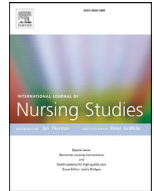




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## A comparison between midwifery and obstetric care at birth in Spain: Across-sectional study of perinatal outcomes

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## ABSTRACT

**Background:** The organizational structure of maternity services determines the choice of which professionals provide care during pregnancy, birth, and the postnatal period, and it influences the kind of care they deliver and the level of continuity of care offered. There is considerable evidence that demonstrates a relationship between how care is provided and the maternal and neonatal health outcomes. Registered midwives and obstetricians provide maternity care across Spain. To date, no studies have assessed whether maternity outcomes differ between these two groups.

**Objective:** The aim of this study was to examine the association between the care received (midwifery care versus obstetric care) and the maternal and neonatal outcomes in women with normal, low- and medium-risk pregnancies in Spain from 2016 to 2019.

**Design:** A prospective, multicentre, cross-sectional study was carried out as part of COST Action IS1405 at 44 public hospitals in Spain in the years 2016–2019. The protocol can be accessed through the registry ISRCTN14062994. The sample size of this study was 11,537 women. The primary outcome was mode of birth. The secondary outcomes included augmentation with oxytocin, use of epidural analgesia, women's position at birth, perineal integrity, third stage of labour management, maternal and neonatal admission to intensive care, Apgar score, neonatal resuscitation, and early initiation of breastfeeding. Chi-square tests for categorical variables and independent sample *t*-test for continuous variables to assess differences between the midwifery and obstetric groups were calculated. Odds ratio with intervals of confidence at 95% were calculated for obstetric interventions and perinatal outcomes. A multivariate logistic regression model was applied in order to examine the effect of type of healthcare provider on perinatal outcomes. These models were adjusted for care provider, type of onset of labour, use of anaesthesia, pregnancy risk, maternal age, parity, and gestational age at birth.

**Results:** Midwifery care was associated with lower rates of operative births and severe perineal damage and had no higher adverse outcomes. No statistically significant differences were observed in the use of other obstetric interventions between the two groups.

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**Conclusions:** The findings of this study should encourage a shift in the current maternity care system towards a greater integration of midwifery-led services in order to achieve optimal birth outcomes for women and newborns.

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### What is already known

- There is considerable evidence indicating a relationship between how maternity care is provided and maternal and neonatal health outcomes.
- Midwifery-led care has been shown to be associated with fewer obstetric interventions and increased women's satisfaction with their birthing experience.
- There is a need to determine which of the factors associated with the organization of maternity services influence the use of obstetric interventions and perinatal outcomes in Spain.

### What this paper adds

- This is the first study to analyse the association of the health care provider group and perinatal outcomes in Spain.
- Healthy women receiving midwifery care were half as likely to have an operative birth and had an approximately 40% lower risk of severe perineal damage than those receiving obstetric care in Spain.
- Midwifery care is safe and effective and is not associated with higher risk of adverse outcomes for women with normal, low- and medium-risk pregnancies and their infants.

## 1. Background

The care offered to healthy women during birth has been subject of considerable debate worldwide in recent years. The World Health Organization has acknowledged that intrapartum care often includes the same level of intervention, regardless of whether the intervention is needed (World Health Organization, 1997). Obstetric interventions are often used excessively or when they are not clinically indicated, and both the potential impact of these interventions on women and infants' wellbeing and their economic cost are issues of great concern, particularly in high-income countries (Caughy et al., 2014; Miller et al., 2016).

The organizational structure of maternity services determines the choice of which professionals provide care during pregnancy, birth and the postnatal period, and it influences the kind of care they deliver and the level of continuity of care offered. There is considerable evidence that demonstrates a relationship between how care is provided and the maternal and neonatal health outcomes (Brocklehurst et al., 2012; Marshall et al., 2015; Martín-Arribas et al., 2020; Souter et al., 2019; Thiessen et al., 2016; Voon et al., 2017).

A number of studies have shown positive results when midwives are the primary care providers throughout this period. Worldwide, midwife led-care has been shown to be associated with fewer obstetric interventions and with increased satisfaction on the part of women with their birthing experience (Sandall et al., 2016; Ten Hoop-Bender et al., 2014; World Health Organization, 2018). In addition, other studies suggest that, for low-risk pregnancies, midwifery care is more cost-effective than other models of care (Kenny et al., 2015; Tracy et al., 2013). Therefore, many countries have made strong efforts to implement alternative models of care for women with low-risk pregnancies.

