



CONSORCI  
HOSPITAL GENERAL  
UNIVERSITARI  
VALÈNCIA



# SISTEMAS DE ALERTA TEMPRANA OBSTÉTRICA PARA PREVENIR COMPLICACIONES MAYORES

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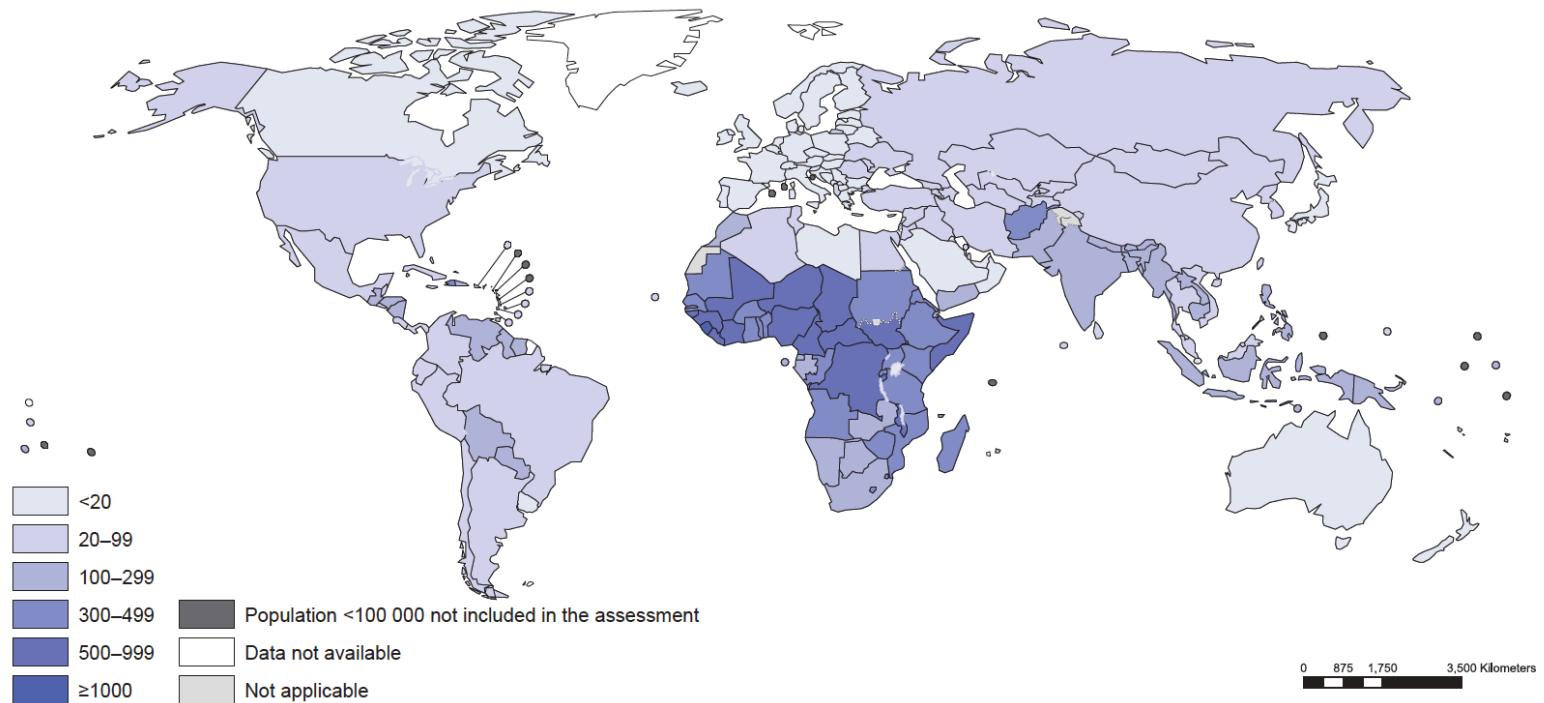
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Valencia 16 de julio de 2018**

# ÍNDICE

- 1) Morbi-mortalidad materna
- 2) Mortalidad materna asociada a la anestesia
- 3) Papel del Anestesiólogo durante el parto
- 4) Sistemas de alerta temprana para prevenir complicaciones mayores
- 5) Simulación y trabajo en equipo en obstetricia



Figure 1. Map with countries by category according to their maternal mortality ratio (MMR, death per 100 000 live births), 2013



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.



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Trends in  
**Maternal Mortality:  
1990 to 2013**

Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division

Country	MMR <sup>a</sup>					% change in MMR between 1990 and 2013 <sup>b</sup>	Average annual % change in MMR between 1990 and 2013 <sup>b</sup>	Range of uncertainty on annual % change in MMR		Progress towards improving maternal health <sup>c</sup>
	1990	1995	2000	2005	2013			Lower estimate	Upper estimate	
United Kingdom	10	11	11	12	8	-24	-1.2	-3.1	0.8	–
United States of America	12	11	13	17	28	136	3.8	1.8	5.8	–
Spain	7	4	5	6	4	-36	-1.9	-3.7	0	–
Morocco	310	240	200	160	120	-61	-4.1	-4.7	-3.4	making progress
Mozambique	1300	1100	870	680	480	-64	-4.3	-4.9	-3.4	making progress
Myanmar	580	470	360	260	200	-65	-4.5	-5	-4	making progress
Namibia	320	280	270	250	130	-58	-3.7	-4.3	-2.7	making progress
Nepal	790	580	430	310	190	-76	-6	-6.6	-5.4	on track



