

FØDSELSMETODE RELATERT TIL UTKOMME FOR BARNET? -PROSSESEN FREM TIL EN FERDIG PHD

Solveig Bjellmo, overlege, PhD Ålesund

Tidslinje

Is breech presentation a risk factor for cerebral palsy? A Norwegian birth cohort study

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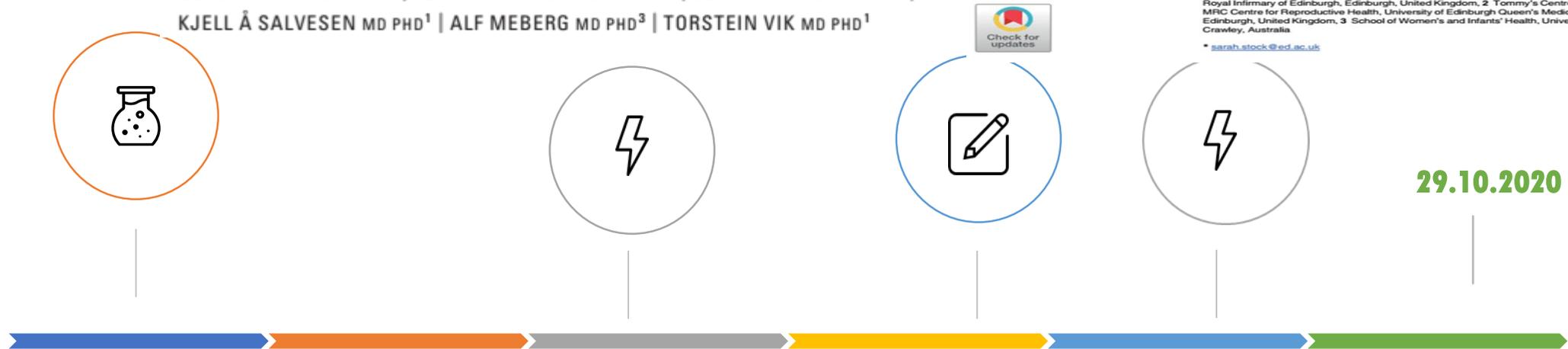
RESEARCH ARTICLE

Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis

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Trondheim(gr1 tjeneste 2012-2014)

Kontakt med Prof Torstein Vik.



Oppstart sept-2015

Midler:

- HMR
- Samarbeidsorganet

Biveilder

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Pål R. Romundstad
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**LEVERTE APRIL-
2020**

DISPUTAS

Recording LMS on Custom Live Streaming Service View Options View

HELSE MØRE OG ROMSDAL



NTNU
Norwegian University of
Science and Technology

Is pregnancy a risk factor for severe Covid-19?

Solveig Bjellmo
Trial lecture- October 2020

Solveig Bjellmo, NTNU

Mute Start Video Participants Chat Share Screen Record Reactions Leave

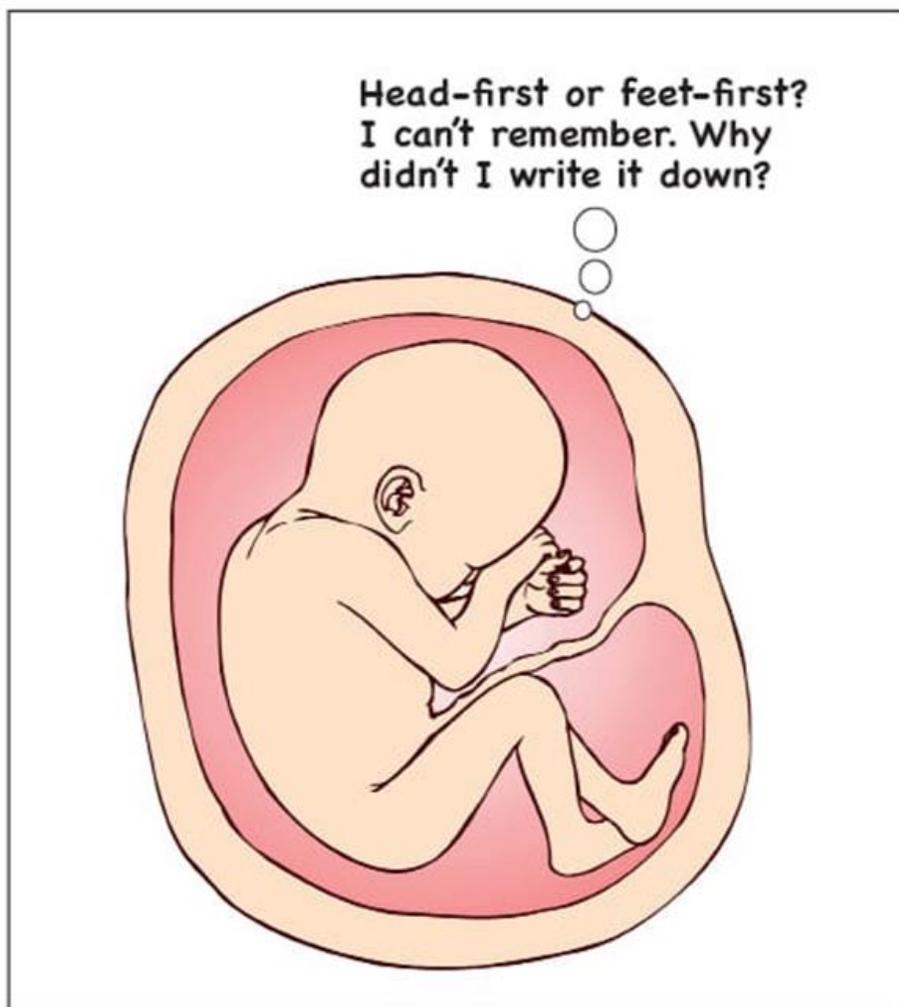


«Vaginal fødsel eller keisersnitt når barnet ligger i seteleie- Hva er risikoen hos barnet- hva er risikoen for mor?»



Helse Møre og Romsdal HF, Kvinneklinikken, Ålesund.
Norges teknisk-naturvitenskapelige universitet (NTNU).

