

Ministry of Health of the Kyrgyz Republic

**National Committee on Confidential Enquiry into Maternal
Deaths**

**Inception Report on Confidential Enquiry into Maternal
Deaths in the Kyrgyz Republic for 2011-2012**

Kyrgyzstan

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This report was drafted by the National Committee on Confidential Enquiry into Maternal Deaths under the Ministry of Health of the Kyrgyz Republic. The technical assistance was provided by UN Population Fund, World Health Organization and Regional "Health in Central Asia" Program of the German Society for International Cooperation as part of "Making Pregnancy Safe" Program.

The Audit of Maternal Deaths approved by the Order of the Ministry of Health was carried out by the CEMD national committees and rayon coordinators.

According to the WHO *Beyond the Numbers* methodology, the entire information used to draft this report was obtained confidentially from various sources. In order to comply with the principle of confidentiality and prohibition to use for other purposes, the collected medical records and questionnaires were destroyed following the conducted enquiry.

For further information and references to this report, please contact the National CEMD Committee.

Table of Content:

Acknowledgments.....	4
Abbreviations.....	5
Preamble	8
Nine Key Recommendations... ..	9
Introduction	10
CEMD Methodology.....	11
Review of Mother Deaths Cases.....	15
Obstetric Hemmorrhage.....	18
Preeclampsia.....	23
Sepsis.....	26
Indirect Causes of Maternal Deaths.....	28
Anesthesia and Intensive Care.....	32
Embolism.....	34
Trends in Pathology-Anatomical Service and Review of Maternal Deaths from the Perspective Thereof.....	37
Role of Socio-Economic Factors Affecting Maternal Deaths.....	43
Concluding Recommendations.....	46
Annex 1. Recommendations in Autopsy in Maternal Deaths	47
Annex 2. Definitions of Mother Deaths and its Indicators, Methods of Mother Deaths Estimates, Basic Health Condition, and Mother Death Trends, MD in Rural and Urban Settings.....	50
Annex 3. Members of National Confidential Enquiry into Maternal Deaths Committee.....	53
References.....	

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List of Acronyms

ALTC	-	Assessment of life-threatening conditions
Abx	-	Antibiotic
BP	-	Blood Pressure
IA + ALV -		Infusion Anesthesia + Artificial Lung Ventilation
HIV	-	Human Immunodeficiency Virus
WHO	-	World Health Organization
IV	-	Intravenous
IM	-	Intramuscular
g/l	-	gram/liter
g	-	gram
HES	-	Hydroxyethyl starch
FGP	-	Family Group Practitioners
GIZ	-	German Society for International Development
DIC	-	Disseminated Intravascular Coagulation
PA	-	Premature Amniorrhoea
DFU	-	Dispensary Follow-up
RF	-	Respiratory Failure
DX	-	Diagnosis
WHO EURO	-	WHO Regional Office for Europe
IDA	-	Iron Deficiency Anemia
WFA	-	Women of Fertile Age
ALV	-	Artificial Lung Ventilation
NMCR	-	Near-Miss Care Review
BMI	-	Body Mass Index
CP	-	Clinical Protocol
CPA	-	Cardiopulmonary arrest
CEMD	-	Confidential Enquiry into Maternal Death
CC	-	Contraceptive Commodities
HPU	-	Health Promotion Unit
KR	-	Kyrgyz Republic
HF	-	Health Facility
MH KR	-	Ministry of Health of the Kyrgyz Republic
ml	-	Milliliter
ICD	-	International Classification of Diseases
EOC	-	Emergency Obstetric care
NC MCH	-	National Mother and Child Health Center
CQI	-	Continuous Quality Improvement
NSC	-	National Statistics Committee
NC CEMD	-	National Committee on Confidential Enquiry into Maternal Deaths
BOH	-	Burdened Obstetric History
ESP	-	Ensuring Safe Pregnancy
OMH	-	Oblast Merged Hospital
ARF	-	Acute Respiratory Failure
HO	-	Health Organization
CBV	-	Circulating Blood Volume

POP	-	Postoperative period
PPROM	-	Preterm Premature Rupture of Membranes
PHC	-	Primary Health Care
PP	-	Post-Partum
PPH	-	Post-Partum Hemorrhage
SPE	-	Severe Pre-Eclampsia
FFP	-	Fresh-Frozen Plasma
RMIC MH KR	-	Republican Medical Information Center under the Ministry of Health of KR
MVA	-	Manual Vacuum Aspiration
RICU	-	Resuscitation and Intensive Care Unit
ARSD	-	Adult Respiratory Syndrome Distress
VHC	-	Village Health Committee
SRH	-	Sexual Reproductive Health
CRF	-	Cardiac Respiratory Failure
ESR	-	Erythrocyte Sedimentation Rate
PATE	-	Pulmonary Artery Thromboembolia
TH	-	Territorial Hospital
EPC	-	Effective Perinatal Care
BPM	-	Beats per minute
DUSS	-	Duplex Ultrasonography Screening
USE	-	Ultrasound examination

C&DP MH KR - Department for management of health and curative care and drug policy under the Ministry of Health of the Kyrgyz Republic

FAP	-	Feldscher-Midwifery Point
COPD	-	Chronic Obstructive Pulmonary Disease
CVP	-	Central Venous Pressure
FMC	-	Family Medicine Center
BTN	-	Beyond the Numbers
CR	-	Cardiac Rate
RR	-	Rate of Respiration
AFE	-	Amniotic Fluid Embolism
PRC	-	Packed Red Cells
UNFPA	-	United Nation Population Fund
HELLP	-	

H — Hemolysis;

EL — Elevated liver enzymes values;

LP — Low platelet count syndrome related to pre-eclampsia

Hb — Hemoglobin

Preamble

This report presents the initial findings of efforts on Confidential Enquiry into Maternal Deaths in the Kyrgyz Republic for 2010-2012. In addition to medical records new sources of information were used In the course of the audit – the anonymous questionnaires for relatives of deceased mothers and health professionals engaged in health care delivery.

This report contains eight key recommendations, which according to NC CEMD are priority interventions to reduce maternal mortality in the country. These recommendations emanate from main chapters of the presented report that cover direct obstetric causes which constitute substantial share in the structure of maternal mortality causes.

In addition to the assessment of cases, each chapter depending on the cause (hemorrhage, sepsis, hypertensive conditions) provides the key recommendations on certain nosology.

9 KEY RECOMMENDATIONS

- 1. The health professionals should emphasize on enhancing of practical skills in emergency obstetric situations. The midwives and nurses should be aware and apply the pathway of actions in emergency conditions in absence of a doctor.**
- 2. It is necessary to improve the emergency care service by improving transport and consultative service, develop training programs to train relevant professionals.**
- 3. All maternity hospitals should develop and ensure availability of local evidence based pathways/algorithms, sets of medical devices and equipment to provide emergency care in basic obstetric complications. The staff should be trained on provision of emergency care with subsequent certification every six months. It is required to conduct systematic and regular monitoring of continuous readiness of obstetrical organizations to provide emergency care.**
- 4. The adequate supply of blood preparations should be available in obstetrical organizations for emergency obstetric conditions.**
- 5. To reduce obstetric interventions that increases the risk of obstetric hemorrhage and septic complications. The staff should revise the attitude to Cesarean section operations and labor induction along with informing the patient on possible risks.**
- 6. Given the high ALV anesthesia risk in high blood pressure, the use of regional anesthesia should be a method of choice of anesthesia in operative delivery of pregnant women with severe preeclampsia.**
- 7. It is necessary to issue/revise national guidelines and protocols on sepsis and develop on prolonged / obstructive childbirth, labor induction, pregnancy management and childbirth in women with pneumonia.**
- 8. To improve the anatomic-pathology/autopsy service and improve the quality of post-mortem autopsy.**

Introduction

In line with the definition of the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), "Maternal death is the death of a woman while pregnant or within 42 days of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related or aggravated by pregnancy, or its management but not from accidental or incidental causes". This implies the link between pregnancy and death, both in terms of the time of death coming, and the cause of the death.

Any health professional in the event of fatal case always feels guilt, and sometimes a feeling of powerlessness, especially when a family loses a young woman and their children are left orphans. These feelings preoccupy the moods of health professionals for a long time causing stress, fatigue, and sometimes the desire to quit the profession. The psychological trauma adversely affects the health, nerves not only of a doctor or midwife, but also their families, medical personnel, so it is hard to overestimate the impact and adverse implications of such losses. The ruled punishment is not a yardstick of guilt and does not address the shortcomings in health care quality but causes bitterness and disappointment. Nonetheless, we all understand that each maternal death should serve as a lesson to prevent other deaths. It can be ensured through review of each case with the identification of gaps, systemic errors, opportunity cost, and adoption of adequate decisions to address them and develop specific recommendations.

The traditional practice of review of maternal deaths in the country, as a rule, is aimed identifying the culprit. Therefore, the health workers are afraid of these reviews which are not followed with friendly peer advice, constructive solution leading to changes in the system of health care delivery in the health facility. The ongoing review of cases of maternal deaths based only on data contained in medical records prevent from identifying all clinical and organizational shortcomings of both of health facility and the system as a whole.

Recognizing the gravity of the problem, the Ministry of Health of the Kyrgyz since 2010 launched the implementation of confidential enquiry into maternal deaths recommended by WHO. The confidential enquiry is based on principles of the anonymous review of cases involving all actors of the tragic events including family members. The outcome of this audit is a report with specific recommendations for management decision-making in the country.

The process of implementation of confidential enquiry was preceded by extensive preparatory efforts from examination and selection of audit approaches in 2004 during the regional meeting of WHO up to direct technical interventions in the country to introduce confidential enquiry of maternal deaths in line with WHO expertise and regional experience. There were national technical meetings from 2007 to 2010 with involvement of international experts for training audit coordinators, developing implementation plan, approval of audit tools and priority national protocols in obstetrics developed on the basis of principles of evidence-based medicine.

The nationwide implementation of Confidential Enquiry into Maternal Deaths is going on since 2010. The findings of the conducted enquiry into maternal deaths during 2011-2012 are presented in this report.

