B.OSS
Belgian Obstetric Surveillance Sytem

2nd Biennial report 2014-2015

Sponsored by the Belgian College Mother and Child

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1. Introduction.

In obstetric medicine we know several diseases and complications that can result in so-called near-miss events: 'severe life-threatening obstetric complications may necessitate urgent medical intervention in order to prevent likely death of the mother'. Obstetric conditions that are 1 or fewer than 1 in 2000 and that require special efforts to address them - correspond perfectly well with the European Union definition of rare diseases; most are metabolic diseases and require the production of 'orphan drugs' (Communication on rare diseases: Europe's challenges).

Unfortunately rare obstetric diseases are not specifically listed as one of the important categories of conditions in the rare diseases consultation. Realizing that at least 2% of all females are pregnant at any given time, hence many millions of women will face the potential risk of obstetric complications, this should be considered as a meaningful misjudgment. Many of these obstetric complications cannot be anticipated by risk factors or tests. Obstetricians will be challenged by these complications at the most a few times along their clinical career, therefore individual expertise is scarce. Rare obstetric diseases or complications of pregnancy are under-researched: there is no rigorous evidence on incidence, risk factors and pathophysiology and we lack evidence-based guidelines on prevention and management.

It is challenging to investigate rare diseases and severe complications to find robust evidence as basis for guidelines. Several difficulties preclude conducting studies on rare complications of pregnancy : firstly these conditions often occur in emergency situations, making it difficult to obtain consent for participation in randomized controlled trials of different management techniques. Moreover emergency situations usually lead to limitations of documentation, resulting in information bias when conducting retrospective studies. Secondly due to the rarity of these conditions (at the most, per definition, 1 in 2000) it is difficult to obtain a sufficient number of cases to undertake adequately powered studies without conducting them over a long period of time. The validity of studies may be called into question by changes in management over the lengthy period of the study. Thereby, the small case numbers may restrict the ability of studies to investigate variations in management practice. Additionally, studies using data from the case-notes routine data on births, hospitalizations or insurance claims often raise concerns about the quality of the data and the validity of the cases identified.

The United Kingdom was a pioneer when developing the UK Obstetric Surveillance System (UKOSS) in 2006, a nationwide survey to identify and study rare diseases of pregnancy. Collaboration of all maternities nationwide allows descriptive epidemiologic studies, case-control and parallel cohort studies. Gathering experience and knowledge on incidence, risk factors, pathophysiology and management results in better understanding, better patient information and better care. in 2006 UKOSS has completed and published around two dozen studies (https://www.npeu.ox.ac.uk/ukoss/completed-surveillances).
Similar surveillance systems have been set up in other countries and the International Network of Obstetric Surveillance Systems (INOSS) has been constituted in July 2010. Current member

countries of INOSS include Australia, Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Italy, the Netherlands, New Zealand, Norway, Portugal, Slovakia, Spain, Sweden and the United Kingdom. The mission of INOSS is to co-operate, share information and enable cross-national comparisons and analyses. (https://www.npeu.ox.ac.uk/inoss).

The Belgian Obstetric Surveillance System, B.OSS, supported by the College of Mother and Newborn, has been constituted in 2011 and started registering in the whole of Belgium as from January 2012. Meanwhile, the registration and evaluation of some diseases or rare complications in pregnancy has become a widely accepted practice in Belgium. Belgian gynaecologists are happy to receive advice based on own data, because practice in Belgium and certainly the organization of medical care do differ from that used in neighbouring countries. Whereas Peristat (http://www.europeristat.com) develops valid and reliable indicators that can be used for monitoring and evaluating perinatal health in the EU, the purpose of B.OSS in Belgium and of INOSS internationally is trying to analyse and explain the figures that are obtained and to establish the best possible treatment to avoid maternal near misses and deaths.

2. Objective.

The purpose of B.OSS is to achieve a registry and a surveillance of rare complications of pregnancy in Belgium: to bring together expertise on the knowledge and the management of these conditions, so that in the future pregnant women with a rare complication of pregnancy could benefit through better information on the condition and the outcome of the condition.

Aim is to conduct descriptive epidemiological studies on rare obstetric disorders based on data collected by B.OSS: to define prevalence in Belgium and identify risk-factors, to describe and evaluate management and compare with international studies and guideline. Secondary objectives are to formulate recommendations for prevention: primary prevention (based on risk-factors) and secondary prevention (based on management and substandard care) and to formulate national guidelines.