Solveig Bjellmo



Potential harms and benefits of planned caesarean delivery of fetuses in breech presentation at term

- An observational study from Norway

Solveig Bjellmo- 2020

Thesis for doctor philosophiae, 29. October 2020

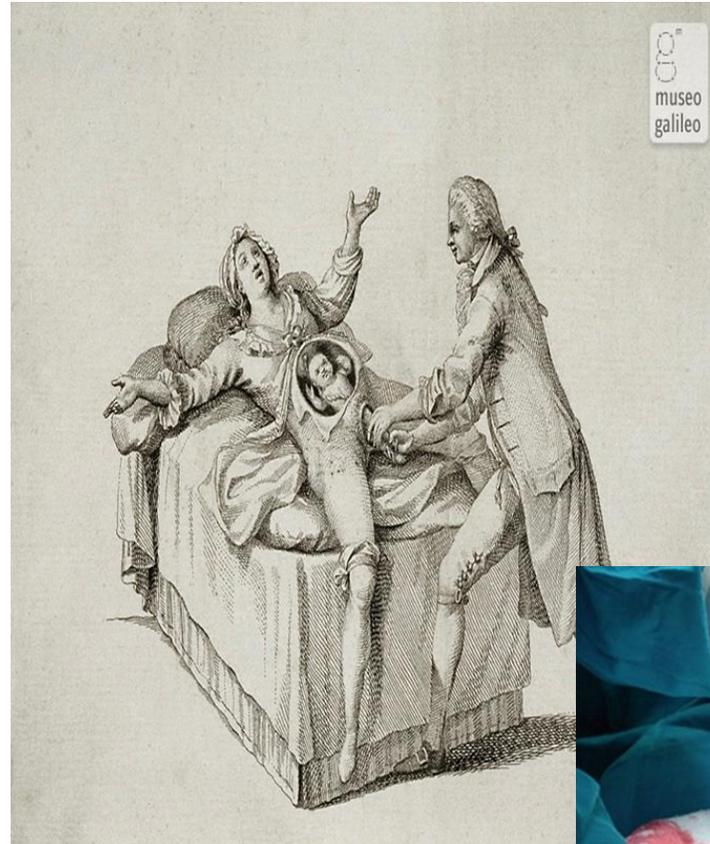
AIM



The main aim of this thesis is to increase the knowledge of acute and late complications in children born vaginally in breech or by caesarean delivery (CD) in a population with low perinatal mortality, and to examine potential complications in subsequent pregnancies after a CD.

OUTLINE

- Background
 - ✓ *Breech presentation*
 - ✓ *Caesarean delivery*
 - ✓ *Cerebral palsy*
- Three research paper
- Summary/Conclusion
- Limitations
- Clinical implications



Breech presentation

Frequency related to gestational age.

Week 28: 25%.

At term: 3-4 %.

20 % is undiagnosed.

Why breech?

-RISK FACTORS

Nulliparity, age of mother, sex, uterine abnormalities, placenta complications, amniotic fluid, previous breech presentation.

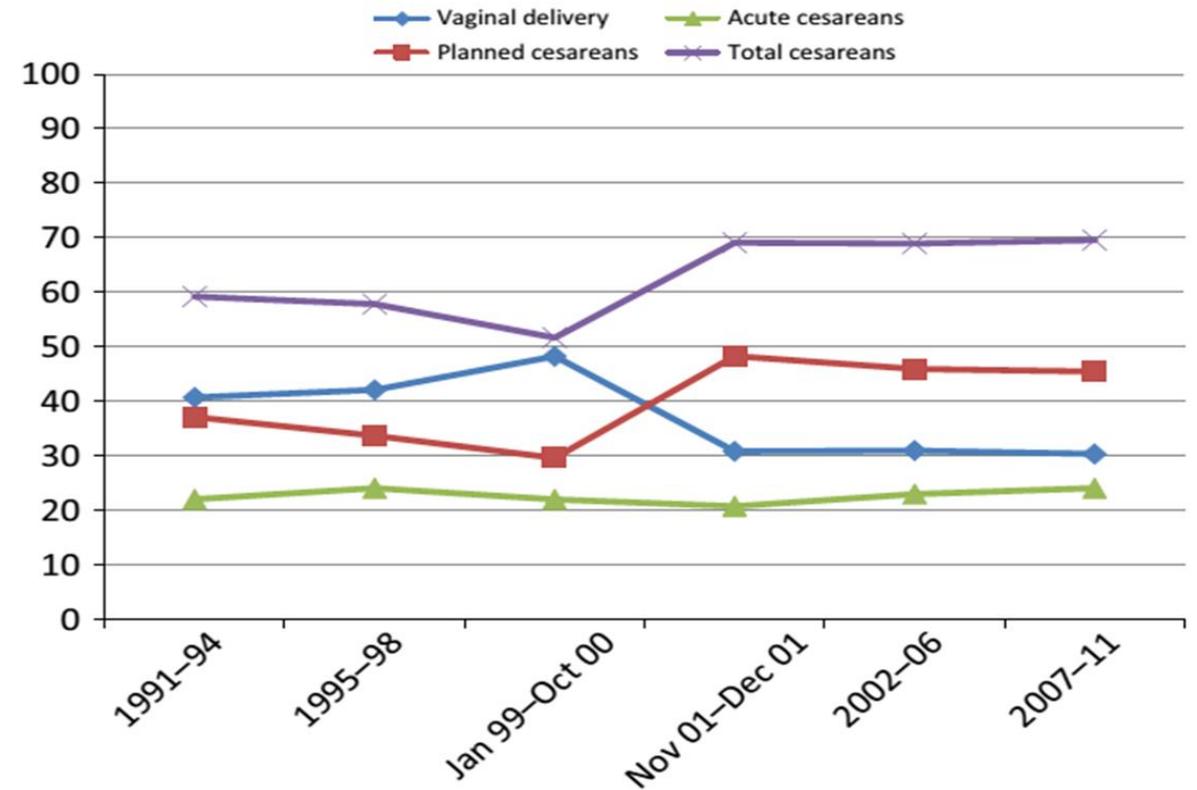


Figure 2. Rates of different modes of delivery in term breech presentation in Norway January 1991 to December 2011.