# Severe Maternal Morbidity Among Delivery and Postpartum Hospitalizations in the United States

*(Obstet Gynecol 2012;120:1029–36)*

*William M. Callaghan, MD, MPH, A DOI: <http://10.1097/AOG.0b013e31826d60c5>*

- **Aumento significativo de complicaciones severas** durante y después del parto en relación a:
  - Aumento de cesáreas
  - Aumento de patología crónica en la embarazada: cardiovascular (HTA, cardiopatías congénitas), endocrina (diabetes), respiratoria (asma, fumadoras)...
  - Aumento obesidad
  - Aumento de hemorragias post parto
  - Edad materna avanzada
  - Aumento tasas de embarazo múltiple





**Table 1. Rates (Standard Errors) of Selected Severe Complications During Delivery Hospitalizations per 10,000 Delivery Hospitalizations: United States, 1998–2009 (n=49,346,974)**

Condition	1998–1999	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	P*	% Increase
Acute renal failure	2.29 (0.16)	1.99 (0.12)	2.61 (0.14)	2.77 (0.16)	3.55 (0.17)	4.52 (0.14)	<.05	97.26
Cardiac arrest or ventricular fibrillation	0.51 (0.06)	0.46 (0.05)	0.49 (0.06)	0.66 (0.06)	0.60 (0.06)	0.63 (0.06)	.14	22.89
Heart failure during procedure or surgery	11.12 (0.50)	9.25 (0.64)	10.37 (0.54)	10.66 (0.66)	9.77 (0.50)	9.92 (0.54)	.48	-10.75
Shock	1.50 (0.10)	1.30 (0.10)	1.52 (0.10)	1.86 (0.12)	2.16 (0.12)	3.01 (0.14)	<.05	100.66
Sepsis	3.14 (0.20)	2.45 (0.15)	2.68 (0.16)	2.57 (0.15)	2.77 (0.15)	3.08 (0.17)	.85	-1.96
Disseminated intravascular coagulation	9.20 (0.33)	8.88 (0.34)	9.81 (0.36)	9.97 (0.52)	11.09 (0.52)	12.46 (0.72)	<.05	35.46
Amniotic fluid embolism	0.40 (0.05)	0.50 (0.05)	0.40 (0.05)	0.44 (0.05)	0.35 (0.05)	0.36 (0.05)	.17	-8.88
Thrombotic embolism	0.81 (0.09)	1.07 (0.09)	1.29 (0.10)	1.39 (0.10)	1.49 (0.10)	1.39 (0.09)	<.05	71.83
Puerperal cerebrovascular disorders	1.94 (0.13)	1.79 (0.11)	2.01 (0.13)	2.12 (0.12)	2.08 (0.12)	1.69 (0.10)	.95	-12.75
Severe anesthesia complications	1.91 (0.14)	1.43 (0.11)	1.43 (0.11)	1.08 (0.09)	1.11 (0.08)	0.74 (0.06)	<.05	-61.27
Pulmonary edema	2.11 (0.16)	2.01 (0.15)	1.61 (0.15)	1.80 (0.20)	1.49 (0.13)	1.44 (0.12)	<.05	-31.76
Adult respiratory distress syndrome	3.56 (0.18)	3.39 (0.17)	3.93 (0.19)	4.49 (0.18)	4.90 (0.21)	6.24 (0.32)	<.05	75.41
Acute myocardial infarction	0.11 (0.03)	0.20 (0.03)	0.18 (0.03)	0.24 (0.04)	0.22 (0.04)	0.20 (0.04)	<.17	79.35
Eclampsia	6.34 (0.29)	5.92 (0.28)	5.79 (0.35)	6.01 (0.37)	5.19 (0.21)	4.80 (0.18)	.06	-24.33
Blood transfusion	34.04 (1.47)	42.59 (1.75)	55.07 (2.02)	71.05 (2.86)	84.83 (2.36)	96.38 (2.84)	<.05	183.15



Ventilation	4.73 (0.19)	4.75 (0.20)	5.36 (0.22)	5.71 (0.23)	5.59 (0.21)	6.32 (0.28)	<.05	33.55
Hysterectomy	7.36 (0.28)	7.41 (0.28)	7.76 (0.29)	8.14 (0.30)	8.27 (0.30)	9.11 (0.36)	<.05	23.73
Sickle cell anemia with crisis <sup>†</sup>	0.92 (0.10)	0.72 (0.09)	0.73 (0.08)	0.93 (0.12)	0.86 (0.10)	0.58 (0.07)	.48	-36.45
Intracranial injuries <sup>†</sup>	0.13 (0.03)	0.12 (0.03)	0.17 (0.04)	0.19 (0.04)	0.10 (0.02)	0.09 (0.02)	.28	-33.37
Internal injuries of thorax, abdomen, and pelvis <sup>†</sup>	0.64 (0.07)	0.52 (0.06)	0.73 (0.07)	0.78 (0.08)	0.68 (0.07)	0.55 (0.07)	.75	-14.10
Aneurysm <sup>†</sup>	0.02 (0.01)	0.04 (0.02)	0.04 (0.01)	0.08 (0.02)	0.09 (0.02)	0.06 (0.02)	.07	194.73
Operations on heart and pericardium <sup>†</sup>	2.63 (0.13)	3.53 (0.72)	3.26 (0.13)	3.98 (0.15)	4.44 (0.32)	4.60 (0.30)	<.05	74.96
Cardio monitoring <sup>†</sup>	2.26 (0.26)	3.47 (1.08)	2.00 (0.68)	2.48 (0.89)	1.21 (0.42)	0.93 (0.08)	.11	-58.80
Temporary tracheostomy <sup>†</sup>	0.22 (0.04)	0.21 (0.04)	0.21 (0.04)	0.21 (0.04)	0.21 (0.04)	0.26 (0.04)	.71	19.75
Conversion of cardiac rhythm <sup>†</sup>	0.53 (0.06)	0.52 (0.06)	0.58 (0.06)	0.59 (0.06)	0.61 (0.06)	0.63 (0.06)	<.05	18.25
<b>At least one complication</b>	<b>73.82 (1.65)</b>	<b>78.59 (1.86)</b>	<b>91.24 (2.23)</b>	<b>106.33 (3.74)</b>	<b>116.86 (2.93)</b>	<b>129.08 (3.34)</b>	<b>&lt;.05</b>	<b>74.86</b>
<b>In-hospital mortality</b>	<b>1.05 (0.09)</b>	<b>0.75 (0.07)</b>	<b>0.86 (0.08)</b>	<b>0.78 (0.07)</b>	<b>0.80 (0.06)</b>	<b>0.66 (0.06)</b>	<b>.18</b>	<b>-37.45</b>

