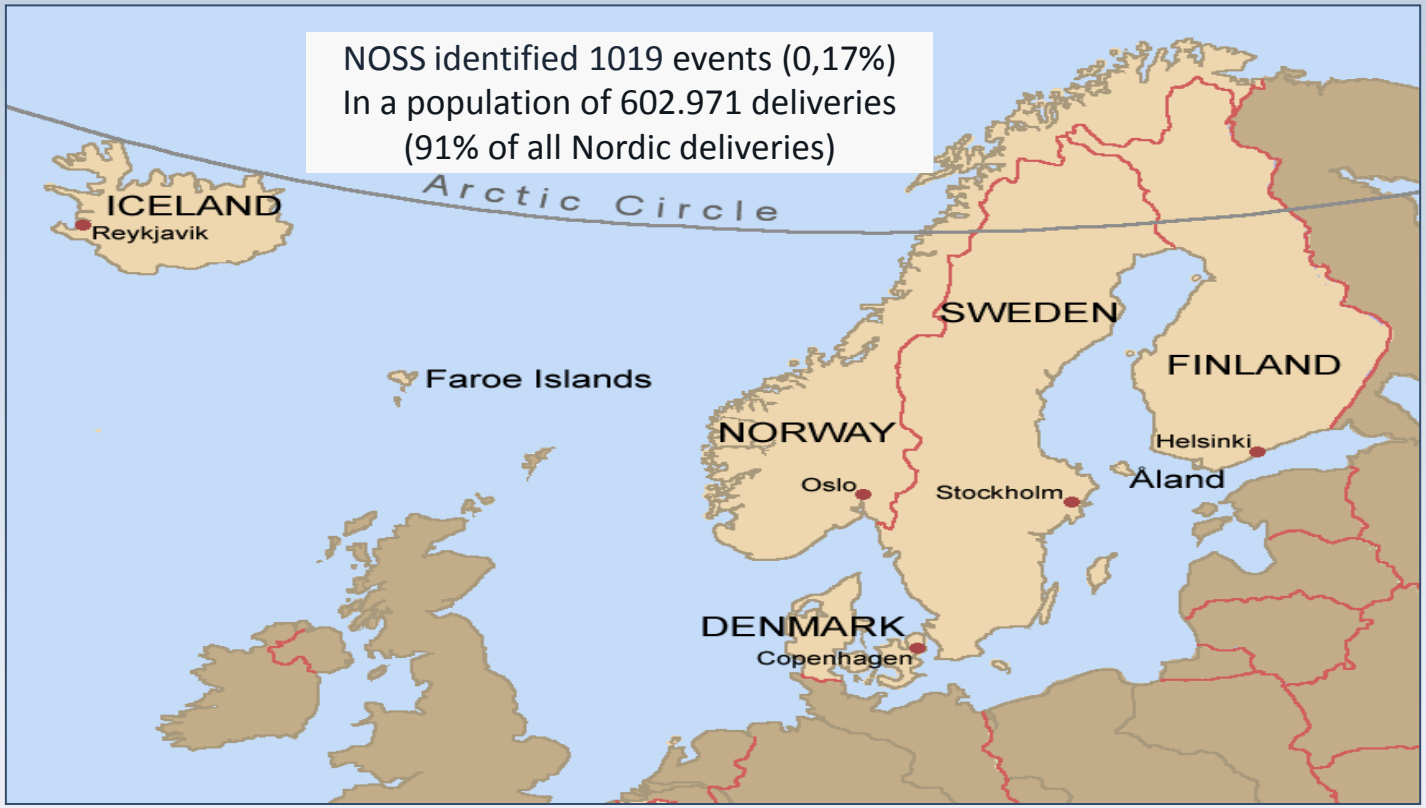
Nordic Obstetric Surveillance Study

- Incidences of severe maternal morbidity in the Nordic Countries -

Colmorn LB, Petersen KB, Krebs L, Tapper AM, Jacobsson M, Gissler M, Klungsoyr K, Bordahl P, Lindqvist P, Källen K, Gottvall K, Thurn L, Bjarnadottír I, Langhoff-Roos J