Viestad et al. 2015

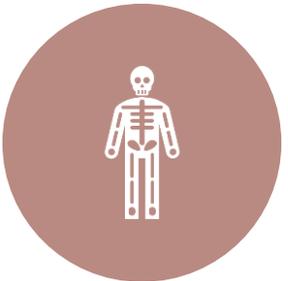
Caesarean delivery



Life-saving intervention for mothers and children.



Increasing use worldwide.



WHO: 6.2 million «not medically indicated» CDs performed each year.



Short-term and long-term consequences.



REVIEW

Open Access



What is the optimal rate of caesarean section at population level? A systematic review of ecologic studies

Ana Pilar Betran^{1*}, Maria Regina Torloni², Jun Zhang³, Jiangfeng Ye³, Rafael Mikolajczyk⁴, Catherine Deneux-Tharoux⁵, Olufemi Taiwo Oladapo¹, João Paulo Souza⁶, Özge Tunçalp¹, Joshua Peter Vogel¹ and Ahmet Metin Gülmezoglu¹

Abstract

Original Investigation

Relationship Between Cesarean Delivery Rate and Maternal and Neonatal Mortality

George Molina, MD, MPH; Thomas G. Weiser, MD, MPH; Stuart R. Lipsitz, ScD; Micaela M. Esquivel, MD; Tarsicio Uribe-Leitz, MD, MPH; Tej Azad, BA; Neel Shah, MD, MPP; Katherine Semrau, PhD, MPH; William R. Berry, MD, MPA, MPH; Atul A. Gawande, MD, MPH; Alex B. Haynes, MD, MPH

Caesarean section rates

% of births using c-section

0 - 20%

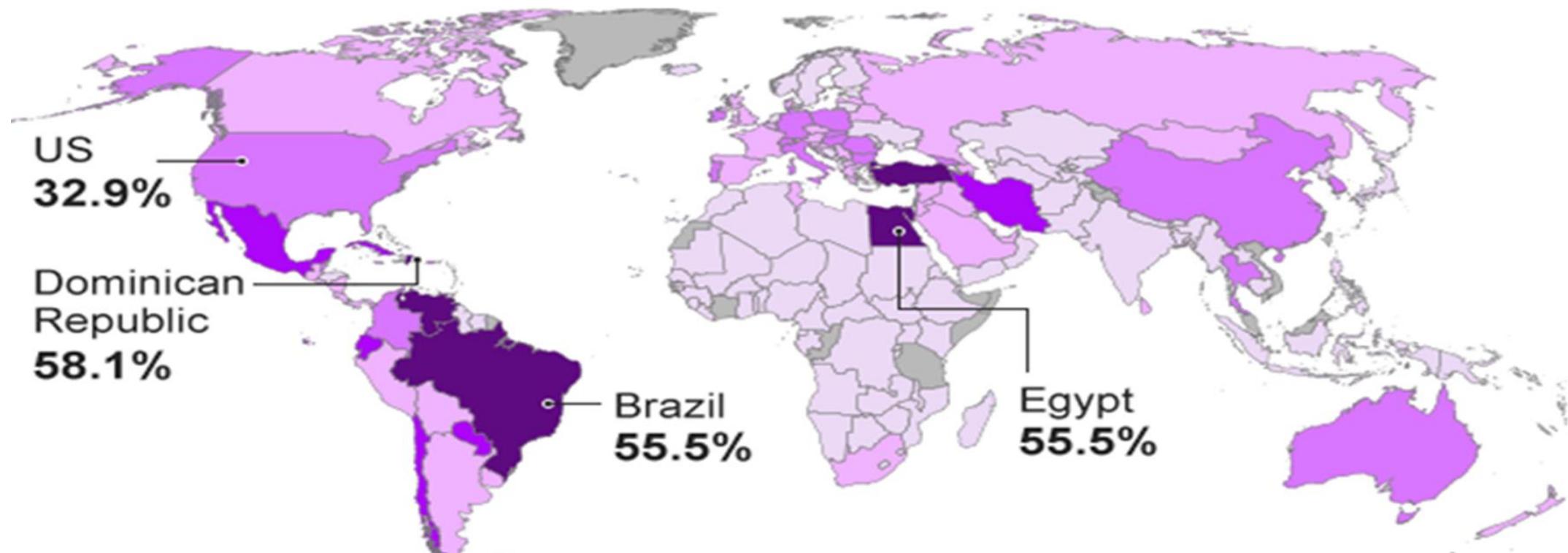
30 - 40%

50 - 58.10%

20 - 30%

40-50%

No data



Caesarean delivery



Life-saving intervention for mothers and children.



Increasing use worldwide.



WHO: 6.2 million «not medically indicated» CDs performed each year.



Short-term and long-term consequences.