- Aumento de las complicaciones severas (75%) → 1ª causa: recibir **transfusión de concentrados de hematíes** (en relación al aumento de hemorragias post-parto e hysterectomías durante el parto)
- **Disminución mortalidad durante el parto**



**Table 2. Rates (Standard Errors) of Selected Severe Complications During Postpartum Hospitalizations per 10,000 Delivery Hospitalizations: United States, 1998–2009 (N=738,124)**

Condition	1998–1999	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	P*	% Increase
Acute renal failure	0.48 (0.06)	0.72 (0.08)	1.02 (0.10)	1.13 (0.11)	1.53 (0.12)	2.17 (0.11)	<.05	351.11
Cardiac arrest or ventricular fibrillation	0.12 (0.03)	0.17 (0.03)	0.22 (0.04)	0.17 (0.03)	0.18 (0.04)	0.41 (0.07)	.08	244.85
Heart failure during procedure or surgery	0.98 (0.08)	1.10 (0.09)	1.34 (0.10)	1.39 (0.11)	1.58 (0.10)	1.86 (0.14)	<.05	89.53
Shock	0.40 (0.05)	0.60 (0.07)	0.75 (0.07)	0.86 (0.08)	1.02 (0.08)	1.40 (0.16)	<.05	250.06
Sepsis	1.42 (0.10)	1.42 (0.10)	1.86 (0.12)	2.38 (0.13)	2.69 (0.14)	3.53 (0.21)	<.05	148.81
Disseminated intravascular coagulation	1.19 (0.11)	1.27 (0.13)	1.68 (0.13)	1.91 (0.13)	1.73 (0.12)	2.18 (0.18)	<.05	82.87
Thrombotic embolism	1.33 (0.11)	1.35 (0.10)	2.29 (0.13)	2.64 (0.14)	2.88 (0.15)	3.57 (0.19)	<.05	168.63
Puerperal cerebrovascular disorders	1.51 (0.12)	1.94 (0.13)	2.28 (0.15)	2.46 (0.14)	2.37 (0.14)	3.13 (0.22)	<.05	107.45
Severe anesthesia complications	0.30 (0.05)	0.18 (0.03)	0.20 (0.04)	0.18 (0.04)	0.22 (0.04)	0.25 (0.05)	.95	-17.80
Pulmonary edema	0.42 (0.06)	0.42 (0.05)	0.49 (0.06)	0.49 (0.06)	0.43 (0.06)	0.58 (0.08)	.08	38.34
Adult respiratory distress syndrome	1.07 (0.10)	1.35 (0.11)	1.71 (0.12)	2.00 (0.13)	2.45 (0.15)	3.01 (0.18)	<.05	181.74
Acute myocardial infarction	0.18 (0.03)	0.28 (0.05)	0.32 (0.05)	0.33 (0.05)	0.40 (0.05)	0.42 (0.06)	<.05	131.24
Eclampsia	1.76 (0.12)	2.01 (0.12)	2.28 (0.14)	2.70 (0.16)	2.69 (0.14)	2.90 (0.18)	<.05	64.52
Blood transfusion	3.48 (0.21)	4.67 (0.26)	6.22 (0.29)	7.82 (0.31)	8.74 (0.36)	9.89 (0.38)	<.05	184.32



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Valencia 16 de julio de 2018**



Ventilation	1.19 (0.11)	1.42 (0.11)	1.81 (0.14)	2.04 (0.15)	2.14 (0.15)	2.57 (0.18)	<.05	116.33
Hysterectomy	0.88 (0.08)	0.89 (0.08)	1.10 (0.09)	1.16 (0.09)	1.04 (0.08)	1.19 (0.11)	.06	35.74
Sickle cell anemia with crisis	0.09 (0.03)	0.10 (0.02)	0.13 (0.03)	0.34 (0.06)	0.33 (0.06)	0.40 (0.11)	<.05	345.10
Intracranial injuries	0.08 (0.02)	0.04 (0.02)	0.08 (0.02)	0.13 (0.03)	0.08 (0.02)	0.08 (0.03)	.45	5.26
Internal injuries of thorax, abdomen, and pelvis	0.21 (0.04)	0.13 (0.03)	0.16 (0.03)	0.28 (0.05)	0.18 (0.03)	0.15 (0.03)	.85	-28.39
Aneurysm	0.03 (0.01)	0.04 (0.02)	0.01 (0.01)	0.03 (0.01)	0.03 (0.01)	0.06 (0.03)	.46	88.47
Operations on heart and pericardium	0.80 (0.08)	1.17 (0.11)	1.64 (0.12)	1.83 (0.15)	1.96 (0.13)	2.47 (0.15)	<.05	209.01
Cardio monitoring	0.53 (0.07)	0.48 (0.07)	0.38 (0.05)	0.43(0.07)	0.48 (0.08)	0.31 (0.06)	.12	-40.76
Temporary tracheostomy	0.09 (0.03)	0.12 (0.03)	0.10 (0.02)	0.21 (0.04)	0.23 (0.04)	0.24 (0.05)	<.05	164.65
Conversion of cardiac rhythm	0.06 (0.02)	0.08 (0.02)	0.13 (0.03)	0.13 (0.03)	0.12 (0.03)	0.30 (0.06)	.07	407.25
<b>At least one complication</b>	13.59 (0.42)	15.42 (0.46)	19.54 (0.56)	22.61 (0.61)	24.45 (0.63)	<b>29.03</b> (0.68)	<.05	<b>113.60</b>
<b>In-hospital mortality</b>	0.26 (0.04)	0.24 (0.04)	0.29 (0.05)	0.30 (0.05)	0.32 (0.04)	<b>0.43</b> (0.06)	<.05	<b>66.10</b>