Methodology of Confidential Enquiry into Maternal Deaths

The confidential enquiry into maternal deaths – is consistent, multidisciplinary and anonymous review of all maternal deaths, or their representative sample at the national level. The purpose of the audit is to determine the number of deaths and their causes, as well as associated preventable or amendable factors. If uncover more details, it is worthwhile to note the following points:

- This implies the identification of real causes of medical and non-medical nature leading to maternal mortality, including social and family nature.
- This implies scientific evaluation based on evidences of maternal deaths cases with identification of factors of inadequate care at community level as well as at the level of health facility.
- This implies the development of feasible recommendations to improve the quality of care to pregnant women, parturient and puerpera in the Kyrgyz Republic, as well as monitoring of the implementation of recommendations.
- This implies the cross-sectoral representation in implementation of confidential enquiry recommendations.

The first step in implementation of a confidential audit of maternal mortality is to ensure clear understanding by regional and national policy makers of their benefits. The policy makers recognize that confidentiality will not be used to justify misconduct, and they have to trust the professionals who conduct the audit. It is the confidentiality that is one of the most critical principles of the audit of maternal mortality.

Lack of practice of autopsy in many cases of maternal deaths prevents from proper audit conclusions, in particular, in cases of acute hepatic steatosis, pregnancy hepatitis, thromboembolism, pulmonary artery embolism.

According to the survey of health workers and relatives of deceased mothers the confidential audit experts identified the cases of conversion of hemorrhage diagnosis into such diagnoses as extragenital diseases, thromboembolism and pre-eclampsia, or uterine rupture in bleeding, pre-eclampsia and obstetric embolism or septic processes under other columns (PATE, pre-eclampsia).

Any approach designed to investigate causes of maternal mortality, incidence or clinical practice in order to improve maternal health is governed by thorough and comprehensive enquiry as a guideline or audit cycle as shown on Fig. 1.

Fig.1. Cycle of Confidential Enquiry



This is the continuous process of identifying cases, data collection and analysis, development of recommendations for actions and implementation, and evaluation of findings and improvement program. The ultimate goal of the enquiry process is action, not just counting cases and estimating their percentage ratio. All specified steps - identification, data collection and analysis, action and evaluation - are very important and should be carried out on continuous basis to justify the costs and make a difference.

The survey of health staff and relatives of deceased mothers is the main source of information in a confidential audit of maternal mortality whereby is distinguished from official audit. The confidentiality of the survey enables to express their opinions without fear of punishment. The data of the survey of health professionals and relatives of deceased mothers testify to underestimation of the condition by patients and their relatives who were aware of contraindications to pregnancy, but disregarded recommendations of doctors. The relatives expressed in questionnaires their great regret about the loss of their loved one. Owing to the confidential audit the relatives realized that not only health professionals but also families incur responsibility for the health of a mother. There are cases when relatives of the deceased mothers express their gratitude for attention and sympathy to regional coordinators, secretaries and NC CEMD.

Each step of confidential enquiry into maternal mortality enables to unfold the topic of methodology for conducting the audit.

Step 1. Identification of Cases. The local enquiries are held in all oblasts following the case of maternal death to identify gaps in provision of clinical care, eliminate violations of the law. All of this is called the traditional system of review of maternal mortality. The confidential audit of maternal mortality is launched parallel to this. There is continuous rapport between the confidential audit coordinator, chief specialist of health management department, doctors and nurses of maternity hospitals which allows to identify maternal deaths. Following the case identification the regional coordinator proceeds to the next step - "information collection".

Step 2: Information Collection. The process of collecting information is strictly confidential and implies anonymous multidisciplinary comprehensive assessment of factors and circumstances affecting the maternal mortality in health organization. The standard form of confidential questionnaire is filled on each death case by all health professionals involved in providing care to a woman. These include PHC physicians, obstetrician-gynecologist, anesthesiologist, nurse or midwife providing care to a woman throughout her pregnancy, childbirth or postpartum period as well as any other doctors (related professionals) and medium level health personnel involved in treatment of conditions associated with her death. The interviews of relatives of deceased woman are conducted. The anonymous questionnaires along with a copy of depersonalized medical records are sent by regional coordinator to central commission of the confidential audit. The medical records depersonalized by hachuring last and first names of women and health workers, names of facilities associated with care delivery. This ensures safe environment for work and anonymity entailing greater openness and entirety of case assessment.

Step 3. Review of Findings. National Committee Confidential Enquires into Maternal Death (NC CEMD) collates and reviews the documentation drafts the final report followed by recommendations. In the case audit each of the factors of health care is reviewed that are inconsistent with effective norms and standards whereby it should be specified according to the scale to what extent it contributed to fatal outcome in accordance with the following classification of improper care:

Primary - factor had a significant effect on lethal outcome. It would be reasonable to assume that other measures would lead to a different outcome.

Secondary - factor had a substantial effect. Perhaps other measures would have led to different outcomes, nonetheless, this way or another, saving the life of purpera was unlikely.

Incidental – factor whereby despite obvious edification of the incident the identified factors did not affect the outcome.

It was followed by ranking the death into various categories according to the scale of maternal mortality case evaluation:

- 0 – no factor (s) of inadequate care was (were) found;
- 1 - incidental factor (s) of improper care was (were) found but not likely it (they) affected the tragic outcome;
- 2 - minor factor (s) of inadequate care was (were) found which possibly affected the tragic outcome;
- 3 - primary factor (s) of inadequate care was (were) found which is (are) likely affected the tragic outcome.

The maternal death cases that commenced in the Kyrgyz Republic from 1 January 2011 to 31 December 2012 were subject to confidential enquiry. 100 (submitted for audit) out of 149 cases of maternal deaths registered in KR were reviewed at 16 meetings of the Committee for 2 years.

Step 4. Recommendations for Action. NC CEMD recommendations are equally important for health professionals as well as for those involved in health policy planning. Based on findings of the review the factors with avoidable effects are identified or rectifiable factors while delivering care to women at the level of health facility, health system or local community. The recommendations enable the health practitioners and persons involved in health care planning to identify and address lost opportunities or any rectifiable factors.

Step 5. Evaluation and Improvement. The audit recommendations can be adopted as baseline data whereof any further progress in terms of practice can be followed up. It is critical for recommendations to be simple, affordable, effective, and widely integrated in clinical practice.

Findings of Maternal Mortality Investigation

Out of 149 (in 2011-71 and in 2012-78) official maternal deaths registered in the Kyrgyz Republic for 2 years the NC CEMD has received documentation of 100 cases for review. This testifies to great concern of the medical community about the performance, points out the long-felt need to make a difference in terms of maternal mortality. However, in the course of review of 100 cases, 5 cases were found uninformative and not included in the report.

During 2011-2012, 83.2% (79) of mothers died from causes related to pregnancy, childbirth and postpartum period (direct causes); 16.8% (16) of mothers died from causes not related to pregnancy, childbirth postpartum period (indirect causes), (see Table №1-2).

Table 1. Number and Incidence of Maternal Death Cases

Death causes	Absolute figures	% of total number of maternal deaths
Direct obstetric causes	79	83,2
Hemorrhage, including:	41	43,2
Injuries	15	15,8
Uterine atony	11	11,6
Abruptio placentae	15	15,8
Obstetric sepsis including:	13	13,7
Sepsis in labor	3	3,2

Postpartum sepsis	10	10,5
Pre-eclampsia-eclampsia	18	19
Thromboembolism	3	3,2
Post-anesthesia complications	3	3,2
Sub Total	79	83,2
Indirect causes	7	7,3
Pulmonary	3	3,2
Hepatic	0	0
HIV	6	6,3
Other		
Subtotal indirect Causes	16	16,8
GRAND TOTAL	95	100%

Table 2. Maternal Mortality as per Gestation Term, Delivery Method and Death

Gestation Term at Death	Absolute Figures	%
Up to 22 weeks	2	2,1
22-28 weeks	7	7,4
29-36 weeks	11	11,6
Full-term pregnancy	75	78,9
Method of Delivery	Absolute Figures	%
At home		
Spontaneous vaginal delivery	50	2,1
Devices in vaginal delivery (forceps, vaccum)	1	7,4
Emergency cesarean section	44	11,6
Hysterectomy	28	78,9
Timing of Death	Absolute Figures	%
Abortion	No data	
Pre-delivery, during pregnancy	4	4,2
In labor and within 24 hours from the inception of labor	17	17,9
Post-partum within 24 hours post delivery	72	75,8
1-7 days	19	20
in 7 days	51	53,7
No data	2	2,1

As it can be seen the leading cause of death are direct obstetric causes. The leading cause among the direct obstetric causes is the hemorrhage - more than half of all cases, or more than two-thirds of deaths due to three causes: haemorrhage, pre-eclampsia and sepsis.

Obstetric hemorrhage resulted in death in 43.2% (41) whereby uterus rupture – in 15.8% (15), post-natal, post-abortion sepsis - in 13.7% (13), hypertensive conditions – in 18.9% (18), ectopic pregnancy – in 1.0% (1), embolism in 3.1% (3), other - 3.1% (3) cases.

In the course of the audit all factors of health care that does not meet effective norms and standards were reviewed. To what extent they contributed to lethal outcome according to classification of inadequate care and categories, they classified maternal deaths according to the following rating scale: (see Figure 2)

Figure 2. Distribution of MD Cases according to CEMD based on Scale of Evaluation of Improper Care



As can be seen from the Figure, primary factors of inadequate care caused 55.8% of maternal deaths, which affected the tragic outcome (secondary factors in 35, 8% of cases and incidental factors in 8.4% cases).

The structure of primary factors of improper care by death causes are presented in Figure 3.