RESEARCH ARTICLE

Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis

Oonagh E. Keag¹, Jane E. Norman², Sarah J. Stock^{2,3*}

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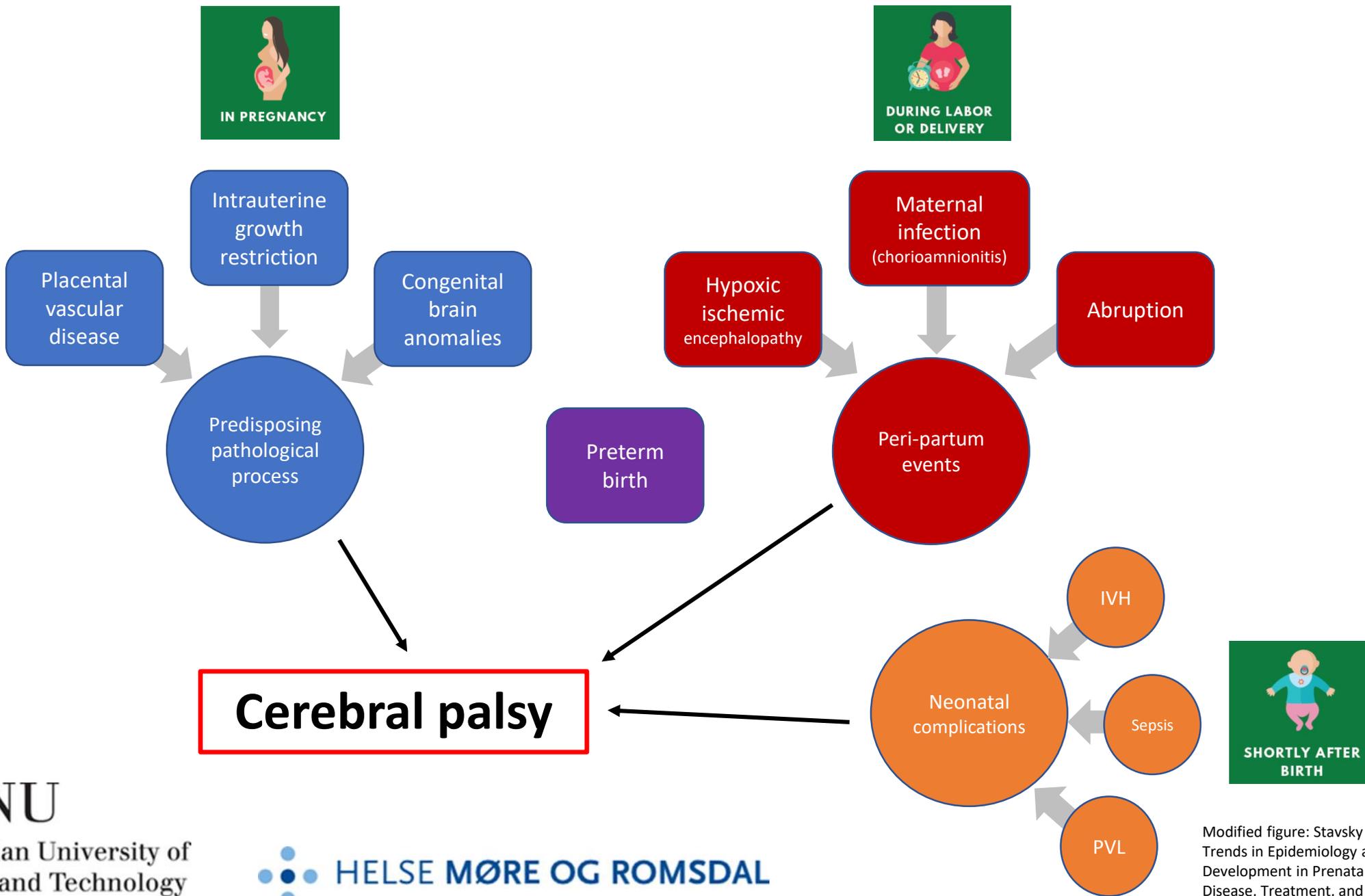
Cerebral palsy

“Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain.”

(Rosenbaum et al., DMCN 2006)

- CP subtype diagnosed at the age 5.
- No standard treatment.
- Lifelong follow-up.

SCPE CP subtype	Description SCPE CP subtype
Spastic unilateral Spastic bilateral	Increased tone and pathological reflexes.
Dyskinetic Choreoathetotic Dystonic	Involuntary, uncontrolled, recurring and occasionally stereotyped movements. Primitive reflex patterns predominate. Muscle tone is varying.
Ataxic	Loss of orderly muscular coordination, so that movements are performed with abnormal force, rhythm and accuracy.
Others	Should be classified according to the dominant clinical feature.



Three papers

Paper I

- Is vaginal breech delivery associated with higher risk for perinatal death and cerebral palsy compared to vaginal cephalic delivery? Registry-based cohort study in Norway.

Paper II

- Adherence to guidelines and suboptimal practice in term breech delivery with perinatal death- a population-based case-control study in Norway

Paper III

- Does caesarean delivery in the first pregnancy increase the risk for adverse outcome in the second? A registry-based cohort study on first and second singleton births in Norway.

National registries

1. Medical Birth Registry of Norway (MBRN)

- National health registry
- Collects data on all births since 1967
 - after 12 weeks of pregnancy and onward
- Compulsory

2. Cerebral Palsy Registry of Norway (CPRN)

- National medical quality registry
- Collects detailed clinical data on CP
- Birth years 1996 to today
- Informed consent-based
- Completeness, more than 90%.

Paper I:

BMJ Open Is vaginal breech delivery associated with higher risk for perinatal death and cerebral palsy compared with vaginal cephalic birth? Registry-based cohort study in Norway

Solveig Bjellmo,^{1,2} Guro L Andersen,^{2,3} Marit Petra Martinussen,^{2,4,5}
Pål Richard Romundstad,^{2,6} Sissel Hjelle,¹ Dag Moster,^{7,8} Torstein Vik^{2,4}

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► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2016-014979>).

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ABSTRACT

Objective This paper aims to study if vaginal breech delivery is associated with increased risk for neonatal mortality (NNM) or cerebral palsy (CP) in Norway where vaginal delivery accounts for 1/3 of all breech deliveries.

Design Cohort study using information from the national Medical BirthRegister and Cerebral Palsy Register.

Setting Births in Norway 1999–2009.

Participants 520 047 term-born singletons without congenital malformations.

Main outcome measures NNM, CP and a composite outcome of these and death during birth.

Results Compared with cephalic births, breech births had substantially increased risk for NNM but not for CP. Vaginal delivery was planned for 7917 of 16 700 fetuses in breech, while 5561 actually delivered vaginally. Among these, NNM was 0.9 per 1000 compared with 0.3 per 1000 in vaginal cephalic delivery, and 0.8 per 1000 in those actually born by caesarean delivery (CD) in breech. Compared with

Strengths and limitations of this study

- More than 500 000 births included in the study.
- Prospectively recording of the data in the two registers
- Restriction of the analyses to singletons at term without congenital malformation
- The number of infants with adverse outcomes in breech were low.
- Register-based data have limited ability to address explanatory factors.

and morbidity of fetuses in breech position following planned caesarean delivery compared with planned vaginal delivery. The study had great impact, changing clinical practice in a number of countries.^{5–6} However,