The Belgian Health Care Knowledge Centre (KCE), commissioned by the Federal Ministry of Health in Belgium, provides a Health System Performance Assessment on a 3-yearly basis, therefore investigating parameters of quality of care (see KCE report number 259A). Whereas KCE particularly has to rely on preventive medicine and to administrative accessibility of medical care, reports produced by B.OSS can provide realistic information on obstetric care in Belgium.

Aim is a high quality performance of the Belgian Obstetric Surveillance System (B.OSS) to be a respectable partner of INOSS, capable to co-operate and compare with other international obstetric surveillance systems.

3. Organisation and methods.

Coordination.

The Belgian Obstetric Surveillance System, briefly called ''B.OSS'' (="Belgian Obstetric Surveillance System) has been constituted in 2011 and registration in the whole of Belgium was established as from January 1st, 2012. B.OSS is indeed conducted by two teams**.** One team is responsible for maternities in Wallonia and Brussels (except for the VUB), coordinated by le Centre d'Épidémiologie Périnatale (CEpiP), another team is responsible for maternities in Flanders, including the VUB Brussels, coordinated by two principal investigators: Prof Hanssens (University Hospital Leuven) and Griet Vandenberghe (University Hospital Ghent). The teams cooperate and regularly meet to update on their progress and to discuss difficulties.

Ethics approval.

At initiation, the collection of patient information by B.OSS has been approved formally by the Medical Ethics Committee of the University Hospital Ghent (EC UZG 2012/734; B670201215359) and by the Medical Ethics Committee of the University Hospital Brussels (EC ULB 2012/111; B406201213660). Informed consent of the women is not required, provided the women have been informed by their gynaecologists by means of an information letter, enabling them to opt-out of the system.

The ethical approval by the Medical Ethics Committee of the University Hospital Ghent has been renewed in 2015 (EC UZG 2015/470) enabling the continuation of B.OSS with future studies.

Methods.

B.OSS has adopted the methodology for case reporting developed by the UKOSS. Briefly, an appointed contactperson (OB/GYN, senior-midwife or secretary) in each participating maternity unit is invited by monthly mailing to report a selected number of rare obstetric complications that may have occurred in the preceding month. In the event a case was reported in reply, the contact person is asked to complete an extensive data collection form. Confidentiality is guaranteed for patient, provider and hospital; person-identifiable information is eliminated from data-analysis. In case of incomplete reporting, the appointed contact person is encouraged repeatedly by email and phone to provide missing data, up to six months following the time of case reporting.

Initially, data on reported cases were obtained through the use of a standardized form, filled out electronically or on hard copy according to preference of the local responsable. **Web-based data-collection** was gradually introduced following the launch of the B.OSS website (www.b-oss.be) in August 2013, facilitating monthly reporting and completion of data collection forms online. Standardized forms filled out until August 2013 have been entered manually into the website forms, independently by the two teams of investigators to assure quality of data entry.

Collected data of completed online data collection forms are coded and exported as a comma-separated values file.

Registered variables.
Data collection forms question maternal characteristics, medical history and obstetrical history, details on the index pregnancy, circumstances of the event, the management and the outcome for mother and infant.