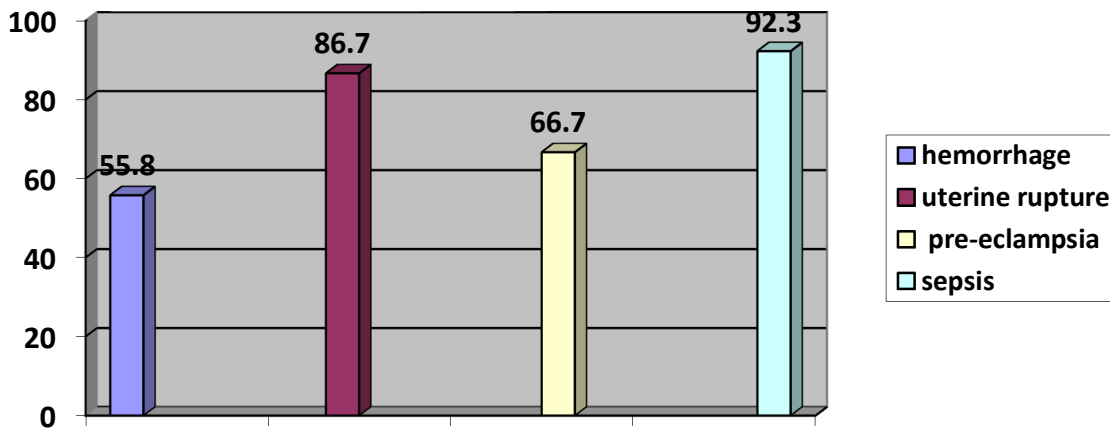


Figure 3. Structure of Primary Factors of Improper Care by Death Causes

As can be seen from the Figure, the incidence of primary factors of inadequate care is mostly occurring in hemorrhage (55.8%), uterine rupture (86.7%), in pre-eclampsia (66.7%), and sepsis (92.3%).

The significance of the Cesarean section factor under CEMD is shown in Figure 4, where it highly affected the death cases in hemorrhage and preeclampsia.

Cesarean section incidence = 16 (hemorrhage) + 15 (pre-eclampsia) + 4 (sepsis) + 4 (EGD) + 3 (anesthesia) + 2 (embolism) = 44 among 95 cases 46,3%.

**Частота кесарево сечения =
16(кр)+15(птс)+4(сепс)+4(эгз)+3(анест)+2(эмбол)=44 от 95 случаев 46,3%**

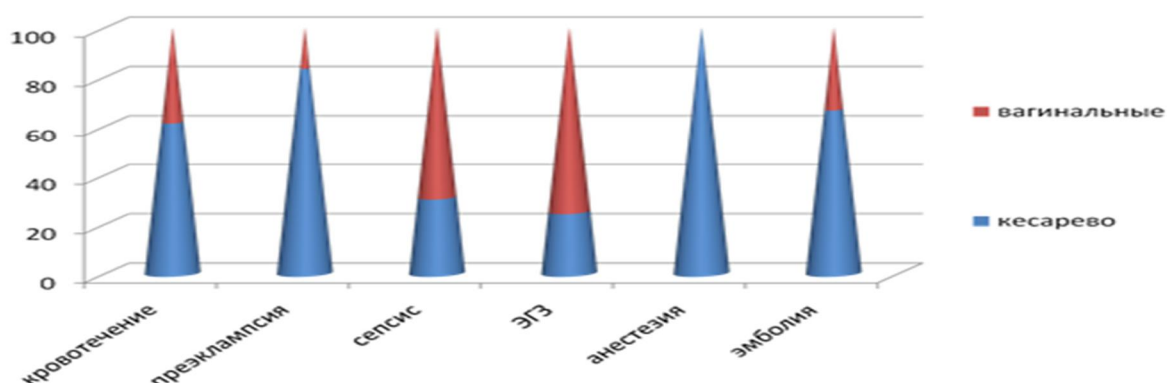


Figure 4. Significance of Factor of Cesarean Section (vaginal and Cesarean)

As it can be seen the Cesarean section was a significant factor and affected many direct obstetric causes of death, in particular, during delivery of women with pre-eclampsia and in hemorrhage associated with placental abruption.

Obstetric Hemorrhage

According to our observations, the overall indicator of mortality rate in the Kyrgyz Republic for three-year period has made 62.6 % i.e. almost 4 times higher than, for example, in the United Kingdom. The obstetric hemorrhage was the main cause in the structure of causes. Thus, the indicator of maternal deaths per 100 000 live births in massive obstetric haemorrhage has made 32.7 % as compared to other direct causes, exceeding the rate by more than 3 times (in septic complications - 9.96 % and pre-eclampsia - 7.82 %). Furthermore, the hemorrhage with fatal outcome in 25 women (out of 41), or the majority of deaths from hemorrhage (60.97%) occurred at the first-level facilities (TH), every third death (31.7%) - in facilities of the second level (city and oblast), and only 3 women, or 7.3%, died at the tertiary level of perinatal care delivery. The most common causes included placenta previa and placental abruption, followed by traumatic injury of uterus, and a way much less rarely post-partum hypo- and uterine atony irrespective of rupture.

Out of 41 cases of hemorrhage, the hemorrhage in pregnancy or at labour onset were caused by placental abruption occurred in 15 cases (36,6%), in postpartum period, i.e. proper postpartum hemorrhage were reported in 11 cases (26,8%).

Table 3. Obstetric Hemorrhage Progression in Extragenital Diseases Affected by Primary Factors of Improper Care

Nosologies	EGD	Category 3 Score
PPH 11/26,8 %	5	8
Abruptio Placentae	8	8
Traumatic injuries to uterus	6	11
Total 41/100 (43,16%) out of 95	19/46,3%	27/65,8 %

The noteworthy are traumatic injuries to uterus - uterine rupture, representing the cause of lethal outcome in 15 cases of all cases of hemorrhage (36.6%). Out of 41 cases (32.74 per 10 000 child births) - bleeding occurred prior to the onset of labor, in pregnancy and childbirth caused by placental abruption has made 10.67 per 100 000 live births or 36.6% out of 41 all hemorrhage cases; in the postpartum period, i.e. – proper PPH has made 7.83 per 100,000 births.

Unfortunately, almost of all 41 cases, 27 cases of lethal outcomes due to obstetric hemorrhage (65.8%) were ranked under the third category according to the scale of mother deaths evaluation, in other words, the primary factors of inappropriate care were identified which affected the tragic outcome.

The audits of maternal deaths from uterine rupture showed that the main cause of complication in childbirths is the unjustified induction. According to our observations, the review of maternal deaths from uterine rupture showed that in two thirds of cases of such complications in childbirth were caused by induction, including multiparous women, women with post cesarean section uterine scar, in case of previous hysterocervicorrhexis, big fetus. Thus, out of 15 cases the births in five women (33.3%) were induced by Misoprostol, in 4 women (26.7%) by Oxytocin. Thus, the unjustified and inadequate interventions using uterus activating drugs such as Misoprostol or Oxytocin were undertaken in 60% of cases of uterine rupture.

The blood losses exceeding 2,500 ml were recorded in 20 or 48.8% of cases out of all the 41 cases or every second woman in labor, who died from obstetric hemorrhage had massive blood loss. Moreover, the lack of blood components was reported in 1/3 patients - (15 cases - 36.6%).

Among women who died from bleeding, every second was bleeding during or post cesarean section or hysterectomy. Thus, in 20 women (35 operated - 57.1%) there was intraoperative hemorrhage with a fall in levels of hemoglobin to critical indicators (below 50 g/l) and with clinical signs of fibrinolysis.

Noteworthy are the cases of traumatic injury during Cesarean section (2 cases of "extended incision on uterus ..."). There was a case of delayed replacement of blood loss due to underestimated volume and delayed arrival of emergency physicians (especially at the primary level of health facilities, where deliveries were attended by a midwife and the decision to call the doctor was made at the end of more than 30 minutes or 1 hour after conservative interventions proved to be inefficient).

In 26 women, or 63.4% of hemorrhage cases there was no 24 hour post of an obstetrician-gynecologist, and , furthermore, at the primary level health facilities the labor of such women were attended by midwives, and the emergency physicians were called with a delay of more than 1 hour. Thus, the delay arrival of emergency physicians were reported in 31.25% of cases, in 25% of cases the operation was started in 1 hour after the decision was made, in 37.5% of cases the operation was delayed by more than 2 hours.

Lesson Learned. Hemorrhage Diagnosis and its Underestimation. Inadequate Blood Loss Replacement

Case № 29. The parturient woman with twins and premature births at gestation of 35 weeks aggravated by anemia of I degree after expulsion of afterbirth the atonic hemorrhage has occurred. According to medical records and interview sheets only the recorded blood loss was assessed, only 5 units of IV Oxytocin was administered.

The uterus contracted poorly, manual examination of the uterus was conducted (having recorded blood loss of 1,450 ml, Hb - 80 g/l, platelet counts - 150 109/l). According to records in 1 hour 25 minutes after the birth of twins the hemorrhage reoccurred again, which continued, the operation- radical hysterectomy- was conducted. Total

blood loss - 2400 ml. Based on the level of hemoglobin the blood loss was significantly higher (decreased from 93 g/l to 48 g/l or reduction rate has made 49.4% from the initial). 3850 ml of blood was replaced, packed red blood cells - 625 ml, Refortan - 500 ml, FFP - 125 ml, isotonic sodium chloride solution – 2,600 ml. Pink color of urine draws the attention two hours later after the surgery, decreased diuresis/urine output, anuria was diagnosed on the second day. The patient was transferred in critically ill condition to the higher level of care with the aim of hemodialysis on the third day. After 16 hours and 50 minutes post transfer despite the ongoing intensive care, the respiratory and cardio-vascular failure were surging up, and the death occurred. In this case, the lack of proper monitoring of uterus during postpartum period and the amount of actual blood loss, as well as incompliance with clinical protocol of management of pregnant women with hemorrhage led to delayed diagnosis and follow-up interventions according to EOC.

Recommendation №1. It is critical to train health professionals on the pathway of blood loss assessment and replacement.

Lesson learnt №2. Incorrect labor induction by prostaglandins (PG) can cause uterus rupture and massive blood loss.