- **Aumento de las complicaciones post-parto, con aumento significativo de la mortalidad.**
- 1% re-ingresos 6 semanas siguientes (causas: HTA, infección herida/uterina, colecistitis, apendicitis, neumonía)



**Table 3. In-Hospital Proportionate Mortality During Delivery and Postpartum Hospitalizations With Selected Severe Complications: United States, 1998–2009**

Condition	Delivery Hospitalizations (n=4,012 Deaths)		Postpartum Hospitalizations (n=1,592 Deaths)	
	n	% (Standard Error)	n	% (Standard Error)
Acute renal failure	697	17.37 (1.38)	501	31.47 (2.60)
Cardiac arrest or ventricular fibrillation	1,214	30.26 (1.61)	388	24.37 (2.40)
Heart failure during procedure or surgery	571	14.23 (1.22)	125	7.85 (1.52)
Shock	756	18.84 (1.37)	423	26.57 (2.47)
Sepsis	579	14.43 (1.23)	387	24.31 (2.40)
Disseminated intravascular coagulation	992	24.73 (1.51)	351	22.05 (2.32)
Amniotic fluid embolism	407	10.14 (1.06)	—	—
Thrombotic embolism	269	6.70 (0.87)	140	8.79 (1.59)
Puerperal cerebrovascular disorders	446	11.12 (1.10)	442	27.76 (2.50)
Severe anesthesia complications	134	3.34 (0.63)	34	2.14 (0.80)
Pulmonary edema	58	1.45 (0.42)	45	2.83 (0.93)
Adult respiratory distress syndrome	1,332	33.20 (1.68)	848	53.27 (2.80)
Acute myocardial infarction	105	2.62 (0.57)	58	3.64 (1.04)
Eclampsia	127	3.16 (0.61)	69	4.34 (1.14)
Blood transfusion	1,340	33.39 (1.68)	424	26.63 (2.48)
Ventilation	2,430	60.57 (1.72)	1,218	76.51 (2.38)
Hysterectomy	443	11.04 (1.10)	56	3.52 (1.05)
Sickle cell anemia with crisis	39	0.97 (0.34)	—	—
Intracranial injuries	145	3.60 (0.65)	—	—
Internal injuries of thorax, abdomen, and pelvis	198	4.94 (0.76)	27	1.69 (0.75)
Aneurysm	—	—	—	—
Operations on heart and pericardium	553	13.78 (1.21)	317	19.91 (2.24)
Cardio monitoring	377	9.40 (1.11)	182	11.43 (1.78)
Temporary tracheostomy	115	2.87 (0.58)	96	6.03 (1.34)
Conversion of cardiac rhythm	1,146	28.56 (1.61)	311	19.54 (2.22)

—, Cells with fewer than 10 unweighted observations are not reported.



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# Anesthesia-Related Maternal Mortality in the United States: 1979–2002

(*Obstet Gynecol* 2011;117:69–74)

DOI: 10.1097/AOG.0b013e31820093a9

*Joy L. Hawkins, MD, Jeani Chang, MPH, Susan K. Palmer, MD, Charles P. Gibbs, MD, and William M. Callaghan, MD*

- **Reducción significativa de la mortalidad materna asociada a la anestesia**
- **<2% de las muertes maternas en USA (1 muerte por 1.000.000)**
- Gran trabajo por partes de Anestesiólogos: guías de práctica clínica basadas en la evidencia, revisiones sistemáticas de gran calidad, interés por la seguridad del paciente
- La **simulación** y el **trabajo en equipo** es muy útil para mejorar el rendimiento en situaciones de emergencia.
- Todos los casos de muerte materna relacionada con la anestesia **EN CESÁREAS** (aunque ha disminuido x3 en la última década).



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**Table 3. Case Fatality Rates and Rate Ratios of Anesthesia-Related Deaths During Cesarean Delivery by Type of Anesthesia in the United States, 1979–2002**

Year of Death	Case Fatality Rates*		Rate Ratios
	General Anesthetic	Regional Anesthetic	
1979–1984	20.0	8.6	2.3 (95% CI 1.9–2.9)
1985–1990	32.3	1.9	16.7 (95% CI 12.9–21.8)
1991–1996	16.8	2.5	6.7 (95% CI 3.0–14.9)
1997–2002	6.5	3.8	1.7 (95% CI 0.6–4.6)

CI, confidence interval.

\* Deaths per million general or regional anesthetics.

