

How to Reduce Maternal Mortality From Venous Thromboembolism

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In the developed countries, venous thromboembolism (VTE) is the second common cause of maternal mortality after hemorrhage accounting for 13.8% of all maternal deaths.¹ Venous thromboembolism was the leading cause of direct maternal deaths in Germany in the year 2010 to 2014, in United Kingdom/Ireland 2009 to 2015, in France 1996 to 2007, and in New Zealand 1997 to 2005.² The incidence of VTE in pregnancy and the puerperium has risen in most of the developed countries during the past 2 decades due to a significant increase in maternal risk factors, for example, advanced maternal age, obesity, diabetes, hypertension and other comorbidities, and a dramatic increase in cesarean delivery rates. In the United States, the incidence of maternal pulmonary embolism is reported to have risen in parallel with increasing rates of cesarean deliveries.³

In recent years, numerous population-based studies from different countries have reported on substandard care and potential preventability of maternal deaths including deaths from VTE,² for example, the Triennium Reports 2009-2014 of the UK Confidential Enquiries into Maternal Deaths and Morbidity analyzed 48 maternal deaths due to VTE and considered 54% of these deaths were potentially preventable.⁴ The most common reasons for substandard care were inaccurate assessment of VTE risk factors, inappropriate VTE prophylaxis, erroneous or misdiagnoses of pulmonary embolism, and poor interdisciplinary cooperation. The National Partnership for Maternal Safety, Consensus Bundle on Venous Thromboembolism,⁵ and the key messages, prevention, and treatment of thrombosis, and thromboembolism from the UK Confidential Enquiries 2015⁶ have recently highlighted strategies for the prevention of maternal deaths due to VTE.

The first step is early recognition and comprehensive assessment of the individual risk factors for VTE, as 79% to 89% of mothers dying from pulmonary embolism exhibit identifiable risk factors.⁷ It is prudent to use standardized checklists of VTE risk factors readily available in every maternal unit, since it is challenging for the obstetrician in daily practice to keep all risk factors in mind. Standardized risk assessment should be performed early in the first trimester and repeated at any hospital admission, immediately after delivery and before patient's

discharge from hospital, since the risk profile may change in the course of pregnancy and the early postpartum period.⁷ Thus, women at increased risk of VTE can be identified timely.

The next step is appropriate risk stratification to decide who might benefit from pharmacological thromboprophylaxis. Risk stratification remains a matter of debate, since guideline recommendations vary considerably. The Royal College of Obstetrics and Gynecology (RCOG) Green-top Guidelines No 37a⁷ recommend a scoring system weighing different risk factors for VTE, while other guidelines propose pharmacological thromboprophylaxis, if the risk threshold resulting from 1 major or ≥ 2 minor risk factors exceeds 3%⁸ and 1%,⁹ respectively. It is mandatory to implement one of these risk stratification tools to the protocol of every maternal unit.

The cornerstone to prevent VTE-related maternal deaths is a risk-based mechanical and pharmacological thromboprophylaxis antenatally and particularly postpartum with the highest daily risk of VTE. It has been calculated that thromboprophylaxis with low-molecular-weight heparin (LMWH) has the potential to decrease the risk of VTE by 60% to 70% in women at increased risk¹⁰ and by 88% in women with a previous VTE.¹¹ In high-risk patients, antenatal pharmacological prophylaxis should begin as early in pregnancy as practicable, since more than 20% of VTE occur already in the first trimester.

The RCOG guidelines suggest LMWH dose adjusted to maternal weight being of advantage especially in obese

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women. Intermediate or therapeutic LMWH dose should be considered in women at (very) high risk of VTE (eg, high-risk thrombophilia, recurrent VTE). If decision-making is difficult as in patients with cardiac prosthetic valve replacement, the obstetrician is well advised to consult an experienced hemostaseologist.

Although peaking within the first 3 weeks after delivery, the risk of VTE remains significantly elevated up to 6 weeks or even longer. In accordance to current guideline recommendations, pharmacological thromboprophylaxis should therefore be continued for 6 weeks postpartum or longer depending on the individual patient's risk.

It has been shown that 22% to 38% of symptomatic VTE occur after discharge from hospital, which is an increasing concern in the light of steadily decreasing length of hospital stay after vaginal and cesarean deliveries. Therefore, it is urgently necessary to avoid supply gaps in the postpartum prescription of LMWH, when the woman is at home.

Although the benefits of graduated compression stockings and pneumatic compression devices have never been validated by randomized controlled trials in obstetric populations, a policy of universal thromboprophylaxis using pneumatic compression devices during and after cesarean delivery has shown to reduce maternal deaths from postcesarean thromboembolism by 86%,¹² which is in line with reported efficacy for other types of major surgery. Early mobilization, avoidance of dehydration, and mechanical prophylaxis may significantly contribute to a reduction of VTE-related maternal deaths. Unrecognized deep venous thrombosis may be life-threatening; if untreated, 15% to 24% of these patients will develop pulmonary embolism, which may be fatal in almost 15% of patients, and in 66% of these, death will occur within 30 minutes of the embolic event.¹³

The obstetrician should be aware that acute chest pain, sudden breathlessness, and episodes of collapse could be symptoms of pulmonary embolism even in the absence of signs of deep venous thrombosis.¹⁴ Any woman with symptoms and/or signs suggestive of VTE should have objective testing performed expeditiously and heparin treatment should be commenced immediately until diagnosis is excluded by objective testing. All hospitals should have a protocol for the diagnosis of suspected VTE in pregnancy and the puerperium, which may require multidisciplinary team involvement.¹³

Finally, every maternal unit should review all thromboembolism events carefully for systemic issues and compliance with protocols.⁵ To learn from failures and to realize if and where improvement is needed are further crucial points to prevent VTE-related maternal deaths.

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