

# EPIDEMIOLOGY OF POSTPARTUM HEMORRHAGE

Brian T. Bateman, MD, MSc  
Massachusetts General Hospital

# Disclosure information



- No relevant conflicts

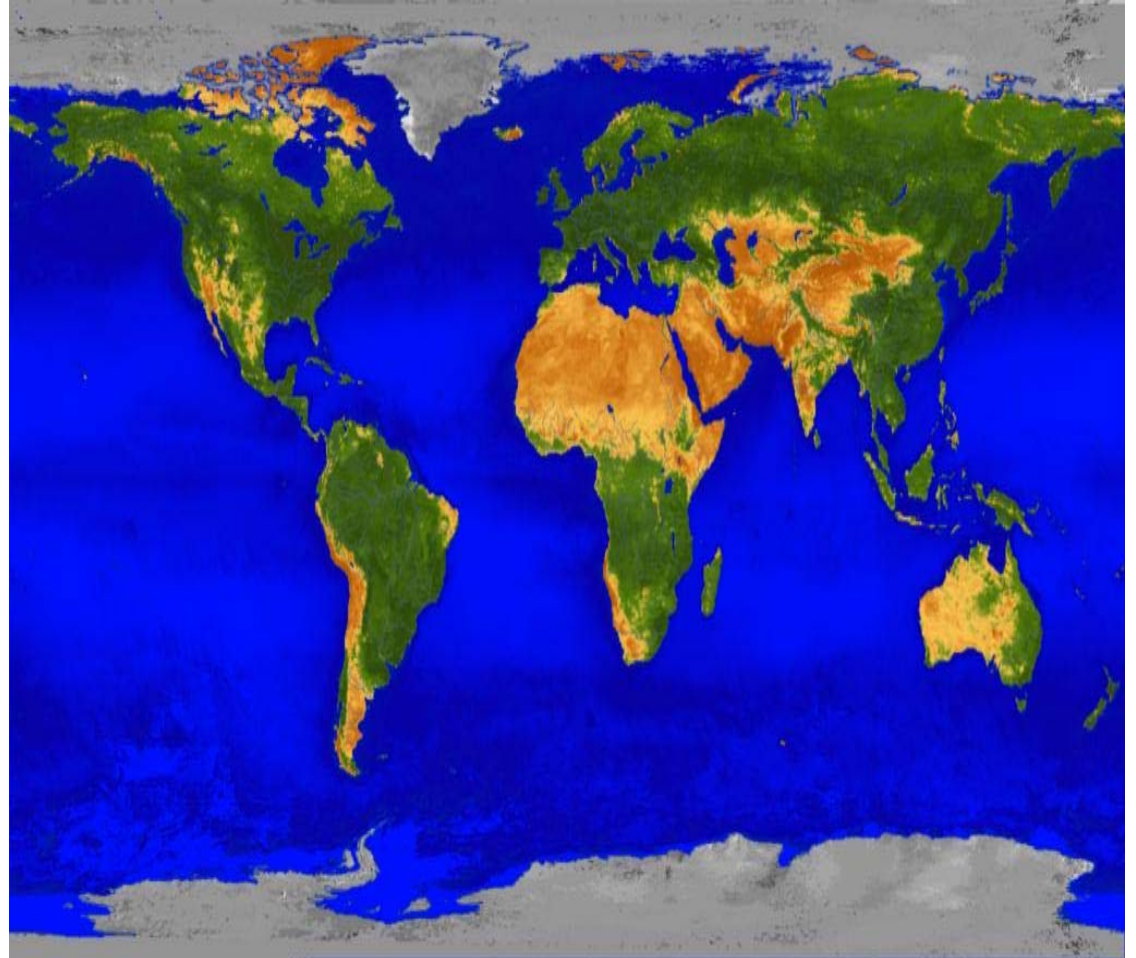
# Outline



- Scope of the problem
- Trends
- Settings in which PPH occurs
- Preventability
- Approaches to prevent PPH morbidity