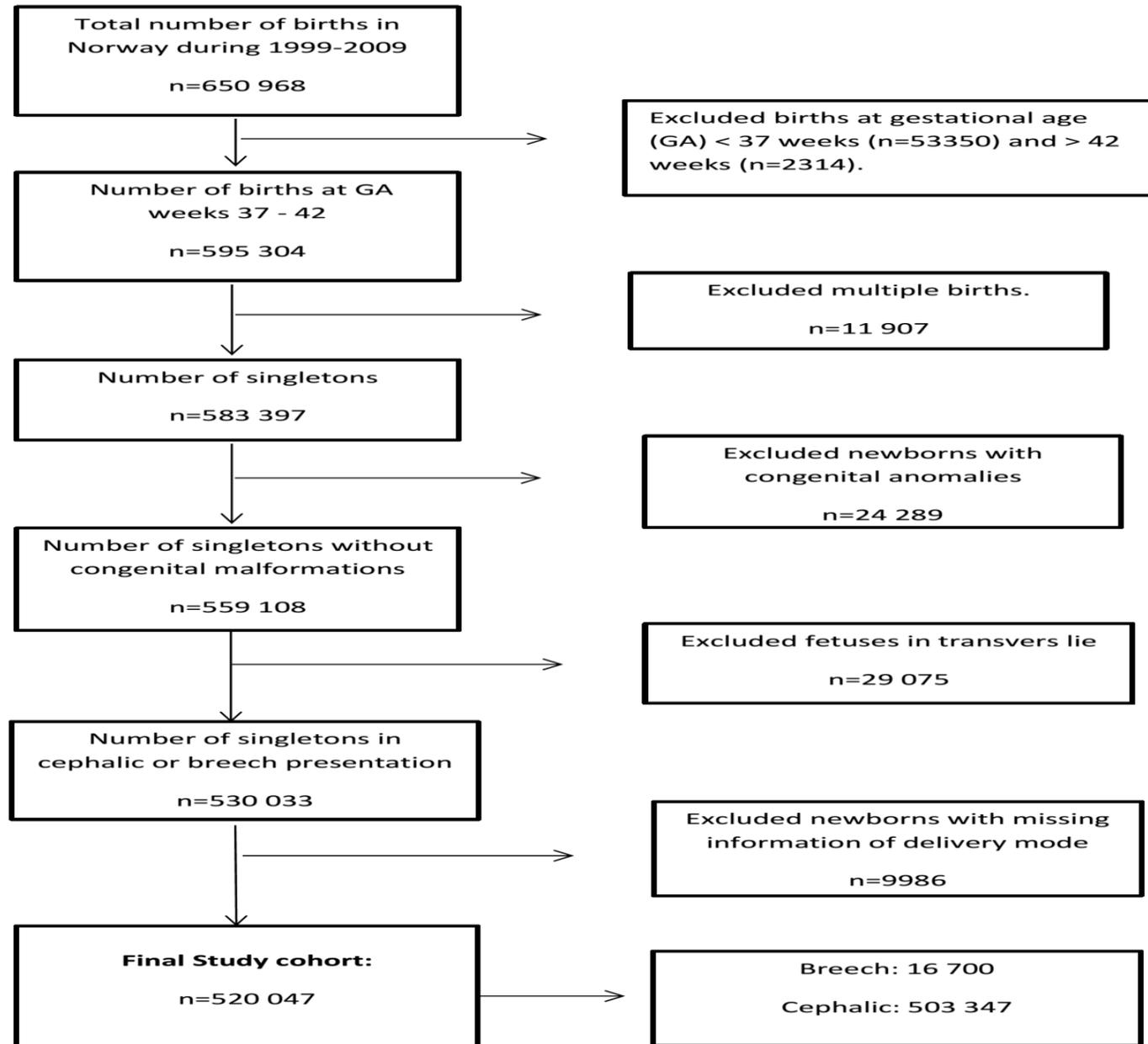
Paper I:

Main aim: Is vaginal breech delivery associated with increased risk for neonatal mortality and cerebral palsy?

Method: A population-based cohort study with data retrieved from the MBRN and the CPRN.

Paper I: Study population

Figure 1: Flow chart of the study population.



Paper I: Results- Cerebral palsy

	Number of infants with adverse outcome	Total number of infants*	Prevalence per 1000 (CI)	OR (CI)
CP†				
Cephalic	498	502 524	1.0 (0.9 to 1.1)	1.0 (Reference)
Breech	22	16 650	1.3 (0.9 to 2.0)	1.3 (0.9 to 2.1)
Breech				
Vaginal delivery	6	5 517	1.1 (0.5 to 2.4)	1.3 (0.6 to 2.8)
Caesarean delivery	16	11 133	1.4 (0.9 to 2.3)	1.7 (1.0 to 2.8)
Breech				
Planned vaginal delivery	10	7 872	1.3 (0.7 to 2.3)	1.3 (0.7 to 2.5)
Planned caesarean delivery	12	8 778	1.4 (0.8 to 2.4)	1.4 (0.8 to 2.5)

Paper I: Results - Mortality

	Number of infants with adverse outcome	Total number of infants*	Prevalence per 1000 (CI)	OR (CI)
NNM*				
Cephalic	225	502 553	0.5 (0.4 to 0.5)	1.0 (Reference)
Breech	14	16 653	0.8 (0.5 to 1.4)	1.9 (1.1 to 3.2)
Breech				
Vaginal delivery	5	5 518	0.9 (0.4 to 2.1)	3.0 (1.2 to 7.3)
Caesarean delivery	9	11 135	0.8 (0.4 to 1.5)	2.7 (1.4 to 5.2)
Breech				
Planned vaginal delivery	8	7 873	1.0 (0.5 to 2.0)	2.4 (1.2 to 4.9)
Planned caesarean delivery	6	8 780	0.7 (0.3 to 1.5)	1.6 (0.7 to 3.7)

Table 5 Restricted to breech deliveries: prevalence and unadjusted ORs with 95% CIs for various adverse outcomes among singletons in breech position born at term, without congenital anomalies according to actual and planned mode of delivery