- **Causas de muerte relacionadas con la anestesia:**
  - Fallos de intubación (23%)
  - Fallo respiratorio (20%)
  - Reacciones farmacológicas (19%)
  - Bloqueo espinal o epidural alto (16%)
- No diferencias estadísticamente significativas en la última década en la mortalidad durante la cesárea con Anestesia General vs Anestesia Regional
- Según diferentes estudios: **28 al 40% de las muertes son prevenibles** (errores más comunes: no identificar edema pulmonar en preeclampsia, no tratar adecuadamente HTA o fallo en estabilizar hemodinámicamente a una paciente sangrante)

Cochrane Database Syst Rev. 2012 Oct 17;10:CD004350. doi: 10.1002/14651858.CD004350.pub3.



**Regional versus general anaesthesia for caesarean section.**

Afolabi BB<sup>1</sup>, Lesi FE.





## Obstetric Anesthesiologists as Perioperative Physicians: Improving Peripartum Care and Patient Safety

Daria M. Moaveni · Jennifer H. Cohn ·  
Zahira D. Zahid · J. Sudharma Ranasinghe

As patients become progressively more complex and high-risk, anesthesiologists play a vital role as perioperative physicians. Labor and delivery are dynamic times when emergencies and crises occur, and care must be delivered quickly and effectively. Care of the parturient is a team effort, and anesthesia providers are leaders in resuscitation and intensive care for critically ill patients. Thus, the anesthesiologist's role extends far beyond performing labor epidural analgesia and administering anesthetics for cesarean delivery.

Improving maternal morbidity and mortality is the greatest challenge facing the obstetric team today, and obstetric anesthesiologists establishing their role in perioperative care allow for their skills and expertise to positively affect maternal and fetal outcomes.



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Valencia 16 de julio de 2018**



# Table 3. Referral Criteria for High-Risk Obstetric Anesthesia Clinic

**Maternal hematological disorder or patients taking anticoagulants**

**Significant spinal deformities or disease**

**Maternal cardiac disease**

**Previous problems with anesthesia**

- Difficult airway
- Malignant hyperthermia
- Problems with previous epidural or spinal

**Any significant medical problems**

- Obesity (BMI >45 kg/m<sup>2</sup>)
- Pulmonary disease
- Endocrine disorders
- Neurological conditions
- Chronic pain

**Any significant obstetric problems**

- Invasive placentation
- Fetal issues requiring intrauterine intervention

**Advanced maternal age (>50 years)**

**Any patient with significant concerns regarding anesthesia**

Abbreviation: BMI, body mass index.

**Building Comprehensive Strategies for Obstetric Safety: Simulation Drills and Communication**

Naola Austin, MD,\* Sara Goldhaber-Fiebert, MD,\* Kay Daniels, MD,† Julie Arafah, MSN, RN,‡  
Veronique Grenon, FCAS, MAAA,§ Dana Welle, DO, JD,§ and Steven Lipman, MD\*

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# **SISTEMAS DE ALERTA TEMPRANA OBSTÉTRICA PARA PREVENIR COMPLICACIONES MAYORES**



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- La mayor parte de pacientes obstétricas ingresadas en la UCI han tenido signos vitales alterados durante las 24-48h anteriores (durante su estancia en sala de hospitalización/sala de partos) y no han sido reconocidos de forma correcta.
- Reconocer a estas pacientes de forma temprana supone una disminución importante de la mortalidad.
- De ahí surgen los **Early Warning Scores (EWS)** → **Sistemas de alerta temprana** → su objetivo es interceptar a tiempo el deterioro clínico antes de que ocurra un evento crítico
- Origen en UK: en 2013 el 100% de los hospitales encuestados lo usa (15 años de implementación) → el 91% de los Anestesiólogos refieren gran utilidad en identificar deterioro clínico.
- Hay varios Scores (MEOWS, MEWC, MEWT, Carle EWS). No hay comparación entre ellos (no gold standard)



**Table 1** A modified early obstetric warning system (MEOWS)<sup>12</sup>

Physiological parameters	Yellow alert	Red alert
Respiration rate	21–30	< 10 or > 30
Oxygen saturation		< 95
Temperature	35–36	< 35 or > 38
Systolic blood pressure	150–160 or 90–100	< 90 or > 160
Diastolic blood pressure	90–100	> 100
Heart rate	100–120 or 40–50	> 120 or < 40
Pain score	2–3	
Neurological response	Voice	Unresponsive, pain

Note: Respiration rate (breaths per minute); oxygen saturation (%); temperature (°C); systolic blood pressure (mm HG); heart rate (beats per minute); level of consciousness is based on the Alert Voice Pain Unresponsive (AVPU) scale which assesses four possible outcomes to measure and record a patient's level of consciousness; pain scores (0 = no pain, 1 = slight pain on movement, 2 = intermittent pain at rest/moderate pain on movement). **A single red score or two yellow scores triggers an evaluation.**







**Table 2** Maternal Early Warning Criteria (MEWC)<sup>10</sup>

Systolic BP; mm Hg	< 90 or > 160
Diastolic BP; mm Hg	> 100
Heart rate; beats per min	< 50 or > 120
Respiratory rate; breaths per min	< 10 or > 30
Oxygen saturation; % on room air	< 95
Oliguria; mL/h for $\geq 2$ h	< 35

Abbreviation: BP, blood pressure.

Note: Neurologic: Maternal agitation, confusion, or unresponsiveness; Patient with preeclampsia reporting a nonremitting headache or shortness of breath. Legend: The presence of any of the abnormal parameters above necessitates the prompt evaluation of the patient by a provider.