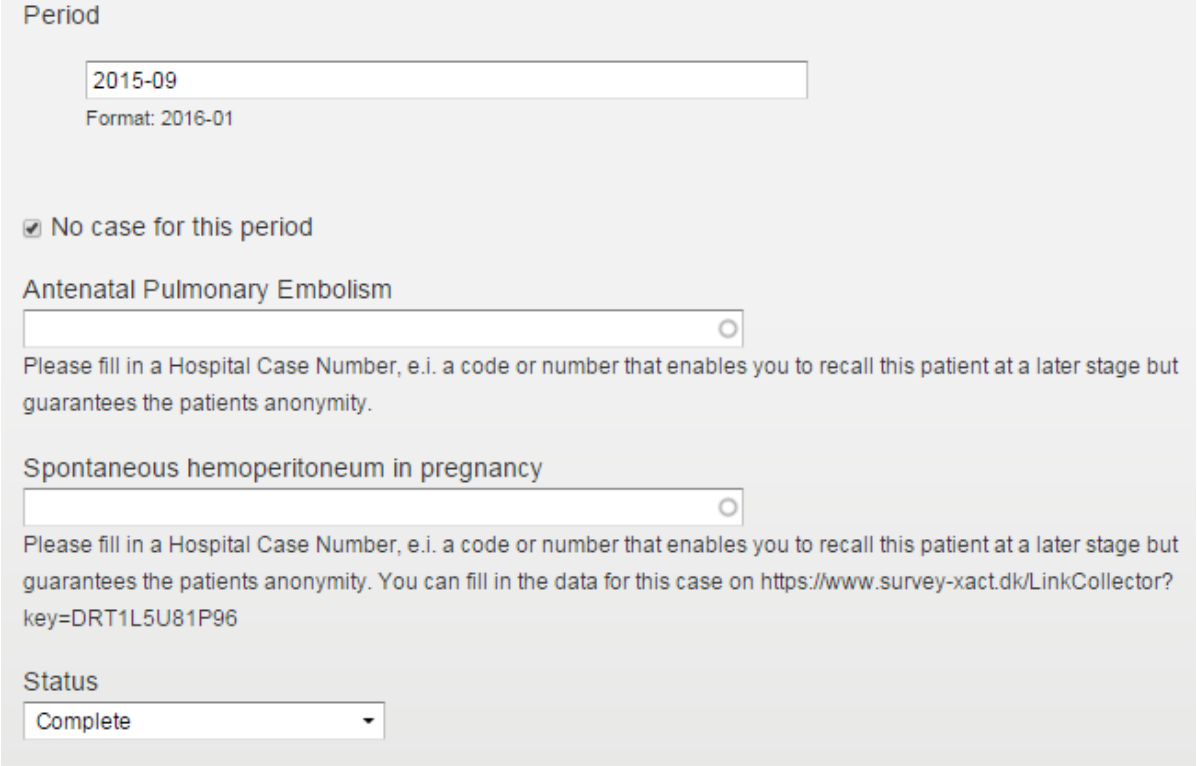

Figure 1 – Monthly case reporting form on www.b-oss.be.

4. Participation.

✓ Number of participating centers :

At the beginning in 2012, **97.3 %** (110/113) of the Belgian maternities formally agreed to participate in B.OSS: 2 centers have refused explicitely, and 1 center never replied.
The number of participating centers has dropped to 107 (situation in January 2014) as a result of merging and closure of centers, and further dropped to 106 (situation in December 2015) due to another merge of two centers.

97.2% (104/110) of the participating maternities have reported at least once during current study period (2014-2015) (i.e. they completed and returned at least one reporting form)

88.7% (95/107) of the participating maternities have logged in to the website www.b-oss.be since launch in August 2013. **76.67%** (82/107) of the participating maternities have used the website www.b-oss.be for reporting on a regular basis.

✓ The overall case reporting response rate for Belgium is
- **95.9%** (1232 of 1284 reporting forms that were sent have been completed and returned) between January and December **2014**)
- **86.4%** (1108 of 1282 reporting forms) between January and December **2015.**

Compared to the excellent response rate achieved at the beginning of the study (2012-2013) **98.9%**, the drop in response rate is undeniable. Importantly, a number of large maternities counting for a high number of deliveries are among the centers that have stopped reporting. None of these centers have officially refused further participation in the B.OSS study.
The communication and publication of the results of the first three completed studies, expected to occur in 2016, can be a manner to convince maternities of the utility of their participation in the Belgian Obstetric Surveillance System leading to their re-recruitment for further participation.