Case №54. Multiparous woman was admitted to the maternity department with preeclampsia from FGP. She was under antihypertensive (Atenolol) and magnesia therapy during 5 days. In order to prepare the birth canal ¼ pills of Misoprostol was administered, and continued labor induction with Misoprostol (the dose and regimen of administration are not specified). The course of labor was aggravated with the parturient complaining about shivering and strong contractions (the delivery duration made 3 hours 40 minutes). She gave a birth to a baby girl with weight 3,458 gr. The puerperium got complicated by hypotonic hemorrhage (300 ml.), manual inspection of uterus cavity was conducted. The recorded total blood loss has made 450 ml in volume. This implies underestimation of blood loss, which could be suspected based on lowered blood pressure 80/40 mm Hg, the pulse which was not palpable, by the number in IV (FFP-1000 ml, packed red blood cells 500 ml, Refortan 500 ml., 400 ml of IV fluid, infusion of 2400 ml) and extent of surgical interventions (in 1 hour30 m. radical hysterectomy). The resuscitation interventions are taken (intracardiac Epinephrine, chest compressions, ALV), no effect, the autopsy states the uterus atony as the main diagnosis with DIC syndrome.

Improper care was indicated by health professionals themselves as belated decision-making and delayed operation. Also the organizational gaps were identified, as unavailability of ICU, lack of blood, lack of cohesion between health professionals, improper treatment with available clinical protocols. The criteria of improper care in childbirth in this case included uncontrolled induction, lack of blood loss monitoring, unrecognized uterine rupture.

Recommendation №2. In order to improve knowledge and skills of health professionals it is necessary to revise the training module on topic «Induction of labor by prostaglandins» followed with attestations of health professionals.

Lesson learned №3. Technical errors in Cesarean section and the challenge of appropriate post-operative monitoring.

In two cases (№ 60, 83) the review of operation protocols and interview sheets has reported «extended hysterectomy incision in Cesarean section» (13,3%).

Case №60. Multiparous woman was admitted with a diagnosis "Severe pre-eclampsia" with full term gestation with fetal distress, she was affected by anemia during pregnancy. The magnesium and antihypertensive therapy was administered. She was examined by anesthesiologist - BP 160\100, urine output is small, subclavian catheterization for infusion therapy was conducted (delay in Dx of fetal hypoxia nearly 57 minutes). The fetus was extracted only in 10 minutes, the Apgar score 3/6, the operation lasted 1 hour and 20 minutes (the problem of error – compliance with standards, problem of suturing uterus, especially at the right angle). On the seventh postoperative day the doctor on duty observed severe acute pain in the right lumbar area. The condition deterioration surged on - faintness, dry mouth, vomiting, intense stomach, and in 3 hours she was examined by gynecologist, called the surgeon and referred for ultrasound examination. Unfortunately, the surgeon examined only in 4 hours and stated the earlier symptoms of Schotkin-Blumberg (+) and the blood test showed the drop of Hb to 43 g/l (the initial records of gynecologist - Hb103 g/l), leukocytes - $10,4 \times 10^9$ / liter. The treatment plan – is appendectomy operation and examination by anesthesiologist. The chart contained additional note "low Hb -43 g/l., postoperative hemorrhage was not excluded. In 10 minutes, the anesthesiologist describes a very serious condition, hypovolemia 70\50, PR - 102 beats/min. During the operation, the volume of infusion has made 3,000 ml - including packed red blood cells- 500 ml, FFP- 300 ml, IV fluid – 1,200 ml, Refortan – 1,000 ml with recorded blood loss of - 1 liter 950 ml. The operation was conducted on April 25 at 2.30 PM, liquid blood was determined in abdomen, large massive hematoma in right appendages of uterus, in the broad ligament with transitions to retroperitoneal area (incomplete uterine rupture along the edge), peritoneal hematoma was prosected - 1.5 liter of blood, hemostasis, right appendages of uterus were removed, tamponade and drainage were conducted. - DX: Postoperative bleeding of vessels of right appendages of uterus to the right, hemorrhagic shock, hemorrhagic anemia of 3-4 degree. After the operation, the condition did not improve, soporous consciousness even after extubation, the Hb drops below 31 g/l; leukocytes increased for the first time up to 18×10^9 g/l. On 6 May the ultrasound examination found out echo negative part in the ascending part of large bowels with clear boundaries and the size of 61 × 51 mm. The council of doctors put a diagnosis: "Sepsis, thrombophlebitis of limb deep vein. The laparotomy was repeated and hysterectomy was conducted. "Furthermore, the condition continues to deteriorate, hypotonic condition increases with BP 80\50, 75\45, saturation dropped to 60-40%, hypothermia, and acrocyanosis and cardiac arrest. In this case there were technical errors in suturing the uterus post Cesarean section and, furthermore, on the 7th day the occurrence of hematoma with septic complications, postoperative peritonitis due to dehiscence of stitches.

Recommendation №3. It is necessary to improve practical skills of obstetricians-gynecologists to reduce the risk of technical errors during operations that enable to reduce the risk of hemorrhage and sepsis (conducting the training on clinical operative technologies skills).

Lesson learned №4. Delayed postpartum interventions in surgical hemostasis and blood transfusions.

Case №94. A pregnant woman was admitted at the first stage of labor, after 5 hours 30 minutes she gave a birth to baby boy with weight of 3,800 grams, height - 52 cm., with estimated 5/7 Apgar score. The regular puerperium with blood loss of 200 ml. Later the hemorrhage of genital tract occurred, poorly contracted uterus, stream IV of 500 Vazokan with Refortan was administered, infusion fluid of 2 ml. of oxytocin, I/M 2 ml of oxytocin, external uterus massage was conducted, uterus was examined manually, 400 mg of Misoprostol was administered rectally, the hemorrhage was arrested. (The recorded blood loss has made 500 ml, Hb - 68 g/l). The hemorrhage reoccurred, the emergency physician undertakes external uterine massage and aorta compression. Despite the undertaken efforts, the blood pressure goes down to 70\20 mm Hg., PR - 106 beats /min and the condition deteriorates (recorded blood loss has made 900 mL). The administration of infusion: 100 mL of Aminocaproic acid, 500 mL of Refortan with 2 ml. of Oxytocin, 400 ml. of Polyglucin, 60 mg of Prednisolone. The clotting time as per

the method of Lee-White has made 20-22 minutes. Due to late decision the laparotomy was delayed as well as the lack of emergency preparedness. Only in 2 hours 40 minutes in puerperium the laparotomy was made, note the inefficiency of conservative methods to arrest hemorrhage was reported (hemostatic stitches on uterus, uterine vessels deligation) the operation lasts 2 hours and 40 minutes due to technical challenges. Intraoperative blood pressure dropped to 40/0 mm Hg, due to coagulopathy the wound continued bleeding. The recorded blood loss has made 600 ml., with hemoglobin Hb -52 g/l, which did not correspond to actual blood loss. Despite this later on at the end of the operation cardiac arrest has occurred. Delayed administration of: FFP - 1170 ml., packed blood cells - 770 ml., Refortan - 1500 ml., Poliglucinum - 800 ml., IV fluid - 400 ml, Contrykal - 30 thousand units.

The similar problem with blood products supplies was reported in the case №26 a, whereby the interview sheets reported that there were no blood products of blood type 1 in the hospital's blood transfusion department. Owing to this the blood transfusion was not possible causing the death of a woman.

Recommendation №4. To improve hands-on training of professionals on practical skills of organ saving and radical operation in obstetrics. It is critical to ensure adequate supplies of blood products in health organizations.

Lesson learned №5. The problem of transportation or emergency transportation

Case №91. A pregnant woman was registered at gestation of 26 weeks, only once visited the health facility for antenatal care, this is the second pregnancy, at registration her Diagnose: "IDA of I degree, gestational pyelonephritis. Her delayed visit she explained by the fact that they were out at pastures (jailoo) high in the mountains. Following the registration the pregnant woman again has left to jailoo. She was admitted to the maternity hospital at gestation of 32 weeks with complete placental abruption, still birth and DIC syndrome.

The interview sheets specify delayed hospitalization associated with transportation from the pasture (jailoo) and lack of professionals at primary level of health care. She was suffering from lower abdominal pains for the past two days, when we resided in the mountains. The patient complained to her husband and mother-in-law about the pains. They made their minds to consult the doctor on the third day after the blood tinged discharge from the genital tract, furthermore, the hyposthenia increased, feeling of shortness of breath has occurred. The pregnant woman herself initiated the visit to a doctor. Prior to hospitalization to TH the blood tinged discharge from the genital tract continued for 4 hours, she sought care at FAP, at the PHC level.

Then it took them 35 min. to get to the central hospital by the receding traffic (hitch-hiking). In 8 minutes following the admission to the hospital the Cesarean section was conducted and after applying the clamps on vascular bundles the dead male fetus was delivered with weight of 1696 g. with height of 42 cm., circumference of chest and head were 28/27 cm. Total placental abruption was diagnosed, liquid blood with clots in in the amount of 1,300 ml. In view of the Couvelaire uterus the hysterectomy without appendages was conducted. Despite these interventions, after 8 hours and 25 minutes following the admission the biological death was reported.

Recommendation №5. To improve the system of referrals between all level of health care. To establish the teams of sanitary aviation. The training course for the transportation-consultative service is required.