Relative to other countries such as the United Kingdom and the Netherlands, maternity care in Spain is still significantly med-

icalized (Escuriet-Peiró et al., 2015). Most women give birth in highly technological obstetric units staffed by both obstetricians and midwives (Ministry of Health and Consumers' Affairs, 2008). In the Spanish Health System, midwives provide care to women with normal, low-risk or medium-risk pregnancies. However, studies have shown that midwives' degree of autonomy is constrained by the organizational structure of professional teams (Martín-Arribas et al., 2020). A local study highlighted the need for further examination of factors associated with the organization of maternity services that may influence the use of obstetric interventions and perinatal outcomes (Escuriet et al., 2014). Furthermore, in Spain, to date, no large studies have analysed the association of the health care provider group and perinatal outcomes.

The aim of this study was to examine the association between the care received (midwifery care versus obstetric care) and the maternal and neonatal outcomes in women with normal, low- and medium-risk pregnancies in Spain from 2016 to 2019.

## 2. Methods

### 2.1. Study design

This article presents a part of the results obtained within the MidconBirth study. This is a prospective, multicenter, cross-sectional study under the auspices of COST Action IS1405. The protocol can be accessed through the registry ISRCTN14062994 (Escuriet et al., 2017).

### 2.2. Patient and public involvement

A multidisciplinary team and users' representatives were involved in the design and the dissemination plans of this research. The priority of the research question and choice of outcome measures were decided by these two groups. Once the study has been published, participant centres and women's associations will be informed of the results via email and through a dedicated website ([www.llevadora.eu](http://www.llevadora.eu)). The results will also be presented in a summary suitable for a non-specialist audience.

### 2.3. Settings and participants

For the purpose of this study, we selected 44 publicly funded hospitals from four different regions that are representative of Spain as a whole in terms of sociodemographic and economical characteristics.

The sample was limited to primiparous and multiparous women between 18 and 40 years of age with a singleton, cephalic presentation and low or medium-risk pregnancy between 37 and 42 weeks of gestation. Women were classified as "women with normal, low- or medium-risk pregnancies" if, before the onset of labour, they were not known to have any of the medical or obstetric risk factors included on the list describing high or very high-risk pregnancies in the antenatal care guidelines of Catalonia (Spain) (Fernandez and Escuriet, 2018). The presence of such factors is believed to increase risk for the woman or baby, and obstetric-led care would be expected under these circumstances.