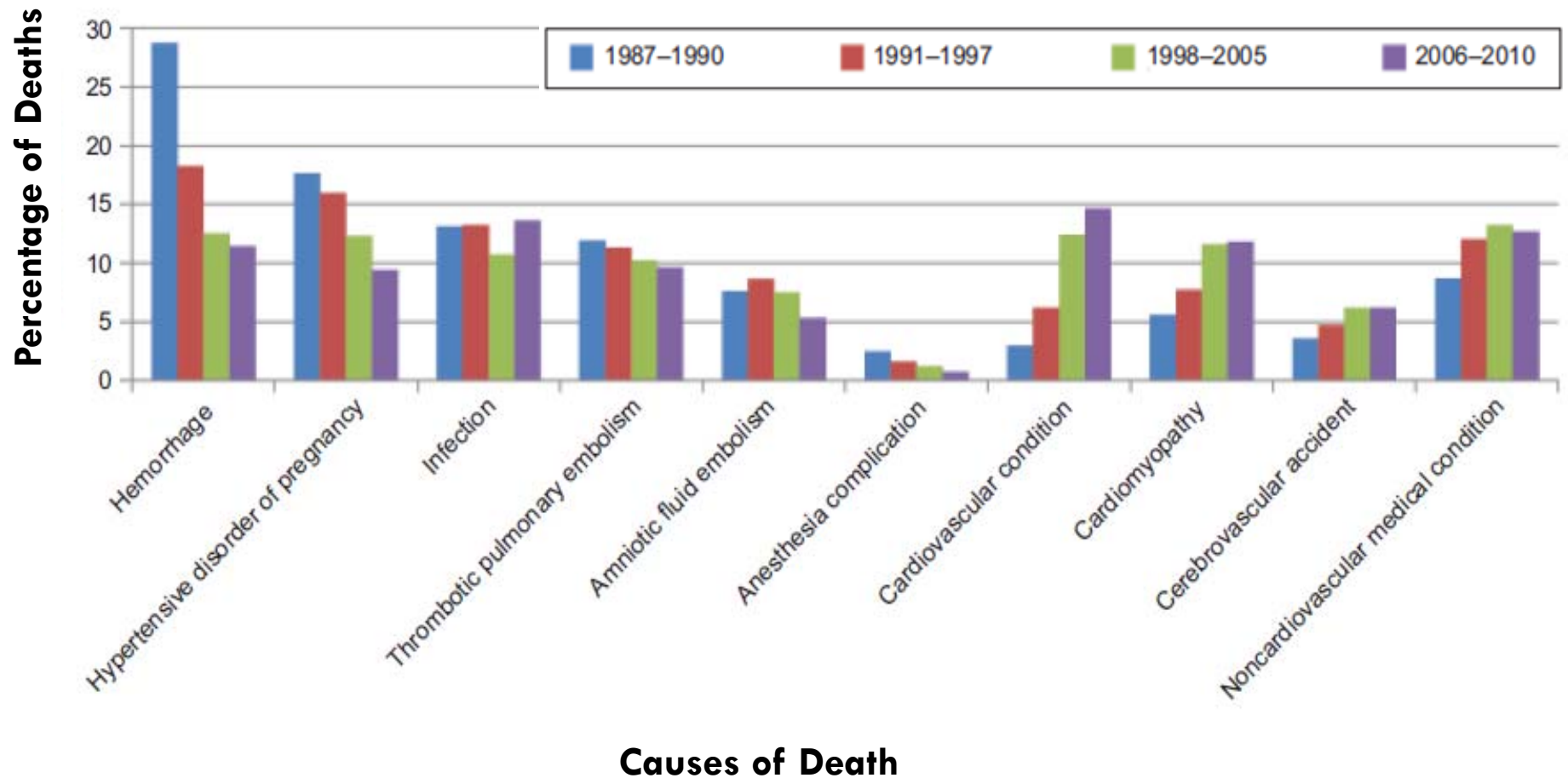
# Scope of the problem

- Hemorrhage is the **leading cause** of maternal mortality worldwide
- Results in an estimated **150,000** deaths per year
- **1 in every 1,000 births** in the world complicated by maternal death from hemorrhage