Special Recommendations in Hemorrhage:

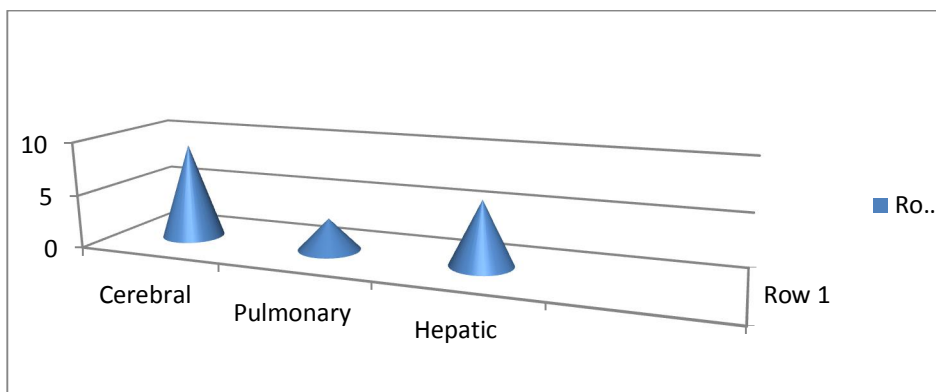
- 1. It is necessary to conduct the training on pathways of diagnostics and replacement of blood loss.**

2. In order to improve knowledge and skills of professionals to revise the training module on the topic «Induction of labor by prostaglandins» followed with attestation of professionals.
3. It is necessary to improve practical skills of obstetricians-gynecologists to reduce risks of technical errors during operations which enable to reduce the risks of hemorrhage and sepsis.
4. It is necessary to improve the training of professionals on practical skills on organ saving and radical operations in obstetrics.
5. It is necessary to have adequate supplies of blood products in health organizations.
6. It is necessary to improve the emergency service through improving transportation capabilities and consultative service, development of training program on training respective professionals.

Pre-Eclampsia

Background. According to the NC CEMD report for 2011-2012, severe pre-eclampsia ranks next to hemorrhage in the structure of causes of maternal mortality. Altogether 18 women (19%) have died. The average age of deceased women were 30.5 ± 3.3 years of age and varied from 22 to 43 years of age. In terms of the place of death, the secondary level hospitals ranked the first where 14 (77.8 %) patients died, 2 (11.1%) died at tertiary level hospital, 2 (11.1%) - primary level hospital. Noteworthy is the case of obesity in almost every fourth woman that died in this group (4 -22.2 %, BMI is 30 or more). In terms of birth parity the multiparous women (15) ranked the first with preterm gestation (12). 31.8% were vaginal deliveries, and 68.2% were Cesarean section s. The primary factors of improper care that affected the tragic outcome have been identified in more than half of cases (61.1% - 11 women). Out of 18 deceased women 8 (44.4%) have undergone autopsy examination, while the inconsistent diagnosis was noted just in one case: the SPE cause of death was re-evaluated as viral hepatitis, that was why this death was excluded from SPE group, originally including 19 cases. Altogether 38 children were left orphans, including three infants. In other cases, the perinatal mortality was observed: 4 cases recorded a fetal death, 12 cases were early neonatal mortality. Thus, only three newborns (15.8%) have survived from the potentially expected 19 ones.

Figure 5 Causes of Death Resulting From Pre-Eclampsia and Eclampsia



From 18 women, which died from SPE, 9 died due to cerebral lesions, including 3 of intracranial hemorrhage, one from cerebral infarction; 5 patients died from cerebral edema as a cause of a death, including the fourth - after the attack of eclampsia and one - after hemorrhage. Out of three women, which died due to pulmonary causes, two women were admitted to hospital with clinical ARDS, one had developed lung edema already in hospital. HELLP-syndrome was noted as the cause of death in 6 patients.

The confidential audit of medical records, questionnaires of actors of preeclampsia maternal mortality cases have revealed a number of problems of medical nature.

Problem # 1: Failure to Comply with the Standard of Magnesia Therapy.

Failure to comply with the standard administration of magnesium sulfate was observed in 10 (55.6%) cases. Delayed prescription was mentioned in every other case (5 of 10), wherein from 1 to 6 hours after the diagnosis, during which the patients with symptoms visited the hospital and waited for a health worker in the emergency room. Insufficient amount of loading magnesium sulfate dosage was noted in 4 cases (40 %), when only 10 ml were administered instead of 20 ml. The lack (1 case) or late prescription of maintenance dose of magnesium sulfate was noted in 4 cases. Insufficient (less than 1 g of dry substance) hourly quantity of maintenance dose of magnesium sulfate was noted in 6 cases (60%). The above mentioned disadvantages have led to development of eclampsia in every third patient from the given group (particularly three of ten). In particular, convulsions occurred to one woman at home, she was taken to hospital in a coma and died in the emergency room.

The following examples are illustrative:

- 1. Case 5a:** The delayed prescription – the multiparous, 26 years old, sought care at primary hospital with complaints on epigastric pain, nausea, one time vomiting and at gestation of 34 weeks. She was advised to seek care at the secondary or tertiary hospital, blood pressure was not measured (information from questionnaires filled by the patient's mother). It took four hours to get to hospital by hitch hiked car, waiting one hour in hospital for medical examination. Upon admission to hospital, blood pressure was: 170/120; 160/100 mm Hg, protein in a single urine sample - 330 mg/l. Further, despite compliance with all standards of magnesia therapy (loading, maintenance dose), the patient developed tonic spasms at RICU.
- 2. Case 88:** According to the standard of loading and maintenance dose – the pregnant at gestation under 38 weeks with diagnosis: SPE, delivered by the ambulance. The patient complained of headache for 7 hours at BP - 160/110 mm Hg. The ambulance crew administered 2.5 g of dry substance, which is 2 times lower than the recommended dose. On admission to hospital - BP - 150/100 mm Hg, proteinuria - 4.31 g/l, again a loading dose of magnesium sulphate administered - 5 g of dry substance, prescribed a maintenance dose, but failed the standard rate of administration of 1 g of dry substance per hour. As a result, the puerpera developed convulsive readiness, stunned consciousness, precoma.
- 3. Case 34:** According to the standard of maintenance dose – the multiparous, 38 years old, sought care at FGP with complaints of headaches, asthenia, shortness of breath in walking, blood pressure - 150/90, 160/90 mm Hg, the general condition is regarded as severe, administered a magnesia loading dose, after

which her state has improved significantly, but the maintaining magnesia therapy was not initiated. The pregnant was referred to hospitalization, but the patient refused from escorting and in one and half hour delivered unconscious by relatives to hospital, with seizures at home. Blood pressure during admission was 220/130 mm Hg, consciousness - coma.

Recommendation #1: It should be recognized that the purpose of the magnesium therapy, first of all, is the prevention of seizures, the control of thereof is possible only under strict compliance with magnesium sulfate standard treatment, clear substantiation is required in case of deviations from the standard.

Problem # 2: Correction of Systolic Hypertension:

Another disadvantage in treatment of pre-eclampsia was improper treatment of systolic hypertension observed in 12 cases (66.7%), including non-compliance with the standard prescription (insufficient daily dosage of the drug; irregular, sporadic intake of medication) and follow-up of effectiveness of antihypertensive drugs in pills (no opportunity for regular measuring of blood pressure) - in 6 cases out of 12 (50%); delay (from 1 to 7 hours) of urgent antihypertensive therapy - 5 cases (41.7%), inadequate consideration of additional risk of rising blood pressure as intubation - 3 cases (25%). As a consequence of the above stated (insufficient understanding of linkages between hypertension and hemorrhagic stroke), 4 cases out of 12 (33.3%) were complicated by cerebral lesions (intracranial hemorrhage, heart attack).

- 1. Case 25A:** According to the subscription standard of tablet forms for antihypertensive drugs, the multiparous with obesity during the first visit the BP has made -160/110, 150/110 mm Hg, protein in the urine - 0.099 g/l. Prescribed Nifedipine by 10 mg 2 times a day, following this intake the blood pressure has made 130/90, 140/80, 160/90 mm Hg, no proteinuria was tested. Recommended daily monitoring of blood pressure, but the issue to follow this recommendation was not addressed (no equipment, no possibility for frequent hospital visits and so on). Furthermore, in 19 days after the last visit to FMC, the woman was in a severe soporose state, brought to hospital by her husband. Upon admission, her BP was 200/120, 140/100 mm Hg, started magnesia therapy according to the standard, intravenously introduced Clonidine - 0.01% - 1ml., Promedol - 2% - 1ml. Despite the given therapy, the respiratory arrest occurred, intensive care had no effect, and 30 minutes following the condition deterioration and diagnosing cerebral hemorrhage, the biological death was attested. The autopsy showed hemorrhaging in basal ganglia of brain with blood burst into lateral ventricles of cerebrum.
- 2. Case 88:** The delayed emergency antihypertensive therapy in blood pressure - 160/110 mm Hg, the ambulance doctors restricted the choice to magnesium and didn't initiate antihypertensive therapy. Further, upon admission to hospital with BP - 150/100 mm. Hg, prescribed - 10 mg of Nifedipine, transferred to RICU, where Corinfar Retard was prescribed to the pregnant woman. Further, despite the continuing hypertension of 160/110 mm Hg for 7 hours, antihypertensive therapy was not carried out at all. As a result, aggravated general condition, requiring emergency delivery (headache, nausea, single vomiting, blood pressure 170/120 mm Hg). And only at blood pressure - 180/120 mm Hg, 10 hours post Cesarean section, IV bolus Clonidine was administered, but hypertension not arrested and the puerpera fell into a coma. Consulted by a neurologist who diagnosed a brainstem stroke.

3. **Case 101:** Intubation as an additional risk for blood pressure rising - the pregnant, 24 years old with diagnosis: severe pre-eclampsia, at gestation of 32 weeks, emergency delivery by Cesarean section operation under endotracheal anesthesia at BP - 180/110 mm Hg. At the same time, the additional risk of blood pressure rising was not taken into account, requiring additional therapy and adequate normotonic control was not undertaken. As a result after intubation the anesthesiologist noted anisocoria (right and left eye pupils D>S have different size). There was no photoreaction and corneal reflexes after the surgery. Postoperative diagnosis: "Acute ischemic stroke. Cerebral edema. Brain coma of III degree". The death commenced due to cerebral edema and multiple organ failure.

Recommendation # 2: Women with a systolic blood pressure of 160 mm Hg and higher require antihypertensive therapy. The lowering blood pressure in pre-eclampsia is usually a temporary phenomenon, requiring careful monitoring but hypotensive drugs can help to manage the risk of hemorrhagic stroke. Anesthesiologists should expect further increase in blood pressure under intubation in women with SPE during general anesthesia and take appropriate preventive measures. In addition, they should make attempts for wider practice of block anesthesia methods.

Problem # 3: Failure to Comply with Infusion-Transfusion Therapy Standard.