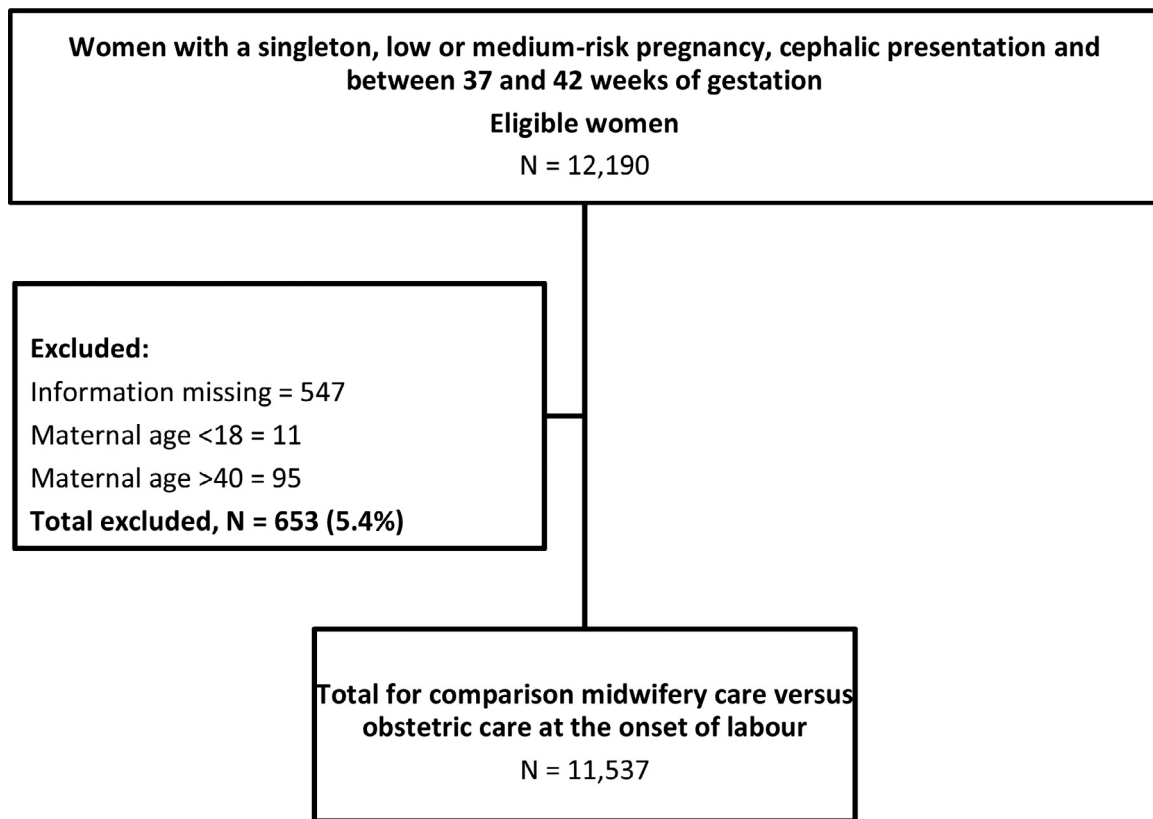


Fig 1. Flow chart of the record selection of registered births between 2016 and 2019.

Therefore, this study did not include women with pregnancies classified as high or very high risk or those requiring an elective caesarean section.

#### 2.4. Sample size

The reference population was 42,141 women. The sample size was calculated based on the annual number of births of each participating centre. To calculate the sample size (95% level of confidence) it was assumed that an unknown proportion of births attended by midwives for each estimated population (50%) in each setting, with a (+/−) 5% precision and a reposition proportion of 10%. The minimum estimated sample size to achieve a representative sample for each hospital in Spain was 11,314 women. The initial sample was 12,190. Then, after excluding records of women who were not eligible or records with missing values, the final sample size of this study was 11,537 women (Fig 1).

#### 2.5. Outcome measures

The primary outcome was the mode of birth of women who gave birth in publicly funded hospitals during the study period. The secondary outcome was a composite of a range of different perinatal outcomes. This composite was designed to capture the quality of intrapartum care according to the WHO's standards of good practise (World Health Organization, 2018). This composite included augmentation with oxytocin, use of epidural analgesia, women's position at birth, perineal integrity, third stage of labour management, maternal and neonatal admission to intensive care, Apgar score, neonatal resuscitation, and early initiation of breastfeeding.

#### 2.6. Data collection

Data were collected through an online platform from 2016 to 2019. Each participating unit or trust had a local coordinating midwife. Data collection forms for the study were designed to be completed by the midwife providing intrapartum care. All midwives participating in the study received a training session on data collection. In addition, all midwives signed a commitment form stating that the data was collected according to the protocol. Furthermore, data collection was conducted consecutively during the specified period until the minimum number of cases needed was reached, as per protocol.

The intervention examined in this study is the care provided to women with normal, low- and medium-risk pregnancies during labour and birth. The data collected included information on the sociodemographic characteristics of the women (age, nationality, level of education, ethnicity) and on obstetric features. Information was also gathered on the health professional attending each woman, along with data related to procedures performed on each woman who met the inclusion criteria, and their respective perinatal outcomes.

#### 2.7. Statistical analysis

The analysis population included all eligible healthy women with normal, low- and medium-risk pregnancies for whom data were collected. Women were included in the midwifery care or obstetric care groups at the start of care in labour regardless of whether they were later transferred during labour. We compared the two groups in order to establish whether outcomes differed between them. In addition, women's records with missing values were excluded from the analysis.