	Number of infants with adverse outcome	Total number of infants*	Prevalence per 1000 (CI)	OR (CI)
<i>NNM*</i>				
Actual mode of delivery				
Caesarean delivery	9	11 135	0.8 (0.4 to 1.5)	1.0 (Reference)
Vaginal delivery	5	5 518	0.9 (0.4 to 2.1)	1.1 (0.4 to 3.3)
Planned mode of delivery				
Caesarean delivery	6	8 780	0.7 (0.3 to 1.5)	1.0 (Reference)
Vaginal delivery	8	7 873	1.0 (0.5 to 2.0)	1.5 (0.5 to 4.3)
<i>CP†</i>				
Actual mode of delivery				
Caesarean delivery	16	11 133	1.4 (0.9 to 2.3)	1.0 (Reference)
Vaginal delivery	6	5 517	1.1 (0.5 to 2.4)	0.8 (0.3 to 1.9)
Planned mode of delivery				
Caesarean delivery	12	8 778	1.4 (0.8 to 2.4)	1.0 (Reference)
Vaginal delivery	10	7 872	1.3 (0.7 to 2.3)	0.9 (0.4 to 2.2)

Paper I: Conclusion

- Vaginal breech delivery, regardless of whether planned or actual, and actual breech CD were associated with excess risk for NNM compared with vaginal cephalic delivery, but not with CP.
- The risk for NNM and CP in planned breech CD did not differ significantly from planned vaginal cephalic delivery.



Paper II:

RESEARCH ARTICLE

Open Access

Adherence to guidelines and suboptimal practice in term breech delivery with perinatal death- a population-based case-control study in Norway



Solveig Bjellmo^{1,2*} , Sissel Hjelle¹, Lone Krebs³, Elisabeth Magnussen⁴ and Torstein Vik²

Abstract

Background: In a recent population-based study we reported excess risk of neonatal mortality associated with vaginal breech delivery. In this case-control study we examine whether deviations from Norwegian guidelines are more common in breech deliveries resulting in intrapartum or neonatal deaths than in breech deliveries where the offspring survives, and if these deaths are potentially avoidable.

Material and methods: Case-control study completed as a perinatal audit including term breech deliveries of singleton without congenital anomalies in Norway from 1999 to 2015. Deliveries where the child died intrapartum or in the neonatal period were case deliveries. For each case, two control deliveries who survived were identified. All the included deliveries were reviewed by four obstetricians independently assessing if the deaths in the case group might have been avoided and if the management of the deviations from Norwegian guidelines were more common in case than in control deliveries.

Results: Thirty-one case and 62 control deliveries were identified by the Medical Birth Registry of Norway. After exclusion of non-eligible deliveries, 22 case and 31 control deliveries were studied. Three case and two control deliveries were unplanned home deliveries, while all in-hospital deliveries were in line with national guidelines. Antenatal care and/or management of in-hospital deliveries was assessed as suboptimal in seven (37%) case and two (7%) control deliveries ($p = 0.020$). Three case deliveries were completed as planned caesarean delivery and 12 (75%) of the remaining 16 deaths were considered potentially avoidable had planned caesarean delivery been done. In seven of these 16 deliveries, death was associated with cord prolapse or difficult delivery of the head.

Conclusion: All in-hospital breech deliveries were in line with Norwegian guidelines. Seven of twelve potentially avoidable deaths were associated with birth complications related to breech presentation. However, suboptimal care was more common in case than control deliveries. Further improvement of intrapartum care may be obtained through continuous rigorous training and feedback from repeated perinatal audits.

Keywords: Breech delivery, Mortality, Perinatal audit, Obstetrics

Paper II:

Main aim: To explore if deviation from Norwegian guidelines was more common in breech deliveries associated with intrapartum or neonatal death than in breech deliveries where the infant survived. Assess if death might have been prevented if the child had been delivered by planned CD, and whether suboptimal clinical management was more common in breech deliveries where the infant died than deliveries where the infant survived.

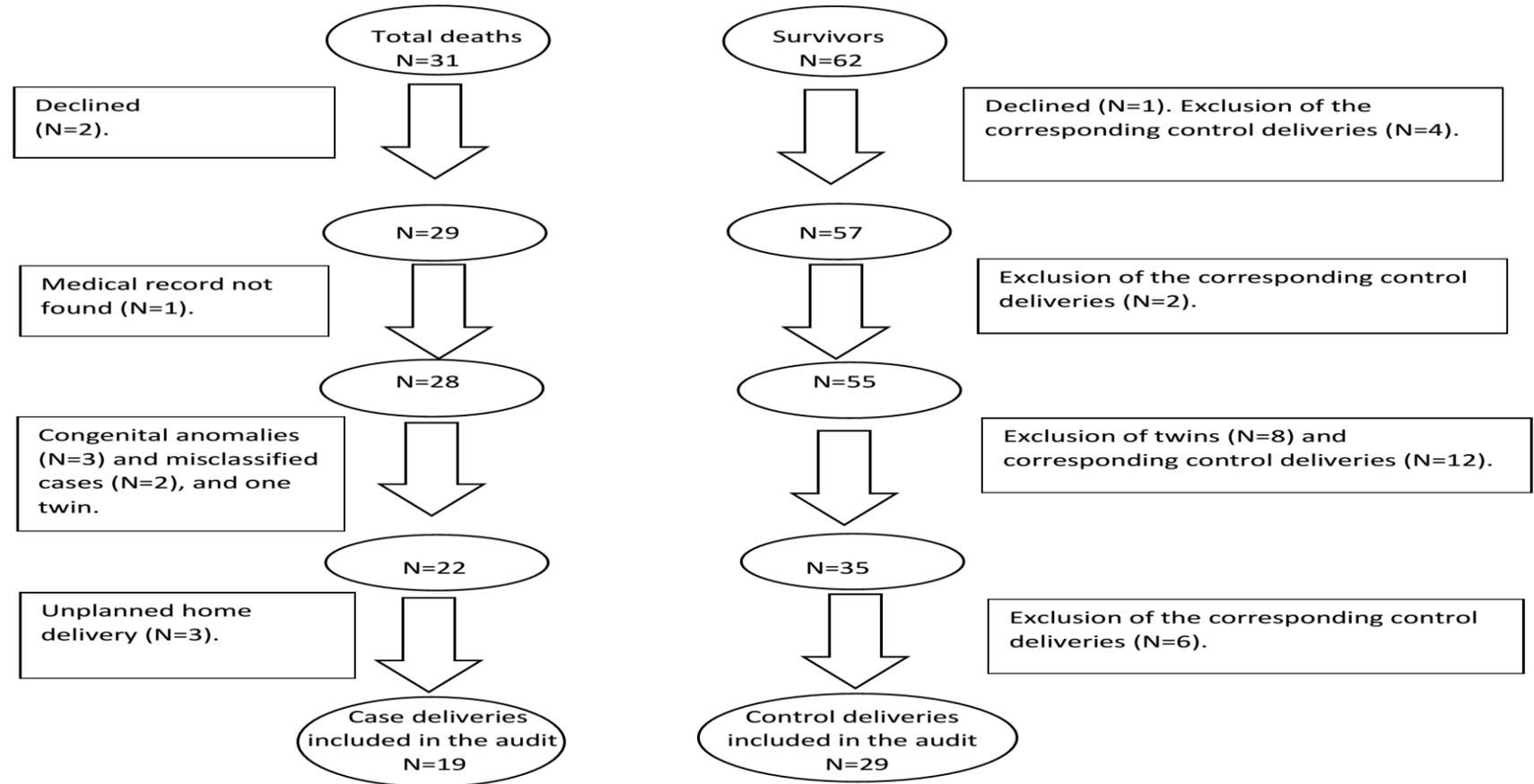
Method: Case-control study completed as a perinatal audit, cases and controls were identified through the Medical Birth Registry of Norway (MBRN).