The infusion excess of 80 ml per hour was observed in 3 out of 18 cases (16.7%), resulting in pulmonary edema and coma in 2 patients. In one case they transfused 3900 ml per day, in two cases - the volume of infusion therapy exceeded 4 liters.

Case 88: During the first day post-surgical delivery with severe pre-eclampsia, in the absence of indications, 4000 ml were transfused in total (not taking into account the fluids for medications), including 500 ml of Refortan. There was the output of 1000 ml of urine following the forced diuresis, i.e. unwanted positive shift of fluid balance was noted ($4000-1000=+3000$ ml), which, in turn, would further increase the risk of lung edema and cause aggravation of cerebral edema in the patient with pre-eclampsia. Indeed, CVP increased to 80 mm of H₂O. The series of tonic seizures was noted as well, resulting in coma, and moist rales appeared in the lower lung.

Recommendation # 3: During infusion therapy, one should carefully read all administered infusion medium, mindful of possible pulmonary edema and cephaloedema. During infusion therapy prior to delivery, one should limit the amount of intravenously administered fluid to 40-45 ml/h (maximum 80 ml/h), preferring balanced crystalloids, as an actual deficit of CBV in this category of patients is only 600 ml. The restrictive fluid therapy is applied after delivery as well, except for HELLP- syndrome. Moreover, it is necessary to move to enteral feeding as early as possible under preeclampsia/eclampsia.

SPE Related Specific Recommendations:

1. It is necessary to strictly comply with magnesium sulfate treatment standards, in case of deviations from the standard, one should provide clear substantiation.
2. Women with a systolic blood pressure of 160 mm Hg and higher require antihypertensive therapy.

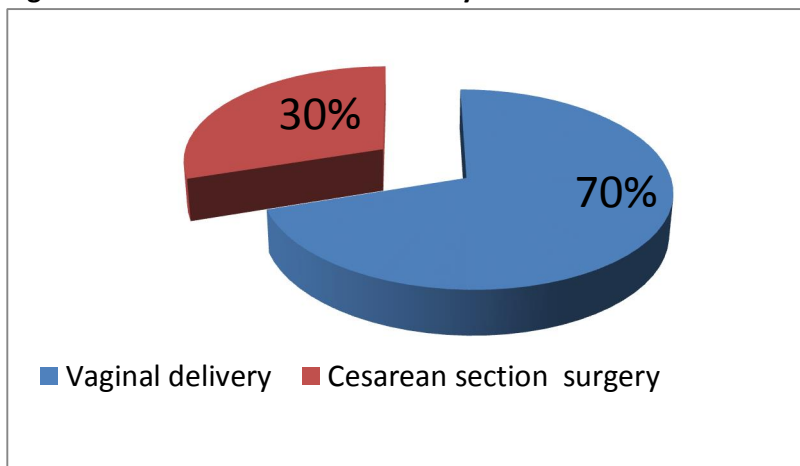
3. Anesthesiologists should expect further increase in blood pressure in intubation in women with SPE during general anesthesia and take appropriate preventive measures. The regional anesthesia should be the method of choice for anesthesia during Cesarean section surgery at women with SPE.

4. Under SPE the maximum volume of intravenously administered fluid should not exceed 80 ml/hour.

Sepsis

13 case histories of maternal deaths resulting from sepsis along with interview sheets were presented for assessment. 2 cases out of them were deaths within less than one day (15.4%), and one case of death had occurred on the thirty fourth day post termination of pregnancy. The age ranged from 18 to 41 years old, with the average age 29 years old. Eight women were registered for the antenatal care and visited a doctor more than 5 times. 4 cases had a Cesarean section (30%), complicated by sepsis, 9 cases (70%) - after vaginal delivery. There were four transfers from the primary to the secondary levels of care followed by the transfer to tertiary level of health organization. Noteworthy is the case of anemia in 7 women with Hb level from 70 g/l to 48 g/l.

Figure #6. Structure of Delivery Methods in Maternal Deaths Resulting from Sepsis



Nine women died from puerperal sepsis after spontaneous vaginal delivery of which in 6 cases (66%) hysterectomy was performed. One should note the lack of continuity between professionals and the lack of coordination between them: in one case, on the ninth day, the patient was admitted to the infectious disease hospital with diarrhea where she was diagnosed: "Sepsis". In another case, on the thirty- fifth day of antenatal period, the woman was admitted to the cardiology department with infectious myocarditis.

In 4 cases the sepsis has developed post Cesarean section. One case in the background of bigeminal pregnancy was complicated by fetus coupling and chorioamnionitis. There were three surgeries in the background of hypertensive disorders and kidney diseases. The indication for surgery - antenatal amniorrhea, complicated by chorioamnionitis and poor uterine contraction strength. In all cases there was delayed diagnosis during antenatal period and, respectively, delayed treatment (in particular on the fifth, seventh and eleventh days). The assessment noted the discrepancy between the infusion therapy

volumes, from 500 to 1200 ml per day. In terms of antibiotic treatment, the failure to follow phasing, dosing and delay of antibiotic change and, therefore, treatment were noted. The compliance with Sepsis related CP would allow timely reduction of septic complications.

According to the scale of maternal mortality assessment, the factors affecting the tragic outcome have been evaluated by 3 points, which amounted to 92%. Among the reasons mentioned - failure to comply with CP on Sepsis, lack of skills of the staff and lack of coordination between professionals, delayed diagnosis and, therefore, treatment were noted in the structure of causes. There were cases of failure to comply with CP on Infusion and Antibiotic Therapy.

The continuum of care between hospital and outpatient facilities is crucial. The health staff of the primary health care level should be aware of the importance of early and timely detection of new mothers with early signs of septic condition.

Problem #1. Lack of Controlled Monitoring of Septic Conditions in Patients and Coordination Between Ho Professionals

Case - 19a. A pregnant woman with anemia of second degree and hypamniosis according to USE was admitted with amniorrhea at gestation of 30 weeks in the evening. The arborization test was negative. The fetus respiratory distress syndrome and antibiotic preventive therapy was conducted: one time Ampicillin 2 g intravenously. The partogram was recorded formally. The amniotomy was made in 2 hours and 5 minutes. The baby girl was delivered prematurely with the weight of 1400 g., 42 cm high, 5/7 points according to the Apgar scale. The patient was discharged home with recommendations. According to the interview sheets of her relatives, the patient was admitted at that time to the hospital without medical records and was discharged on her own unaccompanied by health personnel to the specialized surgery department. The diagnosis reads: "Puerperium - 7 hours, acute intestinal obstruction and peritonitis". The emergency laparotomy was made. The final diagnosis reads: "Acute postnatal purulent endomyometritis, purulent salpingitis, alvus thrombo-necrosis, intrafilar abscesses, Douglas abscess, omentitis, purulent peritonitis, overwhelming sepsis, septic shock, multi organ failure". The condition of the patient got aggravated during the day. The cardiac arrest has occurred followed with the death of the patient. The autopsy was conducted – postnatal purulent parametritis, acute purulent salpingitis, oophoritis, peritonitis, Douglas abscess and intrafilar abscesses.

Recommendation #1. In order to improve postnatal follow-up of septic patients and review for compliance with effective international standards, it is necessary to revise Clinical Protocols on obstetric sepsis.

Problem #2. Inadequate postnatal nursing and ignorance of women and family members of dangerous signs of postpartum infections.

In three cases the main factor leading to maternal deaths was delayed seeking of care by women. Thus, there was a case of home delivery of the third child complicated with defective afterbirth and the midwife delivers her to hospital. Following the removal of the remnants of placenta, the woman went home on her own excusing for her elder children alone at home. On the seventh day the patient was

admitted in very severe agonic state accompanied by her brother and died 25 minutes later in the emergency room.

In another case, the patient was admitted on the thirty fourth day in emergency condition and died during surgery (cardiac arrest occurred twice). The relatives tend to underestimate the postnatal state of the woman; woman herself was unaware of the warning signs of postnatal period.

Recommendation #2. To conduct postnatal nursing by FAP/FGP, all health professionals should inform parturient women and their families about symptoms and signs of obstetric sepsis.

Sepsis Related Specific Recommendations:

- 1. In order to improve postnatal monitoring of septic patients and assessment for compliance with effective international standards, it is necessary to revise clinical protocol on obstetric sepsis.**
- 2. To enhance postnatal nursing by FAPs/FGP, all health professionals should inform parturient women and their families about symptoms and signs of obstetric sepsis.**

Indirect Causes of Maternal Deaths

Background. According to the National CEMD Committee for 2011-2012, the indirect causes rank the third, in other words, the hemorrhage ranks the first and severe pre-eclampsia the second in the structure of the maternal mortality causes.

Altogether 16 women (16.8%) died; the average age was 28.4 years old and varied from 19 to 38 years of age. All the women were admitted to hospital in emergency condition, even those who have been registered, the emergency transfers (6 cases - 37.5%) were performed without escorted by health professionals. The delayed referral to consult the appropriate expert-professional was found in every fourth case. In terms of delivery methods: the most prevalent included vaginal delivery - 9, Cesarean section - 4, three women died while pregnant. In none of all 16 cases there were any primary factors of inappropriate care identified that affected the tragic outcome. 6 cases were revealed accounting for 37.5%. Altogether 25 children are left orphans, including five newborns, perinatal mortality was observed in the remaining 11 cases, i.e., only every third baby has survived from potentially expected 16 children. Among the deceased mothers more than half (56.25%) were pregnant in the background of chronic extragenital disease; in 43.75% of cases women caught community-acquired pneumonia during pregnancy. Thus, in most of cases women died from respiratory insufficiency (9-56.25%), whereof 7 women developed due to community-acquired pneumonia, and 2 women - in the background of rheumatism; 3 women died from liver failure caused by hepatitis "C", 2 women were reported with thyroid crisis and died from stroke (1 woman), from acute cardio-respiratory failure (1); 2 women arrived in epileptic condition with subsequent cerebral coma of the third degree.