**Table 1**  
Women's socio-demographic characteristics and their obstetric features.

Characteristics	Midwife-led care n = 10,844 (94.0) N (%)	Obstetrician-led care n = 693 (6.0) N (%)	Total n = 11,537 (100) N (%)	P-value
<i>Demographics</i>				
<i>Age in years</i>				
Mean [SD]	31.3 (5.1)	31.8 (4.9)	31.3 (5.1)	0.0045
< 20	192 (1.8)	12 (1.7)	204 (1.7)	
≥ 20 to <35	7410 (68.3)	453 (65.4)	7863 (68.2)	
≥35	3242 (29.9)	228 (32.9)	3242 (30.1)	
<i>Educational level</i>				
Low	2437 (22.5)	174 (25.1)	2611 (22.6)	<0.001
Middle	3469 (32.0)	218 (31.5)	3687 (32.0)	
High	2970 (27.4)	217 (31.3)	3187 (27.6)	
Unknown	1968 (18.2)	84 (12.1)	2052 (17.8)	
<i>Ethnicity</i>				
Spanish	7380 (68.1)	506 (73.0)	7886 (68.4)	0.0159
European (Other than Spanish)	647 (6.0)	27 (3.9)	674 (5.8)	
South and central-American	1000 (9.2)	66 (9.5)	1066 (9.2)	
North-American	16 (0.2)	2 (0.3)	18 (0.2)	
African	1379 (12.7)	71 (10.2)	1450 (12.6)	
Asian	275 (2.5)	18 (2.6)	293 (2.5)	
Other	147 (1.3)	3 (0.4)	150 (1.7)	
<i>Residence</i>				
Cataluña	6905 (63.7)	349 (50.4)	7254 (62.9)	<0.001
Galicia	2219 (20.5)	59 (8.5)	2278 (19.8)	
Comunidad Valenciana	902 (8.3)	99 (14.3)	1001 (8.7)	
Castilla y León	818 (7.5)	186 (26.8)	1004 (8.7)	
<i>Obstetric features</i>				
<i>Parity</i>				
Primiparous	5164 (47.6)	401 (57.9)	5565 (48.2)	<0.001
Parous	5680 (52.4)	292 (42.1)	5972 (51.8)	
<i>Gestational age</i>				
Mean [SD]	39.5 (1.1)	39.6 (1.2)	39.5 (1.1)	<0.001
≤ 40	8654 (79.8)	502 (72.4)	9156 (79.4)	
> 40 to ≤41+6	2190 (20.2)	191 (27.6)	2381 (20.6)	
<i>Pregnancy risk</i>				
Normal pregnancy	3746 (34.5)	166 (24.0)	3912 (33.9)	<0.001
Low-risk	2792 (25.8)	172 (24.8)	2964 (25.7)	
Medium risk	4306 (39.7)	355 (51.2)	4661 (40.4)	
<i>Type of onset of labour</i>				
Spontaneous	7996 (74.4)	264 (44.5)	8260 (72.9)	<0.001
Induction	2745 (25.6)	329 (55.5)	3074 (27.1)	

Descriptive statistics were used to summarize the women's socio-demographic characteristics and their obstetric features. The statistical analysis was carried out using the STATA version 16. Frequencies and percentages of the categories were calculated for all the variables. The standard deviation (SD) of the quantitative variables' means was calculated. Chi-square tests were conducted for categorical variables, and an independent sample *t*-test was done for continuous variables in order to assess any differences between the midwifery care and obstetric care groups. Odds ratios (OR) with confidence intervals (CI) at 95% were calculated for obstetric interventions and perinatal outcomes. P-values < 0.05 were considered statistically significant. A multivariate logistic regression model was performed in order to examine the differing effects of midwifery care and obstetric care on perinatal outcomes and to ascertain the effects of the studied co-variables. These models were adjusted using a stepwise variable selection process based on the level of significance of the univariate analysis. We adjusted for care provider, type of onset of labour, use of anaesthesia, pregnancy risk, maternal age, parity, and gestational age at birth.

### 2.8. Ethics

This study was approved by the ethics committee of the coordinating centre (Clinical Research Ethics Committee of Parc de Salut Mar 2016/6785/1) and by the ethics committee of each participating hospital. Since this is an observational study in which data was anonymized, no consent was required from the women who had received care in the participating centres. If a given hospital re-

quired consent from the women under its care, written consent was obtained.

### 3. Results

The total sample included in the analysis consisted of 11,537 records detailing cases in which 10,844 (94%) women received intrapartum care from midwives and 693 (6%) received this care from obstetricians. The women's socio-demographic characteristics and their obstetric features are presented in Table 1.