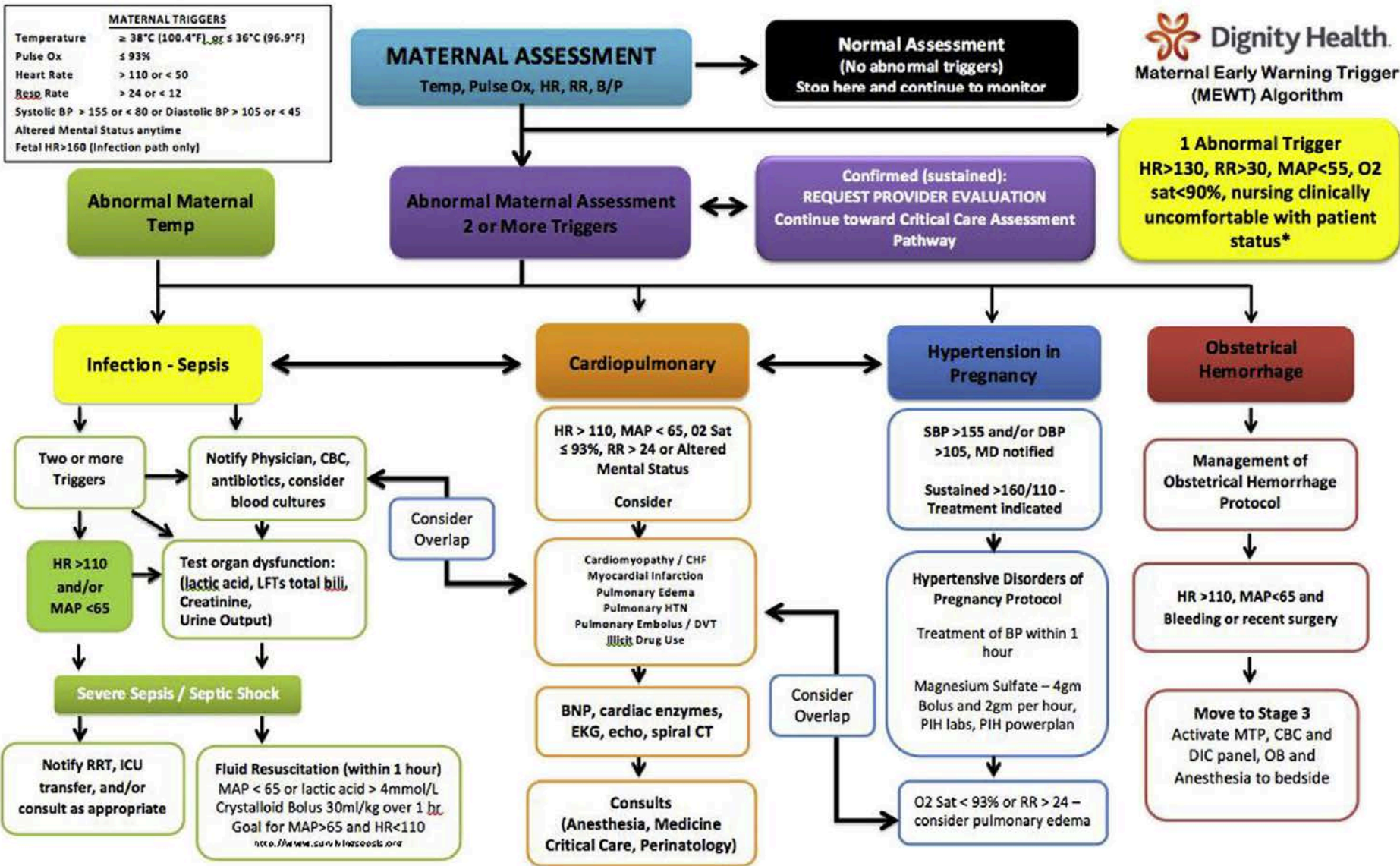
**Table 3** Maternal Early Warning Trigger (MEWT)

“Yellow” triggers	
Systolic BP; mm Hg	< 80 or 156–160
Diastolic BP; mm Hg	< 45 or 106–110
Heart rate; beats per min	< 50 or 111–130
Respiratory rate; breaths per min	< 12 or 25–30
Temperature, degrees centigrade	≤36
Oxygen saturation; % on room air	90–93
Altered mental status	
“Red” triggers	
Nursing clinically uncomfortable with patient status	
Temperature, degrees centigrade	≥38
Respiratory rate; breaths per min	> 30
Oxygen saturation; % on room air	< 90%
Heart rate; beats per min	> 130
Systolic BP; mm Hg	> 160
Respiratory rate; breaths per min	> 30
Diastolic BP; mm Hg	> 110
Mean arterial pressure; mm HG	< 55

Abbreviation: BP, blood pressure.

Note: A single red trigger or two yellow triggers requires evaluation by provider. Abnormal vital signs must be sustained over at least 20 min to be considered triggers.





## Original Article

Design and internal validation of an obstetric early warning score: secondary analysis of the Intensive Care National Audit and Research Centre Case Mix Programme database

C. Carle,<sup>1</sup> P. Alexander,<sup>2</sup> M. Columb<sup>2</sup> and J. Johal<sup>3</sup>

**Table 4** New clinical obstetric early warning score. Score created by combining the statistical score derived using logistic regression analysis and clinical judgement.

