events reported to NYPORTS. Of the 119 maternal deaths reported to NYPORTS from 2006 to 2009, 19% recorded obesity, 30% were among mothers age 35 or older, and 19% were among mothers with significant pre-existing medical conditions. Overall, 52% of the maternal deaths occurred among women with advanced age, obesity or significant chronic disease, and 18% of these women had multiple conditions contributing to their high risk. The significant chronic diseases recorded included sickle cell disease, lupus, cardiovascular and valvular disease, AIDS, poorly controlled cystic fibrosis, and Graves' disease.

According to the facility based root cause analysis results, the majority of maternal deaths were not preventable within the context of the care in the facility. Over 50% had no root cause statements identifying system or human factors contributing to the unexpected death. This, however, does not indicate the deaths were not preventable. In many instances, the deaths could have been considered preventable from the stand point of the continuum of care, from preconception through postpartum, as well as from the broader stand point of the state's prevention agenda, including obesity prevention, smoking cessation, improved physical active and nutrition, and improve mental health care and substance abuse treatment ([http://www.health.state.ny.us/prevention/prevention\\_agenda/](http://www.health.state.ny.us/prevention/prevention_agenda/)).



<sup>1</sup>The Joint Commission, USA (2010 Jan 26) Preventing Maternal Death. *Sentinel Event Alert*, (44), 1-4.

<sup>2</sup>Bourjeily G, Paidas M, Khalil H, Rosene-Montella K, Rodger M. (2010 Feb 6) Pulmonary embolism in pregnancy. *Lancet*, (9713), 500-12.



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