The univariate analysis for obstetric interventions and perinatal outcomes for both groups are presented in Table 2. Women in the midwifery care group were less likely to have received epidural analgesia (80.8% versus 88.9%;  $p \leq 0.001$ ) and augmentations of labour (58.6% versus 72.7%;  $p \leq 0.001$ ) than women in the obstetric care group. The majority of women in both groups gave birth in lithotomy position. Nonetheless, women giving birth in positions other than the lithotomy position were also significantly higher in the midwifery care group (41.9% versus 32.7%;  $p \leq 0.001$ ). The proportion of women in the midwifery care group giving birth spontaneously was higher than in the obstetric care group, and this difference was statistically significant (74% versus 44.3%;  $p \leq 0.001$ ). Operative births included vacuum, forceps, spatula, and caesarean deliveries. Those were significantly less frequent for women in the midwifery care group than for those in the obstetric care group (vacuum: 8.8% versus 9.0%; forceps: 4.5% versus 8.4%; spatula: 2.2% versus 5.9%; caesarean section: 10.4% versus 32.2%; all  $p$ -values were  $\leq 0.001$ ). Women under midwifery care had lower rates of

**Table 2**  
Descriptive and univariate analysis of obstetric interventions and perinatal outcomes.

	Midwifery care n = 10,844 (94.0) N (%)	Obstetric care n = 693 (6.0) N (%)	P-value OR (CI 95%)
Use of epidural/general anaesthesia during labour			< <b>0.001</b>
No drugs	2080 (19.2)	77 (11.1)	1
Use of epidural/general anaesthesia during labour	8764 (80.8)	616 (88.9)	0.5 (0.4–0.7)
Augmentation with oxytocin			< <b>0.001</b>
Yes	6357 (58.6)	504 (72.7)	1
No	4487 (41.4)	189 (27.3)	1.9 (1.6–2.2)
Mode of birth			< <b>0.001</b>
Spontaneous vaginal birth	8029 (74.0)	307 (44.3)	1
Operative birth	2815 (26.0)	386 (55.7)	0.3 (0.2–0.3)
Position at birth			< <b>0.001</b>
Lithotomy	6265 (58.1)	419 (67.3)	0.7 (0.6–0.8)
Others	4523 (41.9)	204 (32.7)	1
Third stage of labour management			< <b>0.001</b>
Active	5789 (53.7)	428 (68.7)	1
Physiological	4999 (46.3)	195 (31.3)	1.9 (1.6–2.3)
Perineal integrity			< <b>0.001</b>
Intact perineum/ I-II degree	9549 (98.3)	159 (29.4)	1
Episiotomy, III-IV degree	170 (1.7)	127 (23.5)	1.1 (0.8–1.4)
Maternal admission to intensive care			<b>0.0196</b>
Yes	65 (0.6)	10 (1.4)	1
No	10,779 (99.4)	683 (98.6)	2.4 (1.2–4.7)
Apgar score			<b>0.012</b>
5-minute Apgar $\geq 7$	10,765 (99.3)	681 (98.3)	1
5-minute Apgar < 7	79 (0.7)	12 (1.7)	0.4 (0.2–0.8)
Neonatal resuscitation			< <b>0.001</b>
Yes	510 (4.7)	63 (9.1)	1
No	10,334 (95.3)	630 (90.9)	2.0 (1.5–2.7)
Early initiation of breastfeeding			< <b>0.001</b>
Yes	8830 (81.4)	490 (70.7)	1
No	2014 (18.6)	203 (29.3)	0.6 (0.5–0.7)

OR: Odds Ratio (Obstetric care vs. Midwifery care); CI: Confidence Interval.