	3	2	1	0	1	2	3
<b>Systolic blood pressure</b> (mmHg)	< 80	80–89		90–139	140–149	150–159	≥ 160
<b>Diastolic blood pressure</b> (mmHg)				< 90	90–99	100–109	≥ 110
<b>Respiratory rate</b> (min <sup>-1</sup> )	< 10			10–17	18–24	25–29	≥ 30
<b>Heart rate</b> (min <sup>-1</sup> )	< 60			60–110		111–149	≥ 150
<b>% O<sub>2</sub> required to maintain SpO<sub>2</sub> ≥ 96%</b>				Room air	24–39%		≥ 40%
<b>Temperature</b> (°C)	< 34.0		34.0–35.0	35.1–37.9	38.0–38.9		≥ 39
<b>Conscious level</b>				Alert*			Not alert†

Urine output, pain score, F<sub>I</sub>O<sub>2</sub> and S<sub>p</sub>O<sub>2</sub> recorded elsewhere on chart. Alert\*, alert and orientated, equivalent to Glasgow Coma Score (GCS) 15 and A on Alert/Voice/Pain/Unresponsive (AVPU) scale; Not alert†, GCS 3–14 or V, P, U on AVPU scale.



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**Valencia 16 de julio de 2018**

**Table S6:** Clinical obstetric earlywarning score trigger thresholds for graded response

<b>Score trigger</b>	<b>Graded response</b>
<b>0</b>	<b>Routine</b> minimum 12 hourly observations
<b>1-3 (aggregate)</b>	<b>Low</b> minimum 4 hourly observations alert nurse in charge
<b>One parameter scores '3'† or ≥4 (aggregate)</b>	<b>Medium</b> minimum 1 hourly observations urgent call to the medical team caring for the patient and to personnel with competencies for acute illness
<b>≥6 (aggregate)</b>	<b>High</b> continuous monitoring of vital signs emergency call to a team with critical care competencies and diagnostic skills

†An extreme value in any parameter is set to trigger senior review of the patient.





# Performance of the Obstetric Early Warning Score in critically ill patients for the prediction of maternal death



Angel Paternina-Caicedo, MSc; Jezid Miranda, MD; Ghada Bourjeily, MD; Andrew Levinson, MD; Carmelo Dueñas, MD; Camilo Bello-Muñoz, MD; José A. Rojas-Suarez, MSc

- Estudia el EWS de Carle et al y su valor para predecir la mortalidad materna en la UCI
- Resultado: **buen predictor para discriminar mortalidad en el periodo periparto en paciente crítica** (sobre todo en las condiciones relacionadas con el parto, no tanto en aquellas que no se relacionan con causas obstétricas). Además, **identifica pacientes de alto riesgo que requieran intervenciones en UCI como VM o DVA.**
- **Mejor predictor en embarazadas que SAPS II o APACHE II** (estos no tienen en cuenta los cambios fisiológicos en el embarazo)



# PROBLEMAS EN SU IMPLEMENTACIÓN EN UK:

Table 3 Responses of 130 lead obstetric anaesthetists regarding perceived barriers to full and proper implementation of an obstetric early warning system (EWS), in descending order of frequency. Values are number (proportion).

Staffing pressures preventing adequate completion of charts	45 (35%)
Lack of support for EWS charts from midwives	28 (22%)
Lack of teaching/training	27 (21%)
Concurrent use of a standard vital signs chart/partogram	26 (20%)
Too time-consuming	18 (14%)
Lack of support for EWS charts from doctors	12 (9%)
Lack of evidence and validation of EWS in obstetrics	11 (9%)
Impact on the mother of frequent interruptions	10 (8%)
Poor correlation of charts with obstetric physiology	9 (7%)
Other	5 (4%)



# ENTRENAMIENTO EN EQUIPO Y SIMULACIÓN



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Valencia 16 de julio de 2018**

**SIMULACIÓN en emergencias obstétricas: experiencia para manejar escenarios estresantes poco frecuentes → mejora el trabajo en equipo, la comunicación, la confianza y el manejo de las pacientes en estas situaciones.**

**Mejora resolución de complicaciones (como prolapsos de cordón), tiempos en entrada a quirófano en cesáreas emergentes...**

**Simulating critical events, improving multidisciplinary communication and developing staffing models that promote provider continuity and availability can help create a culture of safety in obstetric units.**

- La **simulación** puede recrear situaciones realistas y proporcionar un entorno para enseñar, aprender, practicar y evaluar habilidades de **trabajo en equipo**
- Aunque el trabajo en equipo es difícil de medir, los simulacros pueden conducir a un mejor rendimiento del equipo durante emergencias obstétricas
- El **rendimiento óptimo** del equipo durante situaciones estresantes es desafiante. En un estudio de simulación materna con paro cardíaco, equipos multidisciplinarios experimentados realizaron compresiones de pecho apropiadas solo el 56% del tiempo y con frecuencia se omitieron elementos críticos de la reanimación materna.
- El rendimiento del equipo y la seguridad del paciente mejoran cuando los **equipos** están **organizados** y son **eficientes**. La claridad del papel de cada uno en cada situación es crucial para un óptima y eficiente rendimiento del equipo durante una crisis. En un estudio, la supervivencia simulada aumentó de 0% a 89% después de que se impartiera formación en **aspectos organizativos sobre rendimiento en equipo**.
- Practicar los **roles** durante simulacros y evaluar su mediante su visionado en vídeo puede enfatizar su importancia.





## Table 1. Multidisciplinary communication strategies for care providers on labor and delivery units

### Sign-out/handoffs

Set time and location for team sign-out at shift change (inclusive of OB, Anesthesia and nursing representatives)

Structured handoff for anesthesia team such as SAFE tool [17]

- S** → Sick patients (sepsis, preeclampsia, significant systemic disease)
- A** → At-risk patients (emergency cesarean, hemorrhage, anesthetic problems)
- F** → Patients to Follow-up (PDPH, significant PPH, neurologic injury)
- E** → Epidurals (currently running, any that have been problematic)

Use same sign-out process regardless of time of day or weekday versus weekend

### Preprocedure huddle

Ideally prior to any procedure but should occur before all cesarean deliveries [18]

Includes all participating providers (OB, anesthesia, nursing) to discuss patient status, anticipated issues, special needs, etc.