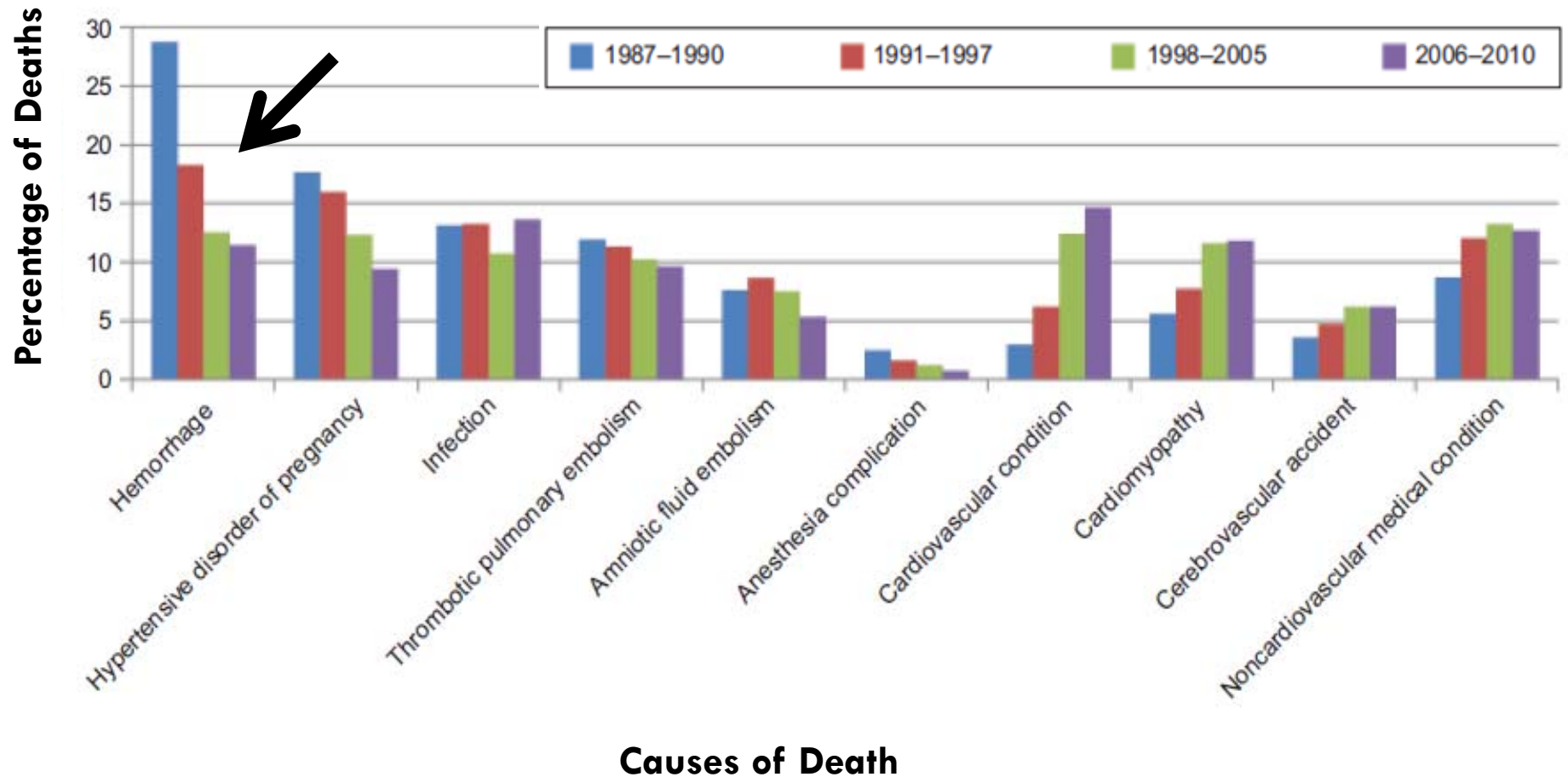
# Scope of the problem

**Cause-Specific Proportionate Pregnancy-Related Mortality:  
United States, 1987-2010**

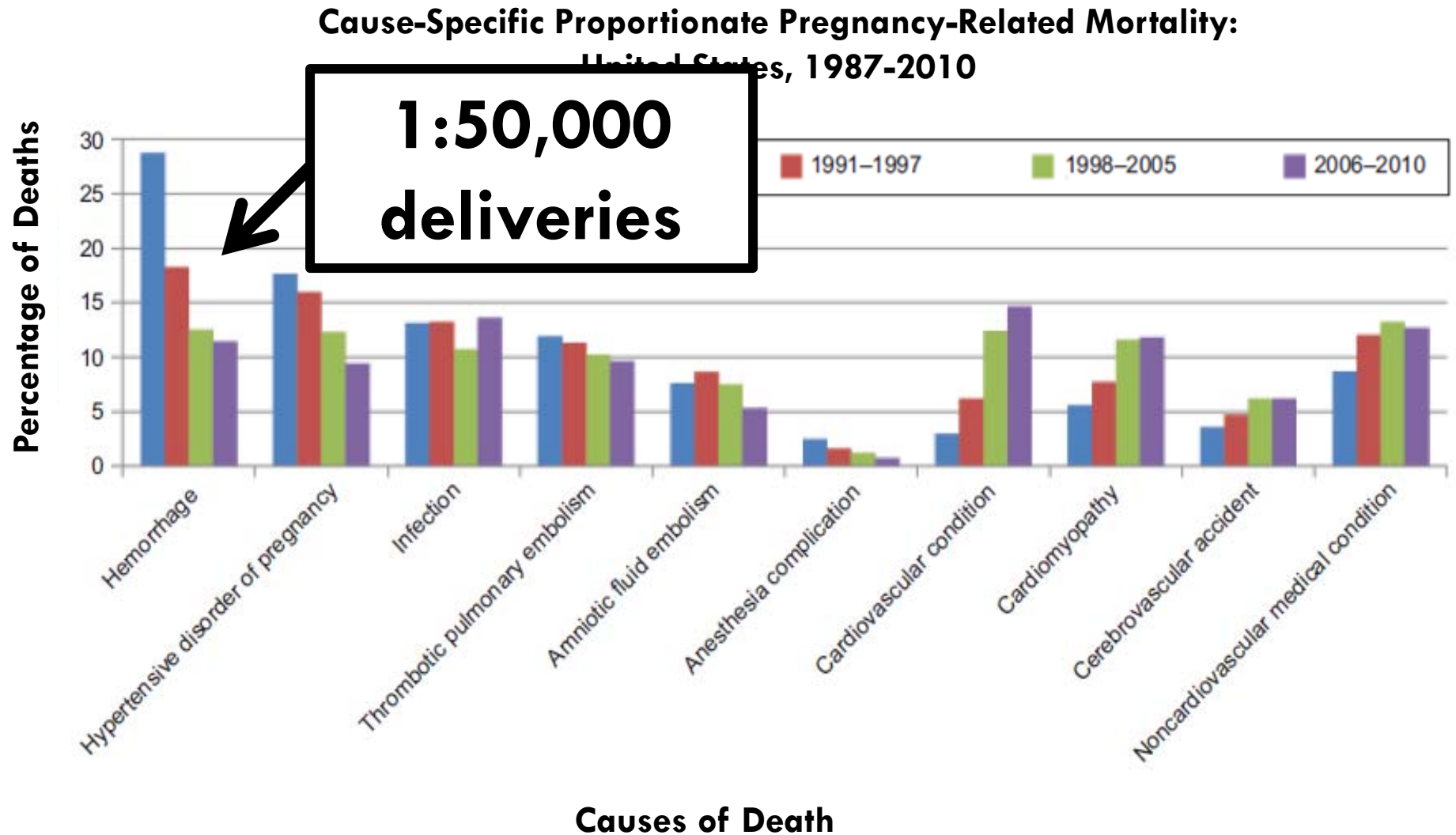


# Scope of the problem

**Cause-Specific Proportionate Pregnancy-Related Mortality:  
United States, 1987-2010**