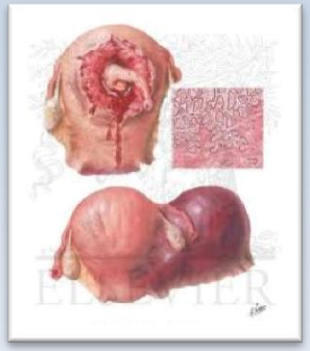
More info: ***www.noss.nu***

Introduction

- Severe maternal morbidity is rare.
- Unfortunately, as rare events are difficult to study, there is a lack of evidence on risk factors.
- Consequently, the management of the complications is often based on traditions rather than evidence based knowledge.

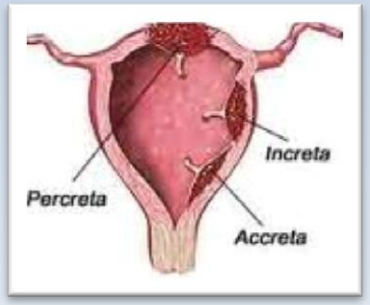
Objective

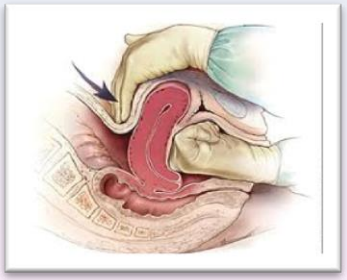
- To asses rates of severe obstetric complications and analyse the impact of previous mode of delivery in all the Nordic countries.