Tailored content depending on urgency of situation

Printed cognitive aids and/or huddle checklists can be utilized

### Culture of 'speaking-up'

Empower all clinicians and providers to bring up concerns regarding patient safety

Encourage environment of open discussion and accountability

Capitalize on multidisciplinary education activities to foster relationships and collaboration between care team members in a 'safe' setting

- No-tolerance policy for intimidation, disruptive behavior and/or bullying [14]

Communication errors are common during emergency obstetric care. During scenarios of postpartum hemorrhage, maternal cardiac arrest, and preeclampsia simulated in a commercially devel-



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**Valencia 16 de julio de 2018**

**Table 1.** Effective tools for team communication

Communication tool	Description
SBAR (Situation, Background, Assessment, Recommendation/Request)	Technique for transmitting vital patient information in a quick fashion S: What's going on with the patient? B: What is the clinical background or context? A: What do I think the problem is? R: What would I do to correct it?
SNAPPI (Stop, Notify, Assessment, Plan, Priorities, Invite)	'Call-out' communication strategy to convey important information S: Stop and get attention of the team N: Notify the team of the problem A: Provide your assessment of the situation P: Share your plan for treatment P: Prioritize tasks that should be completed I: Invite ideas from the team
Check-Back	A closed-loop communication tool to ensure that the receiver of the information understands what the sender was intending to say Sender initiates the message Receiver accepts message and provides feedback Sender checks to make sure message was received

In anesthesia closed-claims analysis, poor communication between the obstetrician and the anesthesiologist was identified as a potentially preventable cause of newborn injury.<sup>87</sup>



of deviations from preestablished standards. One study concluded that anesthesia residents can be expected to have a 90% success rate after approximately 75 attempted epidural blocks [16]. In another, 95% success in correct ultrasound assessment of gastric contents might be expected after 33 examinations [17]. Practice using a simulator might be used to reduce the numbers of procedures required for success by a trainee in clinical situations and reduce the time to surgical incision of emergency CD under either general or SA.

report, anesthesia providers performed fiberoptic intubation on a mannequin immediately before intubating patients with a decrease in time to intubation of approximately 30% [18].

tem improvements for postpartum hemorrhage. The primary outcome was self-reported comfort with managing postpartum hemorrhage by the participants in the simulation. Overall, there was a statistically significant increase in provider comfort after simulation training. Secondarily, they noticed an improvement in massive transfusion practices and a decreasing trend in the number of postpartum hemorrhage cases in their institution.

found significant decline in skills at 6 months and again at 2 years after Advanced Cardiac Life Support training. More research is needed to evaluate the value and necessary dose<sup>81,82</sup> of simulation-based training for improved clinical outcomes for actual patients. With that said, “no industry in

to improve individual and team performance and to increase self-assessed provider comfort with difficult patient scenarios, whether patient outcomes improve is not clear. Ways to predict the long-term retention of individual and team skills after simulation have not been developed.

**No hay diferencias en la simulación en el escenario clínico habitual o en otro lugar ajeno**







# Cursos Multiprofesionales de Emergencias Obstétricas

Se trata de un curso intensivo y multiprofesional, tanto de docentes como alumnos, acreditado por la **Sociedad Española de Simulación**, en el que se revisa y estandariza la manera de actuar de todo el personal del paritorio frente a las 4 emergencias obstétricas que más morbilidad y mortalidad producen: distocia de hombros, preeclampsia grave y eclampsia, hemorragia postparto, y la parada cardiopulmonar en gestante.



**SARTD-CHGUV Sesión de Formación Continua  
Valencia 16 de julio de 2018**

# Building Comprehensive Strategies for Obstetric Safety: Simulation Drills and Communication

Naola Austin, MD,\* Sara Goldhaber-Fiebert, MD,\* Kay Daniels, MD,† Julie Arafteh, MSN, RN Veronique Grenon, FCAS, MAAA,§ Dana Welle, DO, JD,§ and Steven Lipman, MD\*  
(Anesth Analg 2016;123:1181–90)



## Table 1. Implementation Options and Examples for Obstetric Simulation

### Who are the participants?

- Multidisciplinary team—scenario for anesthesia, obstetrics, nursing, and technicians
- Single discipline group—STAT general anesthesia drill for anesthesia resident teams
- Individual learner—B-lynch task trainer for individual obstetric residents

### What is the scenario?

- Common—on-time start drill for first case of the day cesarean delivery
- Infrequent—postpartum hemorrhage drill
- Rare—local anesthetic systemic toxicity drill

### When is the ideal timing?

- Planned—year-long series of disaster drills for all staff to participate once
- Ad hoc—drill for upcoming congenital twin delivery
- Repeated—follow-up drill after time or systems issue improvements

### Where is the best location?

- In situ on labor and delivery—postpartum hemorrhage simulation in labor room
- Simulation center—postpartum hemorrhage simulation in mock operating room
- Alternate location—shoulder dystocia task trainers in teaching conference room

### Why is the simulation useful?

- Based on a real case
- Adoption of new protocol or practice advisory
- Area of inconsistent practice
- Any area with room for improvement in patient care



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Valencia 16 de julio de 2018**



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**SARTD-CHGUV Sesión de Formación Continua**  
**Valencia 16 de julio de 2018**

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Valencia 16 de julio de 2018**