# Scope of the problem



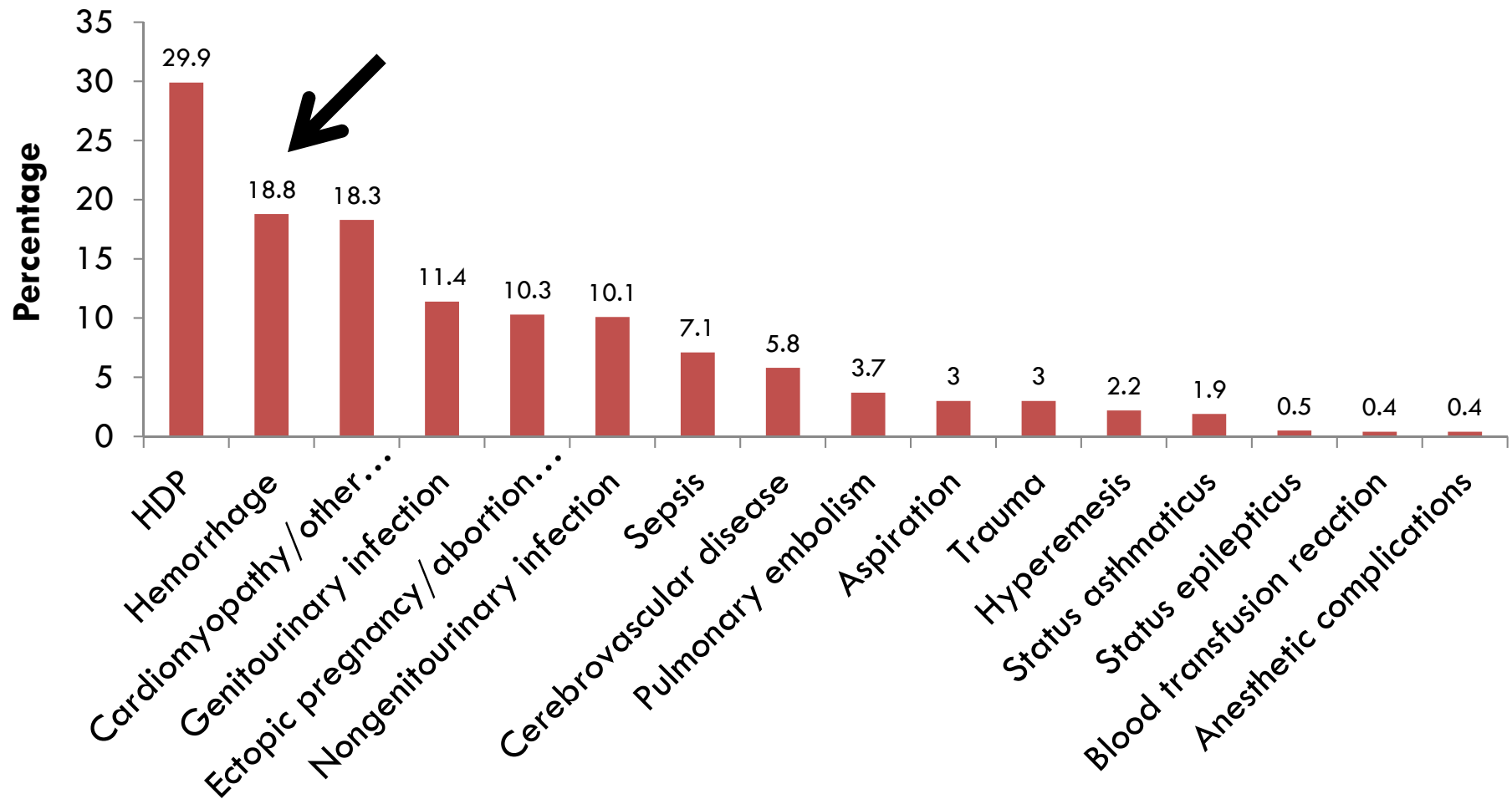
# Morbidity



- Anemia
- Prolonged LOS
- Secondary surgical procedures
- Loss of fertility
- PTSD
- Renal failure
- Respiratory failure
- Myocardial ischemia
- Transfusion-related complications



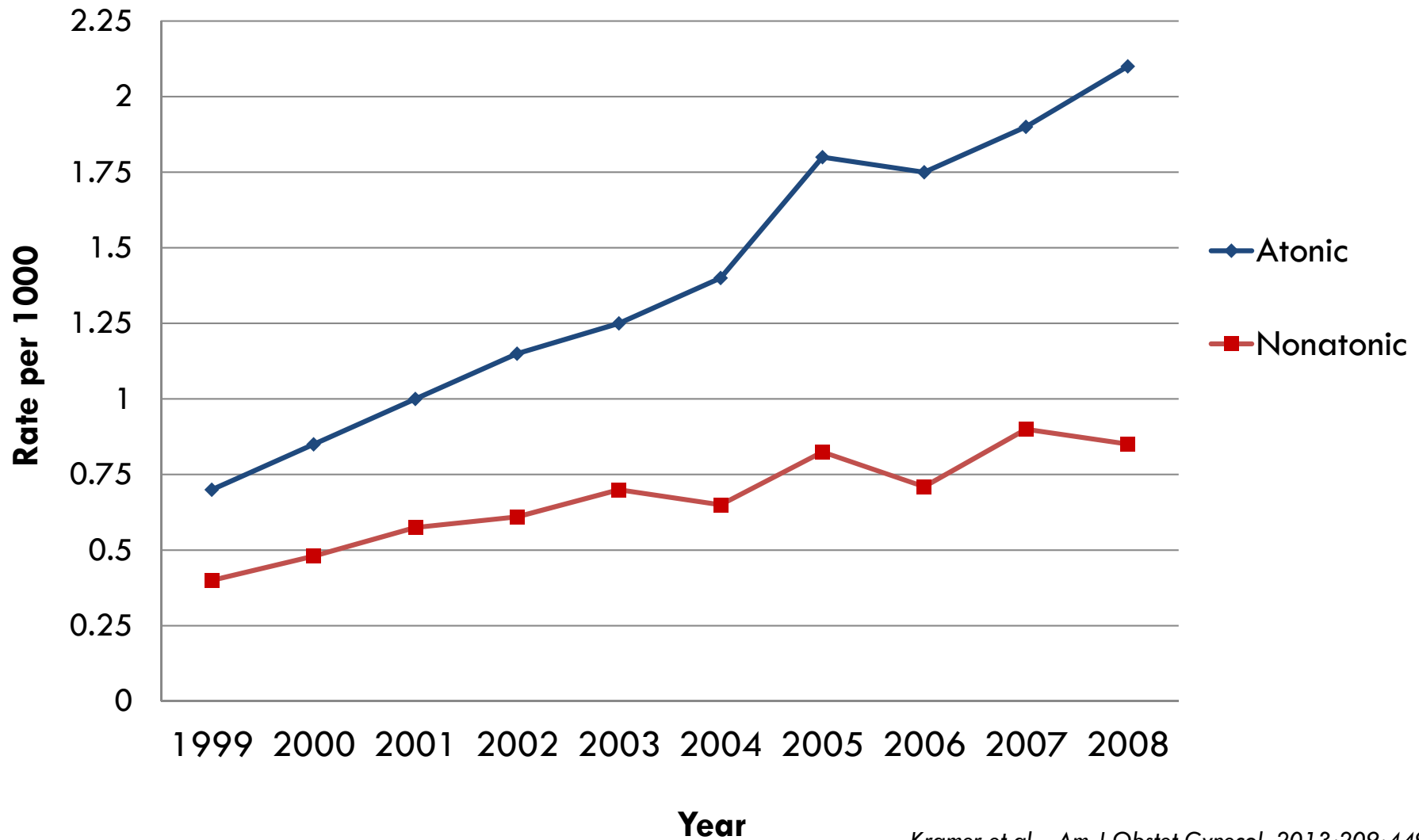
# Indications for Obstetrical ICU Admissions