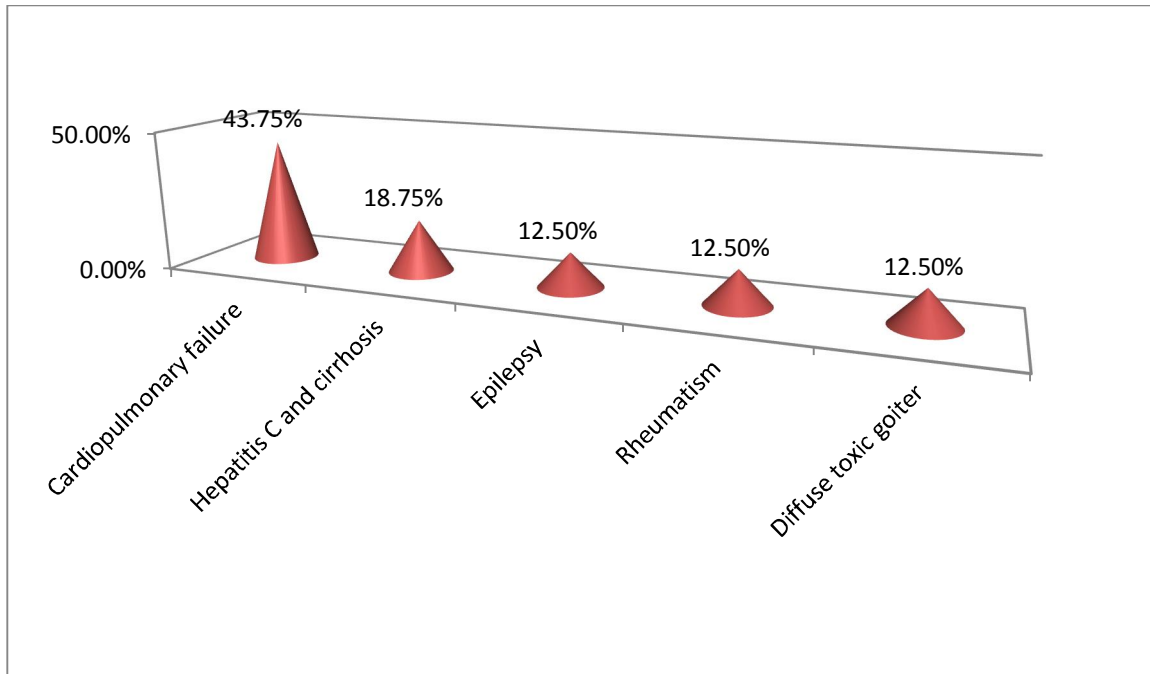


Figure 7. Structure of Indirect Causes of Maternal Mortality

Problem № 1: Refusal to Cooperate.

A number of extragenital diseases are contraindication to pregnancy what makes a woman unhappy who follows her natural desire to have a child, that is why she prefers to hide her primary disease, avoids registration while pregnant, not to visit a doctor, refuse from admission to hospital. Thus, out of 16 women that died from causes not resulting from pregnancy, only half of them - 8 (50%) were registered, while 3 of them were late in seeking care (after 12 weeks of gestation), 3 of them had sporadic prenatal care. Thus, only two pregnant women visited the health worker (12.5%). All 16 cases, according to the questionnaires, filled in by relatives, has reflected dissatisfaction with the quality of consultation provided to their deceased ones. For example, 6 cases indicated that consulting was limited to the advice to terminate pregnancy, leading to refusal of cooperation; in four questionnaires relatives directly have pointed out the lack of professionalism in health workers and regret that did not seek care immediately at another HF, 6 questionnaires confirmed that pregnancy still was contraindicated and should have followed the advice of doctors. In the result of stated above 3 patients sought care having decompensated cirrhosis, 11 had cardio-pulmonary failure, 2 were in cerebral coma of the III degree (epilepsy), and they died despite the efforts of doctors and provided treatment.

Case # 48. A woman, registered for dispensary follow-up owing to her heart disease (rheumatism) for 20 years, while pregnant, made up her mind to skip the follow-up of an obstetrician-gynecologist. She was admitted to hospital in a near-miss condition at 30 weeks of gestation. The death of the pregnant woman resulted from acute rheumatism, which was complicated by bilateral pneumonia and CRF.

Case #16. A primipara woman with thyroid disease was not registered while pregnant resulting in failure to access antenatal care. She was admitted to hospital at 37 weeks of gestation in near-miss condition

with diagnosis: "Acute CRF due to severe diffuse toxic goiter. Thyrotoxic crisis". Due to delayed care and advanced state of the patient, the provided intensive care did not yield any effect. She died while pregnant.

Recommendation # 1: It is necessary to enhance health education among population (mass media, VHC/CC, NGO) aimed at raising public awareness and people's responsibility for their own health. The regular training of health workers on counseling skills of the group of pregnant women with extragenital diseases on issues related to termination and/or family planning, worrying signs of pregnancy, recommendations on hospitalization is equally important.

Problem #2: Restricted Access to Required Services

This draws attention to the following:

The challenges with hospitalization experienced by every second woman of the given group (8 of 16), whereas the relatives of four of them (50%) noted that prior to admission women were forced to undergo series of examinations constrained given those conditions (no equipment, necessity to go to another location, queue/lines, admission by preliminary appointment) to confirm the already known diagnosis (they were registered for dispensary follow-up, had insightful "experience" of their disease and were well aware of the symptoms). In every fourth case the delay of hospitalization was due to management\logistical constraints (which hospital to admit: obstetric or internal medicine; calling out a consultant or hospitalization following the consultation). Two questionnaires indicated that the patients refused to be admitted because of the lack of money (it was necessary to go to another district and additional examinations), which is a crucial factor in delayed hospitalization. Every third questionnaire noted annoyance of the relatives that the pregnant was not informed about which health organization she should consult for her health in the event of a problem, they wished if they had this information to enable them to seek care at respective hospital and avoid time waste.

Case # 37. A woman with consecutive pregnancy, registered for dispensary follow-up due to heart disease (rheumatism), with signs of severe respiratory failure, visited the maternity hospital. She was advised hospitalization to the maternity ward of the oblast level, but only after testing for tuberculosis. The next day the board of physicians at TB dispensary excluded tubercular process and put Diagnosis: "Heart disease. Bilateral lower lobe pneumonia" and referred the patient to the obstetrical facility. The staff of the maternity hospital, without denying the pregnant woman in hospitalization requested her to pass additional examinations at their hospital. The pregnant arrived to the hospital in question at 11, examined by gynecologist and cardiologist, and only at 12 p.m. already on stretchers hospitalized in the RICU of the secondary level maternity hospital, where she died 18 hours following the admission. This example demonstrates complexity of the pre-hospital level and the lack of interdisciplinary approach and integrated health services resulting in deceased women with already known and explicit diagnosis had to seek care at different hospitals.

Access to Consultants. This problem was indicated both by health workers (10 - 62.5%) and relatives of dead women (12-75%). In this case, doctors usually (60%) noted that consultants travelled very long because of the geographical remoteness of HF. In two cases health care workers indicated on poor

quality of consulting. Every second questionnaire, filled by relatives of dead women, noted the absence of a specialized doctor in the place of their residence, causing them to seek care to another HF. Three cases (25%) indicated that relatives had to arrange themselves to locate consultants (to locate on their own the particular specialist and take him to hospital).

Case # 59. A woman was registered due to pregnancy at 12 weeks of gestation. This pregnancy was the sixth one, the expecting delivery was the second. She had 5 antenatal care visits (16 weeks, 21 weeks, 27 weeks, 30 weeks and 32 weeks). The history indicated thyroid disease (thyrotoxic goiter), she was registered for dispensary follow-up, receiving an adequate therapy. Further, according to the questionnaires, due to the absence of an endocrinologist at the hospital at place of her residence, the pregnant, experiencing some difficulties (she failed to get an appointment with a doctor many times), got an appointment with an endocrinologist at another hospital, where she was advised hospitalization. The woman refused from hospitalization because of a small child and geographical remoteness from her house. Upon 33 weeks of gestation she was brought to the primary health care maternity hospital with thyrotoxic crisis signs: pronounced hand tremor, acrocyanosis, heart rate - 145 beats/min., blood pressure - 190/120, 185/115 mm Hg, RR - 44 beats/min. The questionnaires of the health staff noted that due to the geographical remoteness of the HF in terms of providing consultations, the first consultations were conducted by telephone, preventing from providing health care. The woman died due to hemorrhagic stroke.

Recommendation # 2: In case of failure, the health worker should be aware of where to seek advice on further management of his\her patient. In all cases pregnant women with extragenital pathology the team based interdisciplinary approaches of work should be followed in order to eliminate the delaying factor during the initial diagnosis and appropriate treatment. To that end, it is necessary to develop a pathway/course for monitoring, consulting and hospitalization of patients of this group.

Problem #3: Management of pregnant women with respiratory failure.

Seven women have died due to community-acquired pneumonia. Five of them (71.4 %) repeatedly sought care at HF in the place of residence (3-5 times) with complaints of cough, general asthenia. Almost half of GPs in their questionnaires indicated that they had underestimated the general condition of their patients; 5 obstetricians and anesthetists and 6 resuscitators-anesthesiologists indicated the constraints associated with delivery of women having respiratory failure, thus, numerous consultations, calling doctors of sanitary aviation were useless; and all health workers explained the above stated with the absence of the clinical protocol on management of pregnant women with pneumonia.

Case #20. A pregnant at 35 weeks of gestation, complaining about dry cough and sore throat, sought care of the district gynecologist who referred her for consultation to GP. Three days later, due to aggravated general condition (fever, headache and intensive coughing), the patient was hospitalized in internal medicine hospital with Diagnosis: "Gestation at 35 weeks. Acute respiratory viral infection (ARVI). Laryngotracheitis". The patient was examined by a board of GPs, the diagnosis read: "Bilateral community-acquired pneumonia, severe condition. Mild chronic sinusitis". The treatment provided at RICU. The antibiotic and symptomatic therapy was conducted. On the second day of the inpatient care,

due to the onset of labor, the patient was transferred to the obstetrical department. Her state during transfer was assessed as extremely severe due to pulmonary edema, ARF of the III degree. After numerous consultations, the council of GPs took a decision on emergency surgical delivery, after arresting pulmonary edema, Cesarean section - no specific features. The following days her condition remained severe, the patient was on ALV, unconsciousness. And on the third postoperative day the clinical death occurred in the background of progressive cardiopulmonary failure, resuscitation interventions failed. The questionnaires indicated doubts of medical staff about correctness of the pathway of care for this patient: unsubstantiated transfer, delivery method, method of anesthesia, amount of antibiotic therapy.

