



## CLINICAL ARTICLE

## Comparison of outcomes of perinatal care in Slovakia and the UK

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## ABSTRACT

**Objective:** To investigate whether there are differences in maternal and perinatal outcomes between Slovakia and the UK, and whether any observed variations can be attributed to differences in perinatal care. **Methods:** Data on outcomes of perinatal care in Slovakia and the UK between 2006 and 2010 were compared. Perinatal mortality figures included stillbirths weighing 1000 g or more and early neonatal deaths. **Results:** In Slovakia, the perinatal mortality rate was significantly higher than that in the UK (RR 1.12; 95% CI, 1.06–1.18). Cesarean delivery was significantly more frequent in Slovakia (RR 1.05; 95% CI, 1.05–1.06); instrumental vaginal delivery was less frequent (ventouse delivery, RR 0.20; 95% CI, 0.19–0.21; forceps delivery, RR 0.09; 95% CI, 0.09–0.10). Episiotomy and peripartum hysterectomy were performed more often in Slovakia (episiotomy, RR 4.10; 95% CI, 4.07–4.12; peripartum hysterectomy, RR 2.02; 95% CI 1.65–2.47). The incidence of eclampsia was significantly higher in Slovakia (RR 1.60; 95% CI, 1.26–2.04). There were no significant differences in the rates of maternal death. **Conclusion:** Perinatal care outcomes and intervention rates differ between Slovakia and UK. This may be explained by differences in outcome definitions, perinatal care, and official encouragement of medical complaints.

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## 1. Introduction

Perinatal care, place of birth, and postpartum care vary between countries. In Slovakia, hospital care during labor was instituted in the middle of the 20th century; today, most women attend an obstetric unit for labor and delivery and an obstetrician is responsible for perinatal care. When the mother and newborn have no complications, the postnatal stay is usually 4 days after a vaginal delivery and 4–5 days after a cesarean delivery [1]. In England, women have been able to choose since 1990 between giving birth at home, a free-standing or alongside midwifery unit, or an obstetric unit, and perinatal care is mostly provided by midwives. Women who have a normal birth without complications can be discharged home after a few hours [2]. In 2008, 2.9% of births in England were at home [3].

The aim of the present study was to investigate whether there are differences in maternal and perinatal outcomes between Slovakia and the UK, and whether any observed differences can be attributed to variations in perinatal care.

## 2. Materials and methods

The present study compared the rates of stillbirth, early neonatal death, overall perinatal mortality, perinatal mortality stratified by birth

weight, episiotomy, peripartum hysterectomy, and maternal morbidity and mortality, and the modes of delivery in Slovakia and the UK. Ethics approval and informed consent were not required because it was a secondary analysis of previously collected data.

The data for Slovakia were prospectively acquired from perinatal reports to the chief expert for gynecology and obstetrics at the Ministry of Health in Slovakia. Data on the number of deliveries, live births, stillbirths, early neonatal deaths, cesarean deliveries, and cases of eclampsia, and data on the birth weight were available for 2007–2010 [4–7]. Data on the number of instrumental vaginal deliveries and postpartum hysterectomies were available for 2008–2010 [4,6,7]; data on the number of episiotomies and elective and emergency cesarean deliveries were available for 2009–2010 [4,7]. Data on maternal mortality were available for 2007–2009 [8]. Maternal mortality data for 2010 had not been published at the time of writing.

For the UK, data on the number of live births, stillbirths, and early neonatal deaths were available for 2006–2010 [9–14]. Data about the birth weight of liveborn and stillborn infants and those who died in the early perinatal period were available for England and Wales only during 2006 and 2007 [9,10]. Data about the mode of delivery were obtained for England only for the periods 2009–2010 and 2010–2011 [3,15]; no data on the mode of delivery and the number of episiotomies were available for deliveries at home and in private hospitals in England. Data on maternal morbidity in the UK were obtained from UK Obstetric Surveillance System studies [16,17]. Data on maternal deaths in the UK were available for 2006–2008 [18].