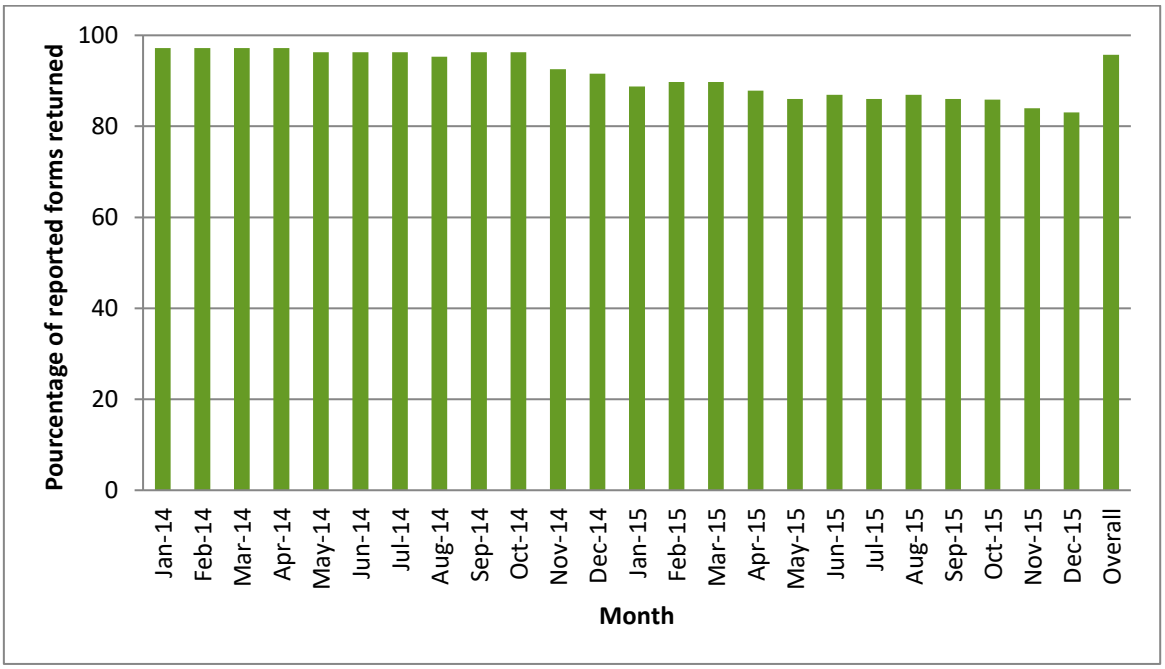

Figure 2 – Monthly response rate in % of all Belgian maternity centers.

5. Studies

5.1. Completed analyses.

5.1.1. Uterine ruptures (see copy of the manuscript in annexe)

Surveillance period

January 2012 – December 2013

Accepted for publication in the BMJ Open, February 2016.

A nationwide population-based cohort study of uterine rupture in Belgium: results of the Belgian Obstetric Surveillance system.

Abstract

Objectives:

We aimed to assess the prevalence of uterine rupture in Belgium and to evaluate risk factors, management and outcomes for mother and child.

Design:

Nationwide population-based prospective cohort study.

Setting:

Emergency obstetric care. Participation of 97% of maternity units covering 98.6% of the deliveries in Belgium.

Participants:

All women with uterine rupture in Belgium between January 2012 and December 2013. Eight women were excluded because data collection forms were not returned.

Results:

Data on 90 cases of confirmed uterine rupture were obtained, of which 73 had a previous caesarean delivery, representing an estimated prevalence of 3.6 (95%CI 2.9-4.4) per 10 000 deliveries overall and of 27 (95%CI 21-33) and 0.7 (95%CI 0.4-1.2) per 10 000 deliveries in women with and without previous caesarean delivery, respectively. Rupture occurred during trial of labour after caesarean section (TOLAC) in 57 women (81.4%, 95%CI 68-88), with a high rate of augmented (38.5%) and induced (29.8%) labour. All patients who underwent induction of labour had an unfavourable cervix at start of induction (Bishop Score ≤7 in 100%). Other uterine surgery was reported in the history of 22 cases (24%, 95% CI 17-34), including 1 case of myomectomy, 3 cases of salpingectomy and 2 cases of hysteroscopic resection of a uterine septum. Fourteen cases ruptured in the absence of labour (15.6%, 95%CI 9.5-24.7). No mothers have died, 8 required hysterectomy (8.9%, 95%CI 4.6-16.6). There were 10 perinatal deaths (perinatal mortality rate 117/1000 births, 95%CI 60-203) and perinatal asphyxia was observed in 29 infants (34.5%, 95%CI 25.2-45.1).

Conclusion:

The prevalence of uterine rupture in Belgium is similar to that in other Western countries. There is scope for improvement through the implementation of nationally adopted guidelines on TOLAC, to prevent from unsafe procedures by therefore reduce avoidable morbidity and mortality.