**Table 3**  
Crude and adjusted associations between different variables and **operative mode of birth**.

	Crude OR (CI 95%)	Adjusted OR (CI 95%)	P-value (adjusted)
<b>Care provider</b>			
Obstetric care	1	1	< <b>0.001</b>
Midwifery care	0.28 (0.24 - 0.33)	0.5 (0.4–0.6)	
<b>Type of onset of labour</b>			
Spontaneous	1	1	< <b>0.001</b>
Induction	2.48 (2.26–2.71)	1.7 (1.4–1.8)	
<b>Pregnancy risk</b>			
Normal pregnancy	1	1	
Low risk	1.05 (0.94 - 1.17)	1.1 (0.97–1.2)	0.127
Medium	1.4 (1.27–1.54)	1.6 (1.43–1.78)	< <b>0.001</b>
<b>Gestational age</b>			
$\leq 40$	1	1	< <b>0.001</b>
$> 40$ to $\leq 41+6$	1.47 (1.35–1.59)	1.50 (1.33- 1.61)	
<b>Maternal age</b>	1.02 (1.01–1.03)	1.04 (1.03–1.05)	< <b>0.001</b>
<b>Parity</b>			
Nulliparous	1	1	< <b>0.001</b>
Parous	0.25(0.23–0.28)	0.2 (0.2–0.3)	

OR: Odds Ratio; CI: Confidence Interval.

severe perineal damage (III- and IV-degree tears and episiotomy) (1.7% vs. 23.5%;  $p \leq 0.001$ ). Furthermore, women in the midwifery care had significantly lower rates of active third stage management (53.7% versus 68.7%;  $p \leq 0.001$ ). Statistical differences between the two groups were also found in the percentage of women admitted to intensive care (0.6% versus 1.4%;  $p = 0.02$ ).

Compared with the infants in the obstetric care group, midwifery newborns had significantly lower rates of 5-minutes Apgar score < 7 (0.7% versus 1.7%;  $p = 0.012$ ), neonatal resuscitation (4.7% versus 9.1%;  $p \leq 0.001$ ) and higher rates of early initiation of breastfeeding (81.4% versus 70.7%;  $p \leq 0.001$ ).

Further analysis was conducted via multiple logistic regressions to examine the association between the maternity care and ob-

stetric interventions and maternal and neonatal outcomes. Clinical variables that were statistically significant in the univariate analysis were used as confounding variables in the multivariate analysis. Statistically significant differences were found between the two groups in terms of the mode of birth and perineal integrity after adjusting for parity, maternal age, pregnancy risk, gestational age, type of onset of labour and use of epidural/general anaesthesia as confounding variables. These results are shown in [Table 3](#) and [Table 4](#), respectively. Women in the midwifery care group were 50% less likely to have an operative birth (aOR: 0.5; 95% CI 0.4–0.6) than women in the obstetric care group. In addition, women under midwifery care also had significantly lower rates of severe perineal damage (aOR: 0.62; 95% CI (0.49–0.78)). Meanwhile, all the other

**Table 4**  
Crude and adjusted associations between different variables and **severe perineal damage**.

	Crude OR (CI 95%)	Adjusted OR (CI 95%)	P value (adjusted)
<b>Care provider</b>			
Obstetric care	1	1	<b>&lt;0.001</b>
Midwifery care	0.44 (0.37–0.54)	0.62 (0.49–0.78)	
<b>Type of onset of labour</b>			
Spontaneous	1	1	0.590
Induction	1.49 (1.35–1.63)	1.03 (0.92–1.56)	
<b>Pregnancy risk</b>			
Normal pregnancy	1	1	
Low risk	0.94 (0.85–1.04)	0.90 (0.79–1.02)	0.107
Medium	0.90 (0.82–0.99)	0.99 (0.89–1.12)	0.975
<b>Gestational age</b>			
≤ 40	1	1	0.729
> 40 to ≤ 41+6	1.17(1.08–1.27)	1.02 (0.92–1.12)	
<b>Maternal age</b>	0.99 (0.98–1)	1.01 (1.0–1.02)	0.040
<b>Parity</b>			
Nulliparous	1	1	<b>&lt;0.001</b>
Parous	0.22 (0.20–0.24)	0.3 (0.28–0.35)	

OR: Odds Ratio; CI: Confidence Interval.

confounding variables were found to have a statistically significant influence on the mode of birth. Maternal age and parity had also a significant influence on the prevalence of perineal damage. No statistically significant differences were observed in any of the other health outcomes that were found to be statistically significant in the univariate analysis.

#### 4. DISCUSSION

To the best of our knowledge, the present study is the largest analysis conducted to date in Spain comparing maternal and neonatal birth outcomes of women with normal, low, and medium-risk pregnancies receiving midwifery care with those of women with normal, low, and medium-risk pregnancies receiving obstetric care.