# Indications for Obstetric ICU Admissions



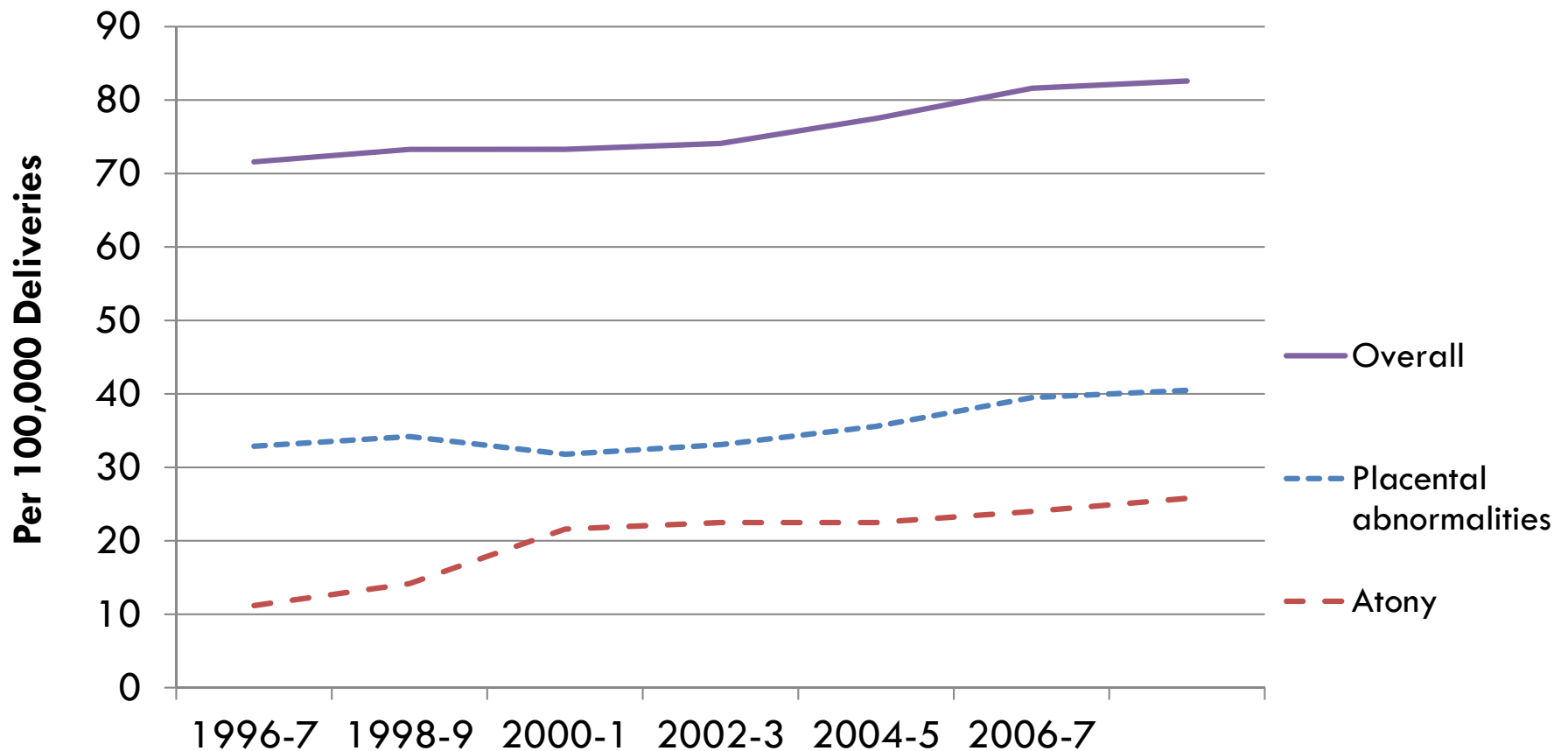
# Temporal trends in atonic and nonatonic PPH with transfusion: 1999-2008