Complete Uterine Rupture

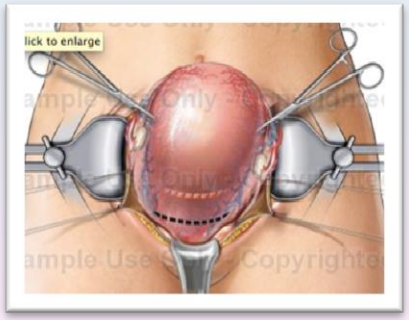
Abnormally Invasive Placenta





Multiple blood transfusions > 5 RBC

Peripartum Hysterectomy



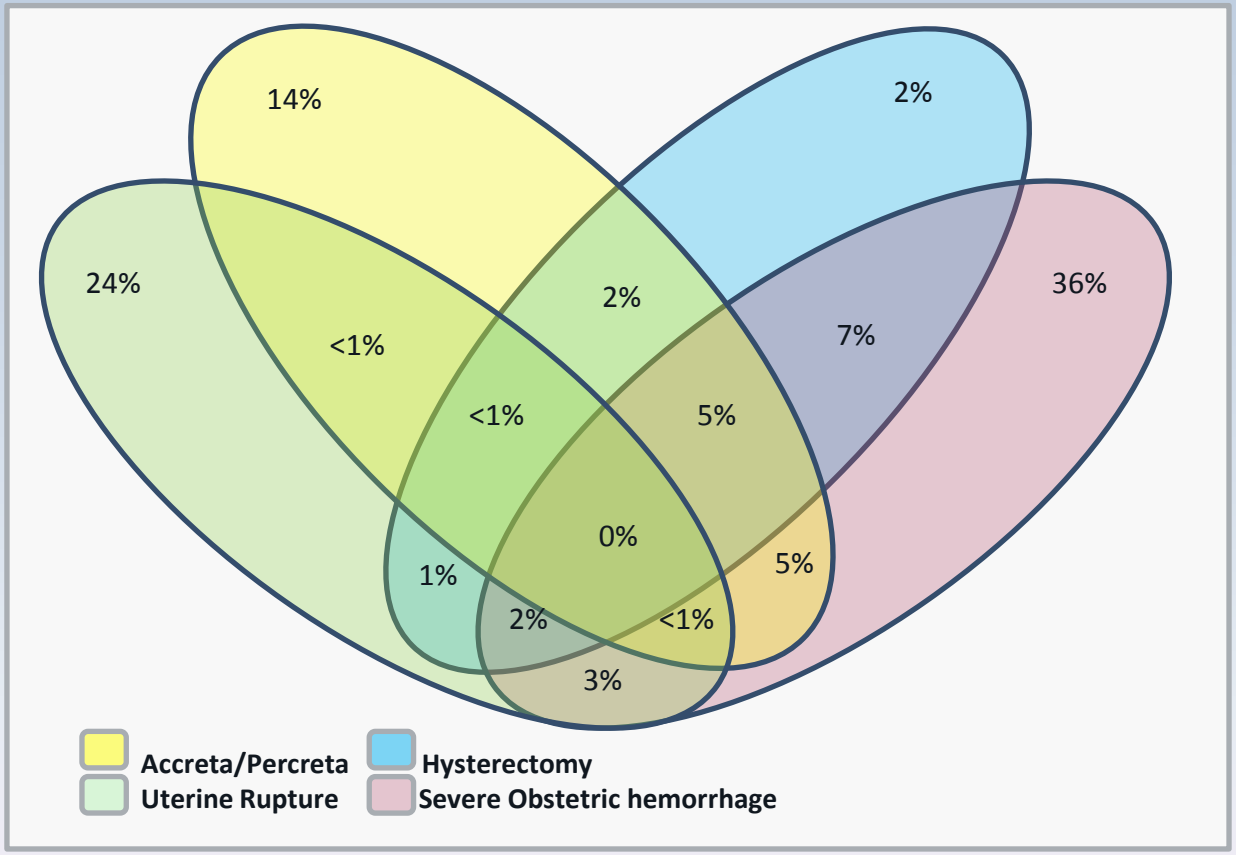
Methods

- All cases of complete uterine rupture, placenta accreta, postpartum hysterectomy and severe obsteric hemorrhage were:

- Reported from obstetric units, and
- Validated by the National Medical Birth registers

- A two-year period from 1. April 2009 – 31. August 2012.

Overlapping



- 76% of the women had only one complication
- 17% had two complications
- 7% had three complications.

Incidence per 10.000 deliveries*

	Denmark	Norway	Iceland	Finland	Sweden	Nordic
Hysterectomy	3,0	3,0	4,2	**5,1**	3,0	3,5
AIP	**7,5**	4,4	1,0	4,0	2,7	4,6
Complete uterine rupture	4,6	4,9	5,2	**8,0**	5,0	5,6
Severe hemorrhage	**13,3**	12,1	8,4	9,8	.	11,7