5.1.2/Peripartum hysterectomy and/or embolisation (see enclosed presentation by Marine Guisset on "de assistentendag of 19-3-2016")

Surveillance period

January 2012 – December 2013

Interim results

We analysed the data of 161 confirmed cases that underwent hysterectomy and/or embolization because of early postpartum haemorrhage, representing an overall prevalence of 6.4 (95% CI 5.5-7.4) per 10 000 deliveries. One mother died, case fatality rate 0.6% (95%CI 0.1-3.4). Hysterectomy was performed in 81 women (prevalence 3.2/10000, 95%CI 2.5-3.9), arterial embolization was performed in 98 women (prevalence 3.8/10000, 95%CI 3.1-4.7). Sixteen women underwent hysterectomy after embolization and 3 women underwent embolization after hysterectomy. Another seven women who underwent a hysterectomy (n=4) or embolisation (n=3) within the first 6 weeks following discharge from maternity were excluded from this analysis. Caesarean delivery (RR 2.8 95%CI 2.4-3.1) and previous caesarean delivery (RR 3.5 95%CI 2.8-4.2) were significant risk factors. The most important causes of the major haemorrhage leading to hysterectomy or embolization are presented in the table below. Hysterectomy was associated with uterine rupture and abnormal placentation, while women with placental remnants or retention and women with genital tract lacerations were more likely to be managed successfully with embolization.

Cause of haemorrhage	Number of women			RR (95% CI)
	Total N=161 N,%	Hysterectomy N=62 N,%	Embolization N=80 N,%	H versus E per cause
Uterine atony	88 (54.3)	30 (46.9)	51 (63.8)	0.7 (0.5-1.0)
Abnormal placentation*	56 (34.5)	24(37.5)	20 (25.0)	1.5 (0.9-2.4)
Placental remnants or retention#	23 (14.1)	7 (10.9)	16 (20.0)	0.6 (0.2-1.4)
Genital tract laceration	12 (7.4)	1 (1.6)	10 (12.5)	0.12 (0.01-0.9)
Iatrogenic during surgery	14 (8.6)	8 (12.5)	5 (6.2)	2 (0.6-5.8)
Uterine rupture	12 (7.4)	12 (18.7)	0	31 (1.8-516)
Coagulation disorders	5 (3)	1 (1.5)	4 (5)	0.3 (0.03-2.7)

*Abnormal placentation includes abnormally invasive placenta (AIP) (n=14), placenta praevia (n=18) and combination of both (n=24).

With exclusion of the cases of abnormal placentation (n=56).

§ $p<0.05$

5.1.3. Eclampsia – preliminary results of the Flanders data obtained in 2012- part of 2013 were presented in TromsØ (Norway) in July 2013 as a Poster presentation at the ISSHP-meeting by Ann Langedock

Definition

Defined according to UKOSS as any woman with convulsion(s) during pregnancy or within the first 10 days after delivery, in combination with at least 2 of the following features within 24 hours of the convulsion(s) :

- Hypertension : a maximum diastolic Blood Pressure of >= 90 mmHg and a diastolic increment of >= 25 mmHg (having had a diastolic Blood Pressure <90 mmHg at the first antenatal visit)
- Proteinuria : at least + protein in a random urine sample or >= 0.3 g of proteins in a 24-hour collection
- Thrombocytopenia : platelet count < 100000/ml
- Raised transaminase levels : ALT of >= 42 IU/l or AST of >= 42 IU/l

Surveillance period

January 2012 – December 2015

Interim results

A total of 74 cases have been reported in these 36 months, of which 65 completed data collection forms have been returned. The estimated prevalence (1.7/ 10 000 deliveries, 95% CI 1.3-2.1) is remarkably lower than the reported prevalence in the Netherlands (5.4 / 10 000) and the UK (2.7 / 10 000 deliveries). There were no cases of maternal deaths.
And honoured

5.2. Studies in PROGRESS :

5.2.1. Antenatal pulmonary embolism (see enclosed presentation by Annely Huygebaert on “de assistentendag of 19-3-2016” , awarded the prize of “best oral presentation”)

Definition

- EITHER PE should be confirmed by using suitable imaging techniques (such as angiography, computed tomography, echocardiography, magnetic resonance imaging or ventilation-perfusion scan showing a high probability of PE
- OR PE is confirmed at surgery or postmortem
- OR a clinician has made a diagnosis of PE with signs and symptoms consistent with PE present, and the patient has accordingly received a course of anticoagulation therapy (>1 week duration)

Surveillance period

January 2015 – December 2018

Interim results

In 2015 ten cases of antenatal pulmonary embolism (APE) were reported. This results in an estimated prevalence of 0.8 (95% CI 00.4-1.4) / 10 000 deliveries. This is lower then the expected prevalence based on a similar study by UKOSS in the UK in 2005-2006 (1.3/ 10 000 deliveries). There were no cases of maternal deaths.