In Slovakia, a stillbirth is defined as a child born without any signs of viability and weighing 1000 g or more; a stillborn infant weighing 999 g or less is defined as a spontaneous abortion [19]. Live births are defined

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as infants with a birth weight of 500 g or more with evidence of viability, and infants with a birth weight of less than 500 g who survive more than 24 hours. Infants weighing less than 500 g who die within less than 24 hours of age are defined as an abortion [19]. In the UK, a stillbirth is defined as a child born after the 24th week of pregnancy who did not breathe or show any signs of life at any time after being completely expelled from the mother [9,10]. To control for differences in these definitions, the Slovakian definitions were used for the present analysis, and stillbirths weighing less than 1000 g were excluded from the UK data.

Early neonatal death is defined as death of a newborn within less than 7 days in both countries [9,10,19].

The numbers of maternities, deliveries, live births, and total births are presented as incidences with 95% confidence intervals (CIs). The data were compared using risk ratios (RRs) with 95% CIs and applying the  $\chi^2$  or Fisher exact test as appropriate.  $P < 0.05$  was considered statistically significant. All statistical analyses were carried out using Stata 11 SE (StataCorp, College Station, TX, USA).

### 3. Results

The perinatal mortality rate (including stillbirths weighing 1000 g or more and early neonatal deaths) was significantly higher in Slovakia than in the UK (RR 1.12; 95% CI, 1.06–1.18;  $P < 0.0001$ ) (Table 1). However, without correction for the differing definitions of stillbirth, the perinatal mortality rate was significantly lower in Slovakia (RR 0.88; 95% CI, 0.84–0.92;  $P < 0.0001$ ) (Table 1). The individual rates of stillbirth and early neonatal death were also significantly lower in Slovakia if definition differences were not taken into account (stillbirth, RR 0.85; 95% CI, 0.80–0.90;  $P < 0.0001$ ; early neonatal death, RR 0.91; 95% CI, 0.84–0.99;  $P = 0.004$ ). The significantly lower rates of perinatal mortality, stillbirth, and early neonatal death in Slovakia were mostly due to differences in stillbirth definitions; in the group of infants with birth weight below 1000 g, the perinatal mortality rate appeared lower in Slovakia (RR 0.5; 95% CI, 0.4–0.6;  $P < 0.0001$ ) principally because of a lower stillbirth rate (RR 0.03; 95% CI, 0.01–0.07;  $P < 0.0001$ ).

A breakdown of the rates of perinatal mortality, stillbirth, and early neonatal death among infants with a birth weight of 1000 g or more revealed differences by weight group (Table 2). Among infants with a birth weight of 1000–1499 g or 1500–1999 g, perinatal mortality rates in Slovakia were higher than those in England and Wales ( $P < 0.0001$  for both). Among infants with a birth weight of 2000–2499 g, these rates were not significantly different ( $P = 0.14$ ). In the group of infants with a birth weight of 2500 g or more, the rate of perinatal mortality was again significantly higher ( $P = 0.0004$ ) in Slovakia; the same pattern was found for the rate of stillbirth ( $P < 0.0001$ ), but the rate of

**Table 2**

Rates of perinatal mortality, stillbirth, and early neonatal death by birth weight in Slovakia (2007–2010) and England and Wales (2006–2007).