Risk factors - maternal characteristics

	Hysterectomy n=211	Complete Rupture n=337	Severe Hemorrhage n=500	AIP n=275	Control n=602 971
Age					
<25	4 (2%)	18 (5%)	35 (7%)	13 (5%)	91 855 (15%)
25-34	110 (52%)	201 (60%)	292 (58%)	151 (54%)	388 649 (64%)
35+	97 (46%)	118 (35%)	173 (35%)	115 (41%)	122 439 (20%)
BMI					
<25	99 (47%)	163 (48%)	293 (59%)	160 (59%)	332 314 (55%)
25-29	52 (25%)	95 (28%)	103 (21%)	59 (21%)	118 530 (20%)
30-34	25 (12%)	27 (8%)	32 (6%)	28 (10%)	44 012 (7%)
35+	19 (9%)	21 (6%)	29 (6%)	16 (6%)	20 546 (3%)
Prev deliveries					
0	43 (20%)	10 (3%)	217 (43%)	94 (34%)	261 560 (43%)
1	65 (31%)	254 (75%)	157 (31%)	81 (29%)	215 921 (36%)
2	30 (14%)	48 (14%)	49 (10%)	44 (16%)	83 820 (14%)
3+	51 (24%)	22 (7%)	53 (11%)	44 (16%)	38 587 (6%)
Prev CS	95 (52%)	305 (91%)	151 (30%)	116 (42%)	59 111 (10%)
Labour induction	50 (24%)	119 (35%)	174 (35%)	57 (20%)	109 244 (18%)
Mode of delivery					
-vaginal spont	27 (13%)	22 (7%)	150 (30%)	72 (26%)	432 955 (72%)
-vaginal instr	19 (9%)	24 (7%)	79 (16%)	22 (8%)	460 35 (8%)
-emergency CS	94 (45%)	284 (84%)	180 (36%)	70 (25%)	61 879 (10%)
-elective CS	70 (33%)	7 (2%)	91 (18%)	118 (42%)	43 606 (7%)
GA (weeks)					
<32	13 (6%)	9 (3%)	25 (5%)	21 (8%)	5663 (1%)
32-36	57 (27%)	21 (6%)	73 (15%)	79 (28%)	26 552 (4%)
37-41	127 (60%)	272 (81%)	354 (71%)	171 (61%)	508 856 (84%)
42+	12 (6%)	32 (9%)	36 (7%)	8 (3%)	59 276 (10%)

Results

A total of 1019 events were reported in 605 362 deliveries during the study period.

The average rates:

Severe blood loss at delivery: 11.6/10 000 deliveries,
Complete uterine rupture: 5.6/10 000 deliveries,
Abnormally invasive placenta: 4.6/10 000 deliveries,
Peripartum hysterectomy: 3.5/10 000 deliveries

25% of women with complications had two or more.

Compared with the background population women with complications were more often:

>35 years old,
overweight,
of higher parity, and
with a history of cesarean delivery

Sharing and publishing

Emergency peripartum hysterectomy: results from the prospective Nordic Obstetric Surveillance Study (NOSS).

Jakobsson M[1], Tapper AM[2], Colmorn LB[3], Lindqvist PG[4], Klungsøyr K[5,6], Krebs L[7,8], Børdahl PE[9,10], Gottvall K[11,12], Källén K[12,13], Bjarnadóttir RI[14], Langhoff-Roos J[3], Gissler M[15].

RESULTS:

- Peripartum hysterectomies n=211, (incidence rate of 3.5/10 000 births.
- Finland had the highest prevalence (5.1) and Norway the lowest (2.9).
- Primary indications included an abnormally invasive placenta (n = 91, 43.1%), atonic bleeding (n = 69, 32.7%), uterine rupture (n = 31, 14.7%), other bleeding disorders (n = 12, 5.7%), and other indications (n = 8, 3.8%).
- The delivery mode was cesarean section in nearly 80% of cases.
- Previous cesarean section was reported in 45% of women. Both preterm and post-term birth increased the risk for emergency peripartum hysterectomy. The number of stillbirths was substantially high (70/1000), but the case fatality rate stood at 0.47% (one death, maternal mortality rate 0.17/100 000 deliveries).

CONCLUSIONS:

A combination of prospective data collected from clinicians and information gathered from register-based databases can yield valuable data, improving the registration accuracy for rare, near-miss cases. However, proper and uniform clinical guidelines for the use of well-defined international diagnostic codes are still needed.

Acta Obstet Gynecol Scand. 2015 Jul;94(7):745-54. doi: 10.1111/aogs.12644. Epub 2015 Apr 30.

Abnormally invasive placenta-prevalence, risk factors and antenatal suspicion: results from a large population-based pregnancy cohort study in the Nordic countries.

Thurn L[1], Lindqvist PG[2], Jakobsson M[3], Colmorn LB[4], Klungsoyr K[5,6], Bjarnadóttir RI[7], Tapper AM[8], Børdahl PE[9], Gottvall K[10,11], Petersen KB[12], Krebs L[13], Gissler M[14,15], Langhoff-Roos J[4], Källen K[10,16].