## OBSTETRICS

# Peripartum hysterectomy in the United States: nationwide 14 year experience

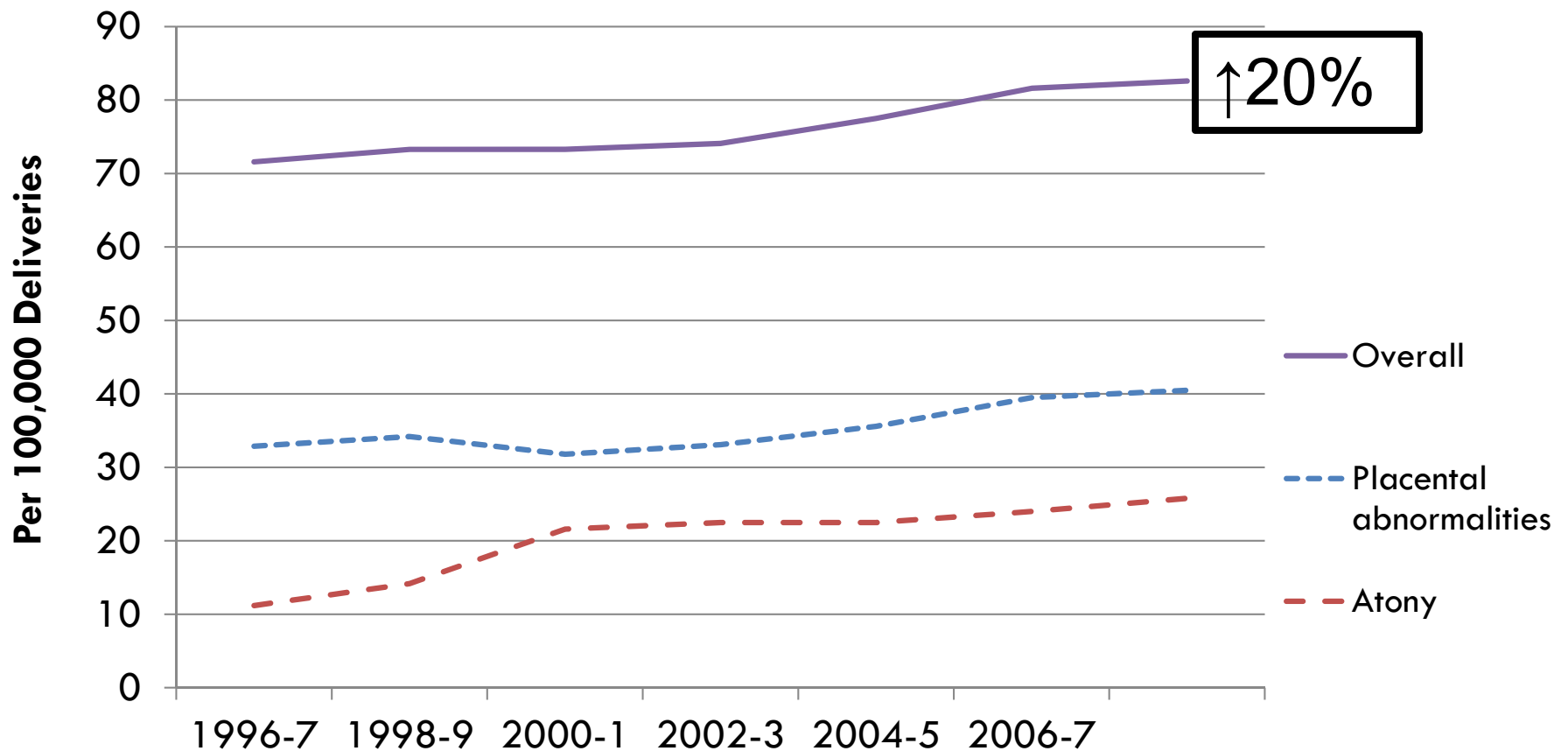
Changes in the Rate of Peripartum Hysterectomy from 1994-5 to 2006-7