The main finding of our study was that, even in a highly medicalized maternity system where 99.8% of women give birth in conventional obstetric units, midwifery care had significant positive effects on maternal health outcomes. Women in the midwifery care group were half as likely to have an operative birth than women in the obstetric care group. This finding is consistent with those from most previous research (Bartuseviciene et al., 2018; Janssen et al., 2007; Sandall et al., 2016; Souter et al., 2019; Sutcliffe et al., 2012). In addition, the caesarean section rate for women in the midwifery care group was 10.4%. This remarkable caesarean section rate is far below both the caesarean rate for women in the obstetric care group and the national CS rate in publicly funded hospitals, which are 33.2% and 22.2% respectively. Furthermore, in accordance with findings in the literature, compared with obstetricians, this study found that midwifery users had an approximately 40% lower risk of severe perineal damage (Bodner-adler et al., 2017; Dencker et al., 2017; Sandall et al., 2016). Moreover, the findings suggest that midwifery care is safe and effective, and that is not associated with a higher risk of adverse outcomes for women with normal, low- and medium-risk pregnancies and their infants. This supports the recent Cochrane review and other contemporary studies (Bartuseviciene et al., 2018; Sandall et al., 2016).

Many may view these findings as expected. These positive outcomes may be explained by the characteristics of care midwives provide. Midwifery education and midwives' scope of practice are characterized by an ethos of normality that includes the conception of birth as a natural process (International Confederation of Midwives, 2020; Kennedy et al., 2010; Ministerio de Educación y Ciencia, 2005). In addition, midwives in Spain tend to view ad-

vocacy for women and the safeguarding and promotion of normal birth as essential elements of their role (Martín-Arribas et al., 2020). Therefore, midwifery care, with its focus on the promotion of normal birth, could have contributed to optimal birth outcomes (Iida et al., 2014; International Confederation of Midwives, 2020; Sandall et al., 2016; Ten Hoope-Bender et al., 2014).

On the other hand, it is important to note that even though women with pregnancies classified as high- or very high-risk pregnancies were excluded from this study, the rate of instrumental births documented here was concerningly high, a finding in line with the latest Spanish data reported on Europeristat (Euro-Peristat Project, 2018). Although the rate of instrumental births was lower amongst women under the care of the midwives, the figure was high for both groups (15.5% for the midwifery care and 23.3% for the obstetric care) relative to the numbers in other European countries. Furthermore, and in contrast with most previous research, no statistical differences between the midwifery care and obstetric care groups were found in the frequency of obstetric interventions such as the use of epidural, oxytocin stimulation, the use of lithotomy position at birth or the active management of the third stage of labour (Dencker et al., 2017; Iida et al., 2014; Sandall et al., 2016; Souter et al., 2019; Voon et al., 2017).

When midwifery-led care is provided, the use of obstetric interventions is expected to be lower in comparison with other models of care. Nevertheless, this was not the case in the present study. This finding may be explained by the interventionist approach to birth care in our country (Escuriet-Peiró et al., 2015; Martín-Arribas et al., 2020). Despite increasing evidence of the influence of the maternity care provider and the birth setting on perinatal outcomes, most women in Spain continue to give birth in conventional obstetric units staffed by teams of midwives and obstetricians, and alternatives to this model of care are rarely present in Spain (Begley et al., 2011; Bolten et al., 2016; Brocklehurst et al., 2012; Martín-Arribas et al., 2020; Reitsma et al., 2020). This raises concerns as to the dubious benefits of giving birth in mixed environments, as recent studies have shown positive health outcomes when healthy women are provided care in midwife-led units that are separated from conventional obstetric units (Rowe et al., 2014; Sandall et al., 2016). A recent study that explored the facilitators and barriers to the promotion of normal birth in the Spanish context concluded that the main challenges standing in the way of efforts to facilitate normal birth in the country were the hierarchical relationship between obstetricians and midwives and the lack of institutional support to providing sufficient midwifery staffing. Midwives felt unable to utilize their midwifery skills, and