Paper II:

Study population:

Figure 1:

Flow chart of case (i.e. deliveries where the fetus died during delivery or in the neonatal period) and control breech deliveries at term in singletons without congenital anomalies during 1999-2015 included in the audit.



Paper II: Results

Table 3: Deviations from current and actual Norwegian guidelines and suboptimal antenatal or intrapartum care for case and control term breech in-hospital deliveries in Norway 1999-2015, included in the study.

	Case N=19	(%) (100)	Control N=29	(%) (100)	p-value ^a
Deviations from guidelines at the time of delivery					
Yes	0	(0)	0	(0)	-
No	19	(100)	29	(100)	
Deviations from current guidelines (2014)					
Yes ^b	2	(11)	4	(14)	1.0
No	17	(89)	25	(86)	
"Suboptimal care"^c					
Yes	7	(37)	2	(7)	0.020
No	12	(63)	27	(93)	

^aFisher's Exact Test

^bAccording to current guidelines a paediatrician should be present at term breech vaginal delivery, but this was not required at the time of these six deliveries.

^cThe assessment of suboptimal management is highly subjective and does not (necessary) imply malpractice.

Paper II: Conclusion

All in-hospital breech deliveries were in line with Norwegian guidelines.

Seven of twelve potentially avoidable deaths were associated with birth complications related to breech presentation. However, suboptimal care was more common in case than control deliveries.

Further improvement of intrapartum care may be obtained through continuous rigorous training and feedback from repeated perinatal audits.

Paper III:

BMJ Open Does caesarean delivery in the first pregnancy increase the risk for adverse outcome in the second? A registry-based cohort study on first and second singleton births in Norway

Solveig Bjellmo ,^{1,2} Guro L Andersen,^{2,3} Sissel Hjelle,¹ Kari Klungsoyr,^{4,5} Lone Krebs,^{6,7} Stian Lydersen,⁸ Pål Richard Romundstad,⁹ Torstein Vik²

To cite: Bjellmo S, Andersen GL, Hjelle S, *et al*. Does caesarean delivery in the first pregnancy increase the risk for adverse outcome in the second? A registry-based cohort study on first and second singleton births in Norway. *BMJ Open* 2020;**10**:e037717. doi:10.1136/bmjopen-2020-037717

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2020-037717>).

ABSTRACT

Objective To explore if newborns in the second pregnancy following a previous caesarean delivery (CD) have higher risk of perinatal mortality or cerebral palsy than newborns in pregnancies following a previous vaginal delivery (VD).

Design Cohort study with information from the Medical Birth Registry of Norway and the Cerebral Palsy Registry of Norway.

Setting Births in Norway.

Participants 294 598 women with their first and second singleton delivery during 1996–2015.

Main outcome measures Stillbirth, perinatal mortality, neonatal mortality and cerebral palsy.

Results Among 294 598 included women, 42 962 (15%) had a CD in their first pregnancy while 251 636 (85%) had a VD. Compared with the second delivery of mothers

Strengths and limitations of this study

- Prospectively recording of high-quality data in the two national registers.
- Large number of births.
- Misclassification may occur for some of the clinical outcomes.
- Limited ability to address explanatory factors.