OBJECTIVE:

- The objective was to investigate prevalence, estimate risk factors, and antenatal suspicion of abnormally invasive placenta (AIP) associated with laparotomy in women in the Nordic countries.

RESULTS:

- 205 cases of AIP in association with laparotomy (3.4 per 10 000 deliveries).
- The single most important risk factor, which was reported in 49% of all cases of AIP, was placenta praevia. The risk of AIP increased seven-fold after one prior caesarean section (CS) to 56-fold after three or more CS.
- Prior postpartum haemorrhage was associated with six-fold increased risk of AIP (95% confidence interval 3.7-10.9).
- Approximately 70% of all cases were not diagnosed antepartum. Of these, 39% had prior CS and 33% had placenta praevia.

CONCLUSION:

- Our findings indicate that a lower CS rate in the population may be the most effective way to lower the incidence of AIP.
- Focused ultrasound assessment of women at high risk will likely strengthen antenatal suspicion.
- Prior PPH is a novel risk factor associated with an increased prevalence of AIP.

BJOG. 2015 Jul 29. doi: 10.1111/1471-0528.13547

Rates of caesarean section and complete uterine rupture: A population-based Nordic comparison.
The Nordic Obstetric Surveillance Study – NOSS.

Lotte B Colmorn[1], Jens Langhoff-Roos[1], Maija Jakobsson[2], Anna-Maija Tapper[3,4], Mika Gissler[5,6], Pelle G Lindqvist[7], Karin Källen[8,9], Karin Gottvall[8], Kari Klungsøyr[10,11],Per Børdahl[12], Ragnheiður I. Bjarnadóttir[13], Lone Krebs[14]

Objective: To investigate the impact of caesarean section (CS) rates and intended mode of delivery on the rates of complete uterine rupture (UR). To assess predictors, symptoms and maternal complications in women with complete UR.

Results:

- Rates of CS (21.3%) and previous CS (11.5%) were highest in Denmark, whereas the rate of trial of labour after CS (TOLAC) was highest in Finland (72%).
- *Rates of* Complete UR
  - 5.5 per 10 000 deliveries
  - 76 per 10 000 in women with TOLAC
  - 0.6 per 10 000 in women without previous CS.

Conclusion:

- National rates of CS did not correlate with complete UR, but high rates of TOLAC and labour induction were associated with an increased rate of complete UR.
- In one fifth of the women the obstetrician had no suspicion of complete UR preceding caesarean delivery. Severe maternal complications more often occurred in women without previous CS

Submitted – unpublished data

The impact of CS – some preliminary figures

N=334.160 para 1+ (58.258 previous CS)

	OR	”Added”
Hysterectomy:	1.9	77
AIP:	2.4	93
Severe PPH:	2.2	110
Uterine rupture:	20.3	295
At least one of these:	12,9	452

Beyond the figures

Potentially Avoidable Peripartum Hysterectomies in Denmark: A Population Based Clinical Audit

Short title: A clinical audit of peripartum hysterectomies in Denmark.

Lotte B. Colmorn[1]*, Lone Krebs[2], Jens Langhoff-Roos[1], and the NOSS study group^

Objective

- To audit the clinical management preceding peripartum hysterectomy and evaluate, if peripartum hysterectomies are avoidable, and by which means.

Material and methods

- We developed a structured audit form based on explicit criteria for the minimal mandatory management of the specific types of pregnancy and delivery complications leading to peripartum hysterectomy.
- We evaluated medical records of the 50 Danish women with peripartum hysterectomy identified in the Nordic Obstetric Surveillance Study 2009 - 2012 and made short narratives of all cases.