they often reported feeling disempowered and frustrated, leading to an increase in obstetric interventions during birth, as seen in previous studies (Carolan-Olah et al., 2015; Hadjigeorgiou and Coxon, 2014; Martin-Arribas et al., 2020; Thompson et al., 2016). The literature has shown that continuity models of care and adequate numbers of midwifery staff are major solutions that can help avoid unnecessary interventions and improve women's satisfaction (World Health Organization, 2018). In order to increase the provision of midwives in Spain, the access to the midwifery training requires to be reviewed as the number of places is very limited and does not meet the number of midwives that are on the process of retirement (Federación de Asociación de Matronas de España, 2014). These two key elements are of great importance as a potential corrective to a context where active management of labour is embraced to the detriment of women-centred care and evidence-based practice. In addition, research has shown that high rates of intervention may be harmful to both women and babies (Butler, 2017; Müller et al., 2016).

#### 4.1. Implications for practice

These findings highlight the importance of the selection of the care provider during birth on the basis of previous risk assessment, and they point to an urgent need to strengthen midwifery care in Spain. In view of the positive birth outcomes for women under the care of midwives described in our study and the strong international evidence that supports the many benefits of midwifery-led care, it is clear that policy-makers should consider a shift in the currently prevailing maternity care provision in order to ensure women's safety during the entire birth process. This change should include an increase in the level of midwifery staffing in birth settings, and efforts should be made to promote midwives' autonomy to their full scope of practice in mixed environments and to continue to expand access to extend midwife-led maternity services for eligible women. In addition, stakeholders may wish to consider ways of providing continuous care throughout pregnancy, birth and the postnatal period, in light of studies showing the value women place on continuity of care (Bodner-adler et al., 2017; Iida et al., 2014; Renfrew et al., 2014; Sandall et al., 2016). Furthermore, we believe that a redistribution of health budgets should be contemplated. Taking into consideration that the majority of pregnant women are healthy, it would be advisable for resources to be allocated proportionately to promote women-centred care in spaces without excessive medicalization. This means that highly technological settings should be avoided when intrapartum care for healthy women is provided. In addition, this may also contribute to the optimal use of resources and the sustainability of the health system (Friedman et al., 2015; Hollowell et al., 2012; Ryan et al., 2013; Tracy et al., 2013). This is an especially relevant issue especially in these times of global economic crisis and limited health care budgets.

#### 4.2. Implications for research

Questions remain about the best way to implement midwife-led continuity of care models in Spain. Future research should evaluate the use of obstetric interventions, women's experience and satisfaction as well as perinatal outcomes for those women and newborns that receive care at the newly formed midwifery-led services with its different variations. In addition, further research should assess the cost-effectiveness of these maternity care services.

#### 4.3. Strengths and limitations

This study has several strengths. This study is the first to provide insight on maternal and neonatal outcomes in midwifery care

in Spain. This highlights the importance of the selection of care provider during birth based on previous risk assessment. It also supports the provision of midwifery-led units as an additional choice in maternity care for women with low-risk pregnancies. Other strengths include the sample size of the study, the number of centres participating, the range of maternal and neonatal outcomes and the adjustment for multiple potential confounding factors in the analyses. Nevertheless, this study has limitations which should be noted. The first stems from the study's observational design, which means that causation cannot be determined (Polit and Beck, 2014). However, the results are consistent with the findings from previous studies that showed better maternal outcomes when midwifery models of care are implemented. This finding deserves the further attention of policy makers and health care providers (Sandall et al., 2016). Additionally, as an observational study, there is a probability that data collection might present some discontinuity. Nonetheless, all investigators were encouraged to collect the data consecutively and signed a commitment form in order to eliminate the risk of sampling bias, as all eligible participants were recruited. In addition, women's records with missing values were excluded from the analysis to avoid misinterpretations (Oliveira, 2020). Lastly, this study does not include data from the recently opened midwife-led units in Spain. However, the authors believe that these findings contribute to strengthening the knowledge of midwifery care in this country and its differences with obstetrician-led care in low-risk births.

## 5. Conclusion

In women with normal, low- and medium- risk pregnancies, midwifery care was associated with significantly lower rates of operative births and a lower frequency of severe perineal damage and had no higher adverse outcomes. The findings of this study should encourage a shift in the current maternity care system towards a greater integration of midwifery-led services in order to achieve optimal birth outcomes for mothers and newborns.

## Declaration of Competing Interest

The authors declare no conflicts of interest.

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