## OBSTETRICS

# Peripartum hysterectomy in the United States: nationwide 14 year experience

Changes in the Rate of Peripartum Hysterectomy from 1994-5 to 2006-7

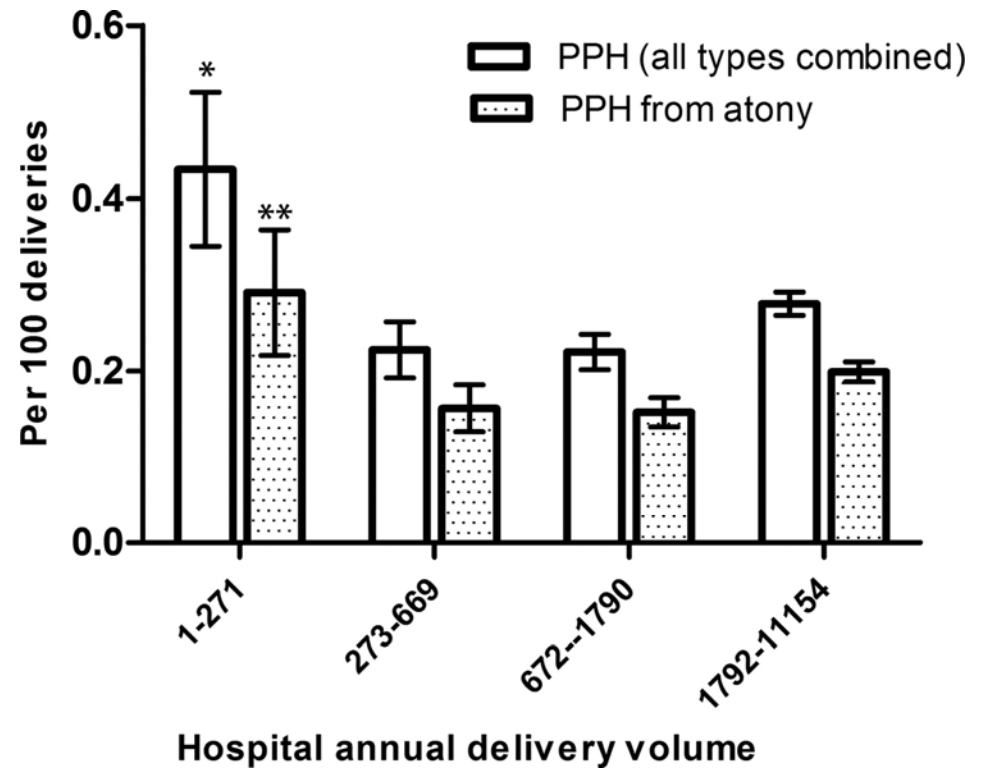
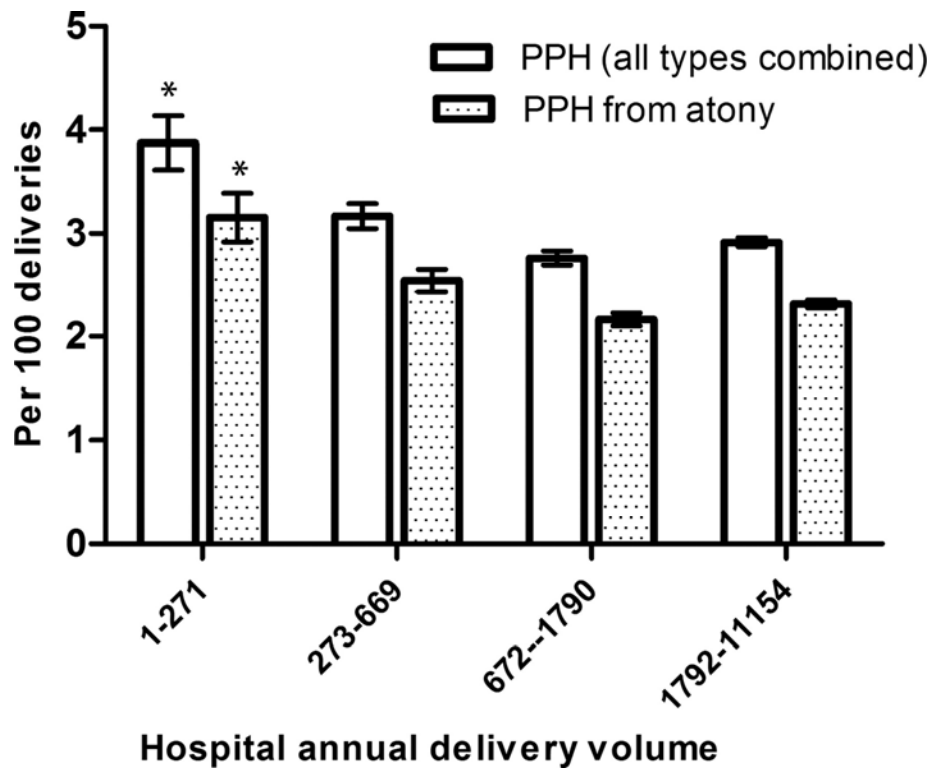