5.2.2. Spontaneous hemoperitoneum in pregnancy (SHiP).

The study is promoted by the International Network of Obstetric Survey Systems (INOSS) and is coordinated by Dr Jane Foss Berlac and Prof Jens Langhoff-Roos, Righshospitality, University of Copenhagen, Denmark.
Cases of SHiP are reported via the website www.b-oss.be, data collection forms are filled in online via a link on the website. Data processing and analysis will be performed in Denmark.

Definition

SHiP is the occurrence of sudden hemorrhage intra-abdominally in pregnancy - unrelated to trauma or rupture of the uterus. SHiP has been associated with endometriosis, rupture of uterine artery or varicose veins and aneurysms of the splenic artery.
Inclusion: any pregnancy after 22 weeks with sudden intra-abdominal hemorrhage requiring surgery (CS, laparotomy, laparoscopy)- without preceding trauma.
Exclusion: cases of uterine rupture, cases of hemoperitoneum following trauma.

Surveillance period

August 2015 – December 2016

Interim results

In 2015 four cases of SHiP have been reported in Belgium. Denmark has received one completed data collection form to this day.

5.3. Future studies.

5.3.1. Anaphylaxis in pregnancy.

An international collaborative study examining anaphylaxis in pregnancy using the International Network of Obstetric Survey Systems (INOSS). Principal investigators are Stephen Mc Call and Professor Marian Knight, National Perinatal Epidemiology Unit, University of Oxford, UK.

Definition

The cases will be all pregnant women in the INOSS region identified as having anaphylaxis according to the following definition:

Anaphylaxis is defined as a severe, life-threatening generalised or systemic hypersensitivity reaction. The following two criteria must be met for a diagnosis of anaphylaxis to be made:

1. A life-threatening airway problem and/or breathing problem and/or circulatory problem
2. Sudden onset and rapid progression of symptoms

1. A life-threatening airway problem is taken to include:
- Laryngeal or pharyngeal oedema
- Hoarse voice
- Stridor

2. A life-threatening breathing problem is taken to include:
- Shortness of breath and raised respiratory rate
- Wheeze
- Decreased oxygen saturations
- Confusion secondary to hypoxia
- Cyanosis
- Respiratory exhaustion or respiratory arrest

3. A life-threatening circulatory problem is taken to include:
- Signs of shock such as faintness, pallor or clammy
skin
- Tachycardia >100bpm
- Systolic BP <90mmHg
- Decreasing level of consciousness
- Signs of ischaemia on ECG
- Cardiac arrest

Planned study period

July 2016 – January 2018

5.3.2. Maternal mortality and morbidity (not named in the accompanying writing)

The discussion on the development of a systematized registry of maternal deaths in Belgium is on going. In 2014-2015 the College of Mother and Child has dedicated several meetings on the subject. They have concluded that :

No benefit was seen in joining the Maternal Mortality Registry of Belgium as a supplementary province of the Netherlands for Flanders and as a supplementary province of France for Wallonia and Brussels. The Health care systems in those countries are organized so differently which would therefore complicate analysis of quality of care. Moreover some complications of pregnancies have been shown to have a prevalence that is very different in those three countries e.g. 'eclampsia' Yet we should take advantage of the long-term experience they have in their countries

To guarantee patient and hospital anonymity an even longer time span could/should be considered. And /or could be conbimed with a "Confidential Enquiries into Maternal near-misses" (see the PNEU website in this)
The Belgian Obstetric Surveillance System can be a platform for the registration of cases of maternal deaths.
Consequently, registered cases should be evaluated by a multidisciplinary expert team in a very short-term.

Before further steps can be undertaken in the development of a Mortality Registry in Belgium, the necessity of this subject should be presented to the Minister for Public Health to obtain permission in this delicate matter.
This meeting has been scheduled in 2016.