Submitted, unpublished data

Criteria for minimal acceptable medical and surgical intervention

Complication	Minimal acceptable interventions
Atony	Oxytocin, Prostaglandin, tranexamic acid. Uterine tamponade (tissue/balloon) or compression sutures (e.g. B-lynch). Additional: Sandwich (tamponade AND compression)
Abruption	Oxytocin
Previa	Oxytocin, tranexamic acid. Hemostatic sutures (cross stitches etc.)
Accreta	Oxytocin, tranexamic acid. Hemostatic sutures
Percreta, recognized	Oxytocin, tranexamic acid. Admittance to referral center, Prophylactic use of Intravesical balloon catheters, resection of affected myometrium, suturing of lesion and tamponade/compression sutures
Uterine rupture (including partial rupture)	Suturing uterus
HELLP	Awareness of coagulation parameters, Steroids. Timely delivery
DIC	Thrombo-elastography or similar analysis. Balanced transfusions.
Sepsis	Relevant antibiotics. Timely diagnosis of sepsis
Fibromas	Oxytocin, tranexamic acid
Laceration and other bleeding*	Tranexamic acid. Hemostatic sutures. Ligation of arterial vessels. Timely re-suturing

Short narratives

ID	Comment	Indication	Blood loss (ml)	Avoidable?
1	29 years, para 1, 38 weeks. Instrumental vaginal delivery with primary atoni following long induction (17h) and hyperstimulation. Sufficient medical and surgical interventions, but no attempt to combine B-lynch sutures and balloon.	Primary atony	10 000	Potentially
2	33 years, para 1, 41 weeks. One previous CS. Emergency CS due to suspicion of uterine rupture and FHR changes. Laceration of uterine artery; insufficiently sutured. Ligation not tried. Dehiescence sutured. Rapid decision to perform hysterectomy.	Laceration and secondary atony	1 800	Yes
3	32 years, para 2, 41 weeks. Instrumental vaginal delivery. Accreta with manual removal and secondary atony. No intrauterine tamponade; a sandwich could have been tried.	Accreta	12 500	Potentially

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Results

- The most frequent indication for hysterectomy was hemorrhage.
- The two main initial causes were abnormally invasive placenta (26%) and lacerations (26%). Primary atony was third and occurred in 20%. Before hysterectomy another 26 % had secondary atony following complications such as lacerations, retained placental tissue or coagulation defects.
- Of the 50 cases, 24% were assessed to be avoidable and 30% potentially avoidable. Hysterectomy following primary and secondary atony was assessed to be avoidable in 4/10 and 4/13 cases, respectively.
- **Early sufficient suturing of lacerations and uterine ruptures, as well as a more widespread use of intrauterine balloons alone or in combination with uterine compression sutures (the sandwich model), could presumably have prevented about one fourth of the peripartum hysterectomies.**

Conclusion

- More than 50% of peripartum hysterectomies seem to be avoidable by simple measures.
- Obstetricians and anesthesiologists should investigate individual cases by structured clinical audit, and disseminate and discuss the results for educational purposes. International collaboration is warranted.

Submitted, unpublished data

Conclusion

- Severe obstetric complications are rare but important. They should be considered when we discuss preferred mode of delivery and cesarean section.
- The prevalence of more than one complication in these women might increase their risk for severe comorbidity and maternal mortality.
- This Nordic initiative provides the basis for audit and common educational activities.

More INOSS

- International audit

- Educational activities

About the first delivery

- Once in a lifetime ….
- Second time with a scar in the uterus is different.

- To avoid the first cesarean section is probably more important than to aim for a second vaginal delivery after cesarean section

Today

- Independent experienced (older) pregnant women need more support than the young women who are more inclined to follow nature.
- Obstetricians and midwives are needed more than ever for advice and support!

A dream about the future (INOSS)

Advanced European course on severe obstetric complications

Copenhagen 17-20 May 2017

- Young and experienced researchers present and discuss their research (17 May)
- One day seminar for obstetricians, midwives, anaestesiologists, etc. Cases and epidemiology (18 May)
- A Danish Dissertation on the subject (19 May) and the celebration that (hopefully) follows (19-20 May)