Birth weight group	Incidence (95% CI) <sup>a</sup>		RR (95% CI)
	Slovakia	England and Wales	
1000–1499 g			
Perinatal mortality	150.3 (133.4–168.5)	115.2 (109.2–121.4)	1.3 (1.1–1.5)
Stillbirth	98.0 (84.0–113.4)	89.3 (83.8–94.8)	1.6 (1.3–1.8)
Early neonatal death	58.0 (46.7–71.2)	28.6 (25.3–32.1)	2.0 (1.6–2.6)
1500–1999 g			
Perinatal mortality	69.5 (61.3–78.0)	46.9 (44.1–49.9)	1.5 (1.3–1.7)
Stillbirth	48.0 (41.1–55.6)	37.4 (34.1–40.1)	1.3 (1.2–1.5)
Early neonatal death	22.6 (17.9–28.3)	9.8 (8.5–11.3)	2.3 (1.8–3.0)
2000–2499 g			
Perinatal mortality	18.6 (16.2–21.2)	16.7 (15.8–17.7)	1.1 (1.0–1.3)
Stillbirth	14.5 (12.4–16.8)	13.0 (12.2–14.0)	1.1 (0.9–1.3)
Early neonatal death	4.2 (3.1–5.6)	3.7 (3.2–4.2)	1.1 (0.8–1.6)
≥ 2500 g			
Perinatal mortality	2.9 (2.6–3.1)	2.4 (2.4–2.5)	1.2 (1.1–1.3)
Stillbirth	2.4 (2.2–2.6)	1.8 (1.7–1.9)	1.3 (1.2–1.5)
Early neonatal death	0.5 (0.4–0.6)	0.7 (0.6–0.7)	0.8 (0.6–1.0)

Abbreviations: CI, confidence interval; RR, relative risk.

<sup>a</sup> Early neonatal deaths are given as number per 1000 live births; perinatal mortality and stillbirth values are given as number per 1000 total births.

early neonatal death was significantly lower ( $P = 0.02$ ) in Slovakia than in England and Wales.

The modes of delivery in Slovakia (2007–2010) and England (2009–2011) also differed considerably (Table 3). In Slovakia, the overall proportion of cesarean deliveries was higher ( $P < 0.0001$ ). In particular, the proportion of elective cesarean deliveries in Slovakia was significantly higher (RR 1.06; 95% CI, 1.05–1.08;  $P < 0.0001$ ). By contrast, the proportion of emergency cesarean deliveries was significantly lower (RR 0.96; 95% CI, 0.95–0.97;  $P < 0.0001$ ). Operative vaginal delivery was less common in Slovakia ( $P < 0.0001$  for both ventouse and forceps delivery), but the rate of episiotomy was higher ( $P < 0.0001$ ) (Table 3).

In terms of maternal morbidity, the rates of both eclampsia and peripartum hysterectomy were higher in Slovakia ( $P < 0.0001$  for both) (Table 3).

When the overall maternal mortality rate in Slovakia during 2007–2010 was compared with that in the UK during 2006–2008, there was no statistically significant difference ( $P = 0.84$ ), although the numerical value was higher in Slovakia than in the UK (Table 4).

### 4. Discussion

The present analysis showed that the perinatal mortality rate in Slovakia is significantly higher than that in the UK. However, without

**Table 1**  
Perinatal mortality in Slovakia and the UK during 2006–2010.

Type of event	Number of events					Perinatal mortality rate during 2006–2010 (95% CI) <sup>a</sup>	
	2006	2007	2008	2009	2010	Stillbirths ≥ 1000 g <sup>b</sup>	Without correction <sup>c</sup>
Slovakia							
Live births	51 526	51 650	54 099	56 809	56 201		
Stillbirths	218	217	230	230	300		
Early neonatal deaths	130	105	126	112	132		
UK							
Live births	748 563	772 245	796 705	790 204	781 956 <sup>d</sup>		
Stillbirths	3987	4027	4057	4132	4005 <sup>d</sup>		
Early neonatal deaths	1942	1944	1982	1890	1775 <sup>d</sup>		

Abbreviation: CI, confidence interval.

<sup>a</sup> Values are given as total number of stillbirths and early neonatal deaths per 1000 total births unless otherwise indicated.

<sup>b</sup> Perinatal mortality rate including stillbirths ≥ 1000 g only.

<sup>c</sup> Perinatal mortality rate using the stillbirth definitions in each country.

<sup>d</sup> Data for England, Scotland, and Wales only.

<sup>e</sup> Data for England and Wales during 2006–2007.

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