6. B.OSS, its place within INOSS.

The International Network of Obstetric Survey Systems (INOSS) is a multi-country collaboration which was formed to promote and facilitate studies of uncommon and severe complications in pregnancy and childbirth.
B.OSS was represented at the annual meetings of the INOSS in Paris in 2012, in Munich in 2013, in Stockholm (Finnhamn) in 2014 and in Vancouver in 2015 and will be represented in Rome in may 2016.

B.OSS is participating in the INOSS study of Spontaneous Hemoperitoneum of Pregnancy (SHiP) and will participate in the INOSS study of Anaphylaxis in Pregnancy.

B.OSS is the main investigator of the International Study of uterine rupture, an international comparative and multinational composite analysis of cases of uterine rupture.
Since 2015 INOSS has embraced two major new members, namely Japan and Canada.
More information on INOSS, aims and members can be found on https://www.npeu.ox.ac.uk/inoss.

7. Presentations and publications.

7.1. Presentations in 2014-2015.

Oral presentation. Assistentendag, Leuven. March 2014.
M. De Blaere , G. Vandenberghe, Y. Englert , V. Van Leeuw , K. Roelens, M. Hanssens.
Uterusruptuur in België, preliminaire resultaten van B.OSS.

Oral presentation. Congres MIC-NIC AZ St Jan, Brugge. October 2014.
Vandenberghe G
De eerste resultaten van de Belgian Obstetric Surveillance system (B.OSS).

Oral presentation "Research Day 2015", Ghent University, Faculty of Medicine and Health Sciences. March 2015.
G. Vandenberghe, H. Verstraelen, Y. Englert, M. Hanssens, K.Roelens.
Uterine rupture in Belgium: results of the Belgian Obstetric Surveillance System.

Oral presentation 20e IGO Doelencongres, Rotterdam. April 2015.
Vandenberghe G, Roelens K, Hanssens M.
Meten is weten: het nut van registraties en evaluaties.

Oral presentation XXI FIGO Wold Congress of Gynecology and Obstetrics. Vancouver, Canada. 4-9 October 2015.
Vandenberghe G.
The International Network of Obstetric Survey Systems (INOSS): an international study of uterine rupture.

Op de "assistentendag" 2016 werden maar liefst 2 abstracten aangenomen en gepresenteerd door 1) en 2) Marine Guisset – ontving een prijs voor beste presentatie --

7.2. Publications in 2014-2015.

A nationwide population-based cohort study of uterine rupture in Belgium: results of the Belgian Obstetric Surveillance system.
Vandenberghe G, De Blaere M, Van Leeuw V, Roelens K, Englert Y, Hanssens M, Verstraelen H.
Accepted for publication in the BMJ Open, February 2016.
See Annex.

7.3. Expected publications in 2016.

The International Network of Obstetric Survey Systems: a study of uterine rupture. Accepted for publication by BMJ-open

Peripartum hysterectomy and embolization of the uterine arteries for major obstetric hemorrhage: results of the Belgian Obstetric Surveillance System.

Eclampsia in Belgium: results of the Belgian Obstetric Surveillance System.

8. Acknowledgements.

Four years later, **B.OSS** still stands firm and has become a competent registration system.
We are aware that this success is essentially thanks to the contribution and of all clinicians reporting to **B.OSS**, who persevere in notifying cases and completing data collection forms, who never complain of website breakdowns or lengthy questionnaires.
We would like to thank all B.OSS-contactpersons, all gynaecologists, the GSO's, midwifes, secretaries throughout Belgium who have contributed in one or another way to B.OSS, without whom this work would not have been possible.

Funding

We wish to thank the College for the Mother and the Newborn, section Mother, who supported the establishment of the Belgian Obstetric Surveillance System, and has continued funding the registration and evaluation of serious obstetric complications in Belgium in 2014-2015.

We also wish to thank the FWO who has given a grant to Griet Vandenberghe

Future

B.OSS continues the registration and evaluation of rare obstetric complications in Belgium in 2016 with current studies (antenatal pulmonary embolism, spontaneous hemoperitoneum in pregnancy) and new studies (anaphylaxis in pregnancy and Maternal deaths and Morbidity).
We rely on your further enthusiasm and participation and hope that the few maternities that have dropped out will be motivated or remotivated by the reported results and first publications.

ANNEXES 5 or 6