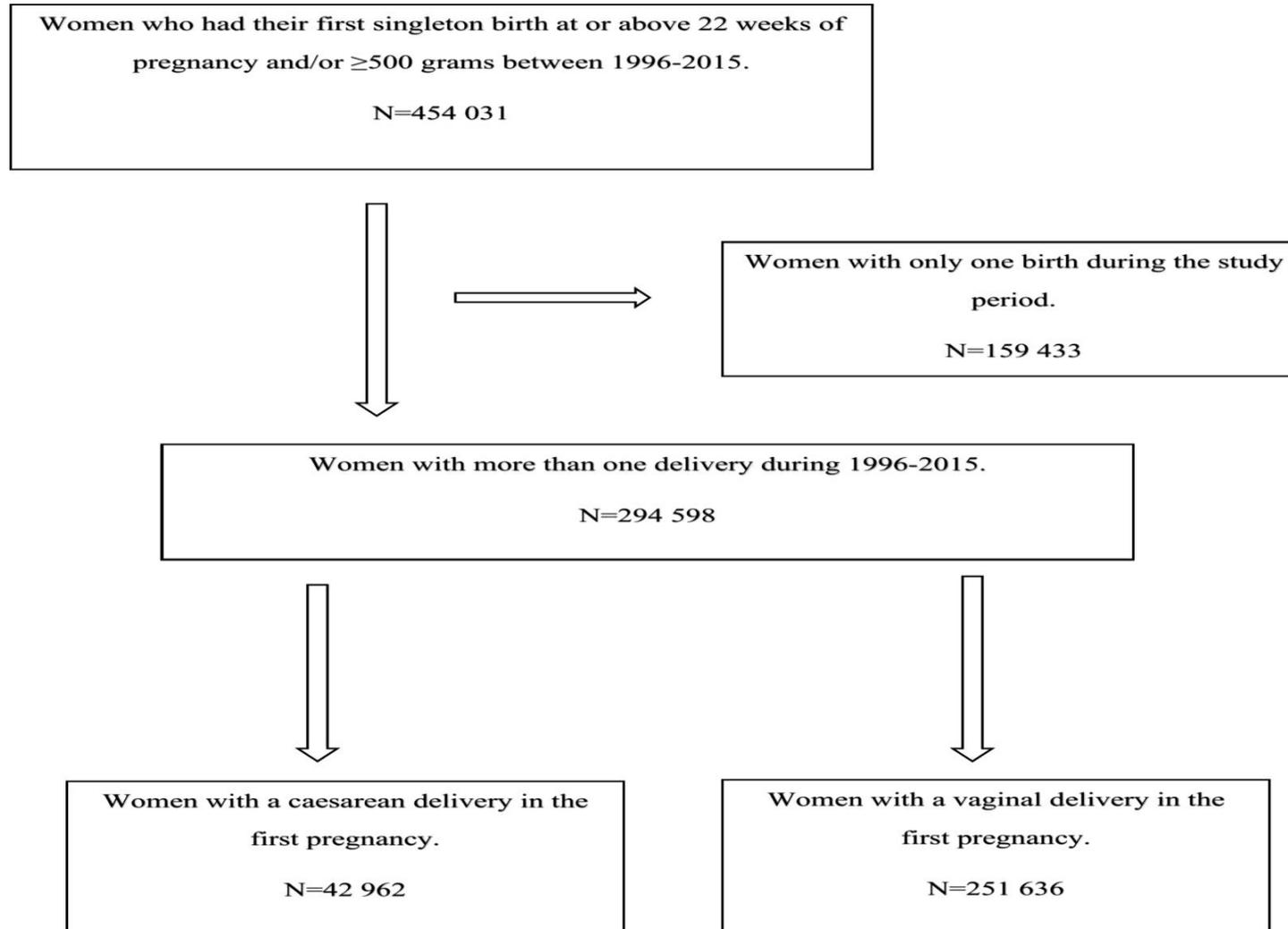
in 2008, WHO estimated that 6.2 million not medically indicated CDs were performed each year.² The ‘ideal’ CD rate has been debated for many years, and different studies have argued that a higher rate than 15% would not

Paper III:

Main aim: To explore if offspring in subsequent pregnancy following a previous caesarean delivery (CD) have higher risk for perinatal death and cerebral palsy than offspring where the mother had a previous vaginal delivery (VD).

Method: Population based cohort study with data retrieved from the MBRN and the CPRN. The offspring were linked to their mother by means of the national identification numbers, yielding maternal sibship files with the mother as the observation unit.

Flow chart of the study population.



Paper III: Results

Table 3: Odds ratio (OR) with 95% confidence intervals (CI) for adverse outcomes in the second pregnancy of 42 962 mothers who had a caesarean delivery (CD) in the first pregnancy compared with 251 636 mothers who had a previous vaginal delivery (VD). Singleton deliveries during 1996-2015.

1 st birth	2 nd birth		Crude OR (CI)	Adj OR (CI) *
	Antepartum stillbirth			
CD 1st	N (%)	128 (0.3)	1.44 (1.19 to 1.75)	1.33 (1.08 to 1.63)
VD 1st	N (%)	520 (0.2)	1.0 (ref)	1.0 (ref)
	Intrapartum stillbirth			
CD 1st	N (%)	14 (0.03)	1.58 (0.87 to 2.85)	1.84 (1.00 to 3.38)
VD 1st	N (%)	52 (0.02)	1.0 (ref)	1.0 (ref)
	Stillbirth (Total)^a			
CD 1st	N (%)	179 (0.4)	1.52 (1.29 to 1.79)	1.45 (1.22 to 1.73)
VD 1st	N (%)	693 (0.3)	1.0 (ref)	1.0 (ref)
	Perinatal mortality			
CD 1st	N (%)	231 (0.5)	1.47 (1.27 to 1.70)	1.42 (1.22 to 1.65)
VD 1st	N (%)	921 (0.4)	1.0 (ref)	1.0 (ref)
	Neonatal mortality			
CD 1st	N (%)	68 (0.2)	1.24 (0.95 to 1.61)	1.13 (0.86 to 1.49)
VD 1st	N (%)	321 (0.1)	1.0 (ref)	1.0 (ref)
	Cerebral palsy			
CD 1st	N (%)	83 (0.2)	1.44 (1.13 to 1.83)	1.27 (0.99 to 1.64)
VD 1st	N (%)	338 (0.1)	1.0 (ref)	1.0 (ref)

*Adjusted for maternal age, birth year, pregnancy related disorders (preeclampsia and diabetes), SGA, congenital anomalies, uterine rupture, placenta previa, placental abruption in first pregnancy and the studied outcome in the first pregnancy.

^aincluding stillbirths with unknown timing of death

Paper III: Conclusion

A previous CD was associated with increased risk for stillbirth and perinatal death compared with a previous VD.

Although less robust, we also found that a previous CD was associated with a slightly increased risk for CP among children surviving the neonatal period.

The aetiology behind these associations needs further investigation.

Summary

- Vaginal breech delivery at term, compared with cephalic delivery, was associated with excess risk for neonatal death, but not cerebral palsy.
- The absolute risk for these complications was however low.
- When assessing children who died in breech at term, all in-hospital breech deliveries were in line with Norwegian guidelines.
- In subsequent pregnancy after the mother previously had a CD we found an associated risk for stillbirth and perinatal death, compared to children born after the mother previously had a vaginal delivery.
- Also here the absolute risk for complications was low.



- Based on our results, we conclude that vaginal delivery may still be offered to women with a fetus in breech presentation at term, provided the availability of competent obstetric care and strict criteria for selection to vaginal delivery.



Limitations

- The number of infants with adverse outcomes in breech were low.
- Low numbers in study II, and the results should be interpreted with caution.
- Misclassifications.
- Register-based data have limited ability to address explanatory factors.



Implications?

- When deciding mode of delivery in first pregnancy it is important to also plan for further pregnancies.
- Even though the absolute risk of complications after a previous CD is low, this risk should be weighed against the absolute risk for adverse outcome in vaginal breech delivery at term.





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