# Trends

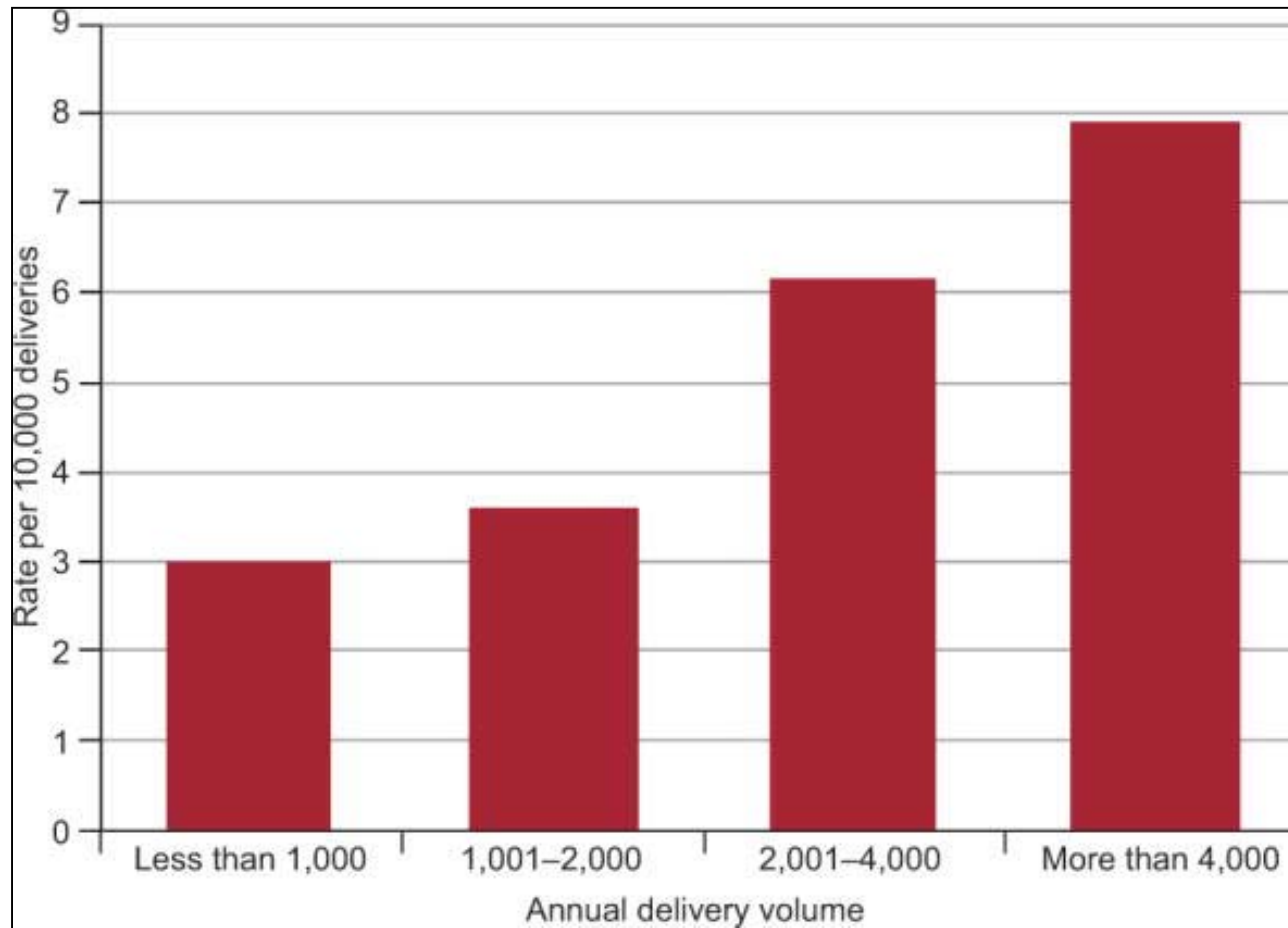


- Increase in the incidence of uterine atony
  - ▣ Increasing prevalence of obesity
  - ▣ Increasing incidence of induction of labor
  
- Increase in the incidence of abnormal placentation
  - ▣ Cesarean rate

# Settings where PPH occurs



# Massive transfusion





# Preventability of Pregnancy-Related Deaths

## *Results of a State-Wide Review*

**Table 2.** Distribution of Causes of Pregnancy-Related Deaths and Percent of Preventable Deaths by Cause, North Carolina, 1995–1999

Cause of Death	% of All Pregnancy-Related Deaths	% Preventable
Cardiomyopathy	21	22
Hemorrhage	14	93
Pregnancy-induced hypertension	10	60
Cerebrovascular accident	9	0
Chronic condition	9	89
Amniotic fluid embolus	7	0
Infection	7	43
Pulmonary embolus	6	17
Microangiopathic hemolytic syndrome	5	0
Cardiovascular condition	5	40
Choriocarcinoma	4	25
Miscellaneous	3	33

# Preventability of Pregnancy-Related Deaths

## *Results of a State-Wide Review*

**Table 2.** Distribution of Causes of Pregnancy-Related Deaths and Percent of Preventable Deaths by Cause, North Carolina, 1995–1999

Cause of Death	% of All Pregnancy-Related Deaths	% Preventable
Cardiomyopathy	21	92
Hemorrhage	14	93
Pregnancy-induced hypertension	10	86
Cerebrovascular accident	9	0
Chronic condition	9	89
Amniotic fluid embolus	7	0
Infection	7	43
Pulmonary embolus	6	17
Microangiopathic hemolytic syndrome	5	0
Cardiovascular condition	5	40
Choriocarcinoma	4	25
Miscellaneous	3	33

# Pregnancy-related Deaths, Chance to Alter Outcome by Grouped Cause of Death; **California** 2002-2003

Cause of Death	Chance to Alter Outcome				
	Strong/Good (N)	Strong/Good (%)	Some (N)	None (N)	Total (N)
Obstetric hemorrhage	7	70	2	1	10
Sepsis/infection	5	63	3	0	8
Preeclampsia/eclampsia	9	60	6	0	15
Deep vein thrombosis/ pulmonary embolism	3	37	4	1	8
Cardiomyopathy and other cardiovascular disorders	5	29	12	2	19
Amniotic Fluid Embolism	0	0	12	2	14
All other causes of death*	7	32	8	7	22
<b>Total (%)</b>	<b>36</b>	<b>38%</b>	<b>47</b>	<b>13</b>	<b>96**</b>

# Pregnancy-related Deaths, Chance to Alter Outcome by Grouped Cause of Death; **California** 2002-2003

Cause of Death	Chance to Alter Outcome				
	Strong/Good (N)	Strong/Good (%)	Some (N)	None (N)	Total (N)
Obstetric hemorrhage	7	70	2	1	10
Sepsis/infection	5	63	3	0	8
Preeclampsia/eclampsia	9	60	6	0	15
Deep vein thrombosis/ pulmonary embolism	3	37	4	1	8
Cardiomyopathy and other cardiovascular disorders	5	29	12	2	19
Amniotic Fluid Embolism	0	0	12	2	14
All other causes of death*	7	32	8	7	22
Total (%)	36	38%	47	13	96**

# Pregnancy-related Deaths, Chance to Alter Outcome by Grouped Cause of Death; **California** 2002-2003

Cause of Death	Chance to Alter Outcome				
	Strong/Good (N)	Strong/Good (%)	Some (N)	None (N)	Total (N)
Obstetric hemorrhage	7	70	2	1	10
Sepsis/infection	5	63	3	0	8
Preeclampsia/eclampsia	9	60	6	0	15
Deep vein thrombosis/ pulmonary embolism	3	37	4	1	8
Cardiomyopathy and other cardiovascular disorders	5	29	12	2	19
Amniotic Fluid Embolism	0	0	12	2	14
All other causes of death*	7	32	8	7	22
Total (%)	36	38%	47	13	96**

# Assessing Preventability for Obstetric Hemorrhage

- Examined 63 cases of obstetric hemorrhage resulting in severe or “near-miss” maternal morbidity
  - ▣ ICU admission
  - ▣ Transfusion of 3 or more units
  
- 34 (54%) deemed preventable

# Preventable

- **Deficiencies in care that led to morbidity/mortality**
- **Denial**
  - Severity of hemorrhage
  - Need for aggressive intervention
- **Delays**
  - Diagnosis
  - Uterotonics
  - Blood products

# Proposed interventions to improve PPH care



1. Systematic risk assessment
2. Quantitative estimation of blood loss
3. Vital signs triggers
4. Systems-level solutions