Recommendation #3: To develop the national protocol for treatment of pregnant women with respiratory failure and amend the curriculum of obstetricians and gynecologists, emergency physicians-anesthesiologists, physicians, family doctors, feldschers, midwives.

Specific recommendations on indirect causes of maternal deaths:

- 1. Intensive health education among the population is required for women with extragenital diseases to timely seek care prior to pregnancy.**
- 2. Pregnant woman, prior to registration for dispensary follow-up, should pass full-fledged examination for pregnancy risks. In all cases of pregnant women with extragenital pathology the team based interdisciplinary approach of work should be followed.**
- 3. There is an urgent need to develop guidelines for treatment of pregnant women with respiratory failure.**

Anesthesia and Intensive Care

Among maternal mortality cases due to causes directly resulting from anesthesia, three women of 25, 36, 38 years of age were identified. All of them were registered for dispensary follow-up, passed outpatient examination.

In one case, the death was resulting from persistent hypotension during spinal anesthesia, in two cases - due to technical problems during intubation and development of Mendelson's syndrome.

Lesson learned #1. The lack of strict compliance with the standard of spinal anesthesia, including intensive care in development of complications resulting from spinal anesthesia may lead to persistent unmanageable hypotonia and body vital functions depression.

Case 1. A new mother of 25 years old was admitted to hospital with complaints of poor fetal movements with diagnosis: "Pregnancy at 40 weeks gestation, xerotocia, and uterus scar". Intrauterine fetal hypoxia. Examined by an anesthesiologist, spinal anesthesia was chosen. The preinfusion 0.9% of physical fluid of 1200ml was conducted. At 9.24 AM the spinal puncture at the level of lumbar vertebrae (L3-L4) was made, lidocaine liquid of 2% - 3 ml, fentanyl liquid of 0.005% - 0.5 ml was introduced into the spinal canal. The patient developed hypotonia at 0-10 mm Hg, IV administration of vasoconstrictors, hormones

and antihistamines. At 9.32 AM the tracheal intubation was made and transferred to ALV. At 9.33 AM the operation was initiated, at 9.36 AM the fetus was extracted – a baby boy of 7 points by the Apgar scale. The hemodynamics was stabilized - 90/60 mm Hg. Heart rate - 138 beats/min. The operation ended at 10.10 AM. The mild rales are heard over lungs, foamy liquid from the endotracheal tube was emitted. IV administration of diuretics, large doses of hormones, vasoconstrictors. Infusion was 4600 ml. The infusion therapy in terms of quality included Refortan - 1000 ml, FFP - 500 ml, 100 ml of albumin, CVP - 250 mm of H₂O. The diuresis made 1900 ml following the stimulation by Furosemide in the amount of 220 mg. The patient developed pulmonary edema. At 1.00 PM despite of resuscitation, the biological death was pronounced. The anesthesia records in the disease history did not match the records in the anesthetic chart; there was no record on procedure itself and equipment (number of needles). The anesthesiologist failed to note in questionnaires whether the procedure rules were observed during spinal anesthesia, whether a catheter was inserted into a peripheral vein. Another professional pointed out that, perhaps, there was an error during anesthesia or during resuscitation. For example, late intubation with transfer to ALV due to unavailability of a set for constrained intubation.

Recommendation №1. Health organizations performing surgery should implement and follow the local protocol for regional anesthesia and constrained intubation. The informed consent of the patient and family members to carry out a certain type of anesthesia should be mandatory.

Lesson learnt #2. Inadequate knowledge and skills of anesthesiologists in obstetric health organizations creates risks of development of intraoperative fatal complications (for example, cases #2 and #3).

Two women died due to technical problems during intubation and development of the Mendelson's syndrome. The possible cause included the fact that doctors-anesthesiologists lacked specific training and with little practical experience. In emerging near-miss case situation, the resuscitation was delayed and there were no professionals capable to provide additional skilled care. Also, in one case, the ALV device in the surgery block was out of order, and the ventilation was carried out manually with the Ambu-bag.

Case 2. At 9.25 AM new mother of 36 years of age arrived on her own to TH, with the history indicating the sixth pregnancy and the third delivery (the second delivery was by a Cesarean section) with diagnosis: "Pregnancy of 39 weeks of gestation, 1-st labor period. Xerotocia. A long standing scar on the uterus. The prescription of the uterine scar makes more than 8 years". The patient was examined by an anesthesiologist and received the consent for general anesthesia. On the third minute a full-term baby boy weighing 4680 g was extracted, 55 cm high, 7/8 points by the Apgar scale. According to the record in the history of delivery – after separation and isolation of the placenta during suturing of the uterus, intraoperative CPA occurred due to massive AFE, cardiac arrest and coagulopathy. The resuscitation was initiated: open-chest cardiac massage, intravenous liquid of adrenalin 0.18% - 1.0, vasoconstrictors. The cardiac activity was restored, blood pressure - 60/30 mm Hg, ALV continued. At 10.40 AM the repeated cardiac arrest commenced. BP not detected, continued resuscitation, adrenaline liquid 0.18% -1.0, the cardiac activity was restored, 70/40 mm Hg, heart rate of 120 beats/min. The operation ended at 10.45 AM. At 11.00 AM there was a complete cardiac arrest in the background of ALV. The questionnaire

recorded information about difficult intubation and development of the Mendelssohn's syndrome. Also noted that one anesthesiologist had little practical experience and did not receive special training in obstetrics, and at the critical moment additional skilled care was not provided. The medical records read different proper diagnosis.

Case 3. At 02.30 a pregnant of 38 years of age was admitted to HF with complaints of amniotic fluid leakage. The case history - second delivery, in 2008 a Cesarean section was made. Diagnosis: "Pregnancy of 39 -40 weeks. Premature Amniotic Fluid Leakuterine scar". Given the lack of expressed intensive labor, extended latency period, lack of readiness of parturient canals, the delivery was completed by a Cesarean section . The emergency physician was called in. The woman was examined by an anesthesiologist and transferred to the surgery unit. The catheterization of a subclavian vein was conducted. According to records - induction of anesthesia: Thiopental Sodium -100 mg., 2 ml of Fentanyl, 5 ml of Dithylin. The intubation performed without complications. At 20.28 a fetus was extracted on AVL. After removing the fetus the blood pressure sharply dropped to 50/00 mm Hg in 8 minutes, pulse rate - up to 140 beats/min. IV administration of Dexamethasone - 12 mg, Refortan - 400 ml, adrenaline - 3 ml, Calcium Chloride - 10 ml, Prednisolone - 90 mg, Dopamine - 10 ml, Infesol - 500 ml. Closed chest massage. Blood loss made 600,0 mL and diuresis -100 ml. At 9.25 pm the biological death was pronounced. According to the questionnaire, there were such omissions as constrained intubation, AVL machine (old model RO6) in the surgery unit was out of order and lungs ventilation was carried out manually with the Ambu-bag. The drugs were administered irrespective the body weight (administered insufficient amount of barbiturates). The resuscitation was delayed.

Recommendation #2. In order to improve quality of resuscitation in obstetric organizations, specific practicaltraining, upgrading the qualification of professionals on emergency obstetrics care skills is required.

Anesthesia Related Specific Recommendations:

- 1. Health organizations, performing surgeries, should implement an anesthetic checklist with mandatory inclusion of such items as informed consent of patient and family members, readiness of anesthesia and respiratory equipment, set of devices in constrained intubation, preventive interventions to prevent aspiration syndrome, as well as protocols for regional anesthesia, constrained intubation.**
- 2. In order to improve the quality of resuscitation in obstetric health organizations, the special practical training, upgrading the qualification of professionals' skills on emergency obstetrics care.**
- 3. All anesthetists employed at obstetric health organizations should have special training on anesthesia and resuscitation in obstetrics.**

EMBOLISM

PATE. The pulmonary artery thromboembolia (PATE) –occlusion of stem or main rami of the pulmonary artery by thrombus particles, formed in veins of the systemic circulation or right heart chambers and

flowed into the pulmonary artery by bloodstream. The aim of the recommendation is to provide evidence-based medicine information for immediate investigation and care of women suspected for venous thromboembolism (VTE) and further complications (PATE) in pregnancy and puerperium. PATE prevalence in patients that died in hospitals makes about 12-15% according to the autopsy, and this figure remained unchanged for, at least, the past four decades. The incidence of thromboembolism and AFE in the Kyrgyz Republic in the structure of the maternal deaths makes 6.1% according to RMIC data for 2011. The key bottleneck is in compliance of applicable practice with the best and evidence-based practice and approaches.

Case #72. A housewife of 38 years old, multiparous (deliveries occurred in 1991, 1992, 1993, 1994, 1995, 1998, and in 1999 she had a miscarriage), was under antenatal care since 9 weeks of gestation, and had 8 visits to PHC with the pregnancy related diagnosis: "Endemic goiter of the I degree. Prolonged diarrhea for 1 year. Risk of premature birth". Admitted to hospital on 23.07.10 at 12.20 (Friday) with diagnosis: "Pregnancy of 40 weeks, the 1st stage of labor (6 cm), xerostomia? (latency period - 21 hours 30 minutes), thrombophlebitis of lower extremities. Upon arrival she had a body temperature of 38°C, lytic cocktail was injected, IV Cefazolin - 1 g. At 2.00 PM expulsive pains started, body temperature was 36,6°C, blood pressure - 110/70 and 115/70 mm Hg. The delivery occurred at 2.30 PM, a baby girl of 3200 grams was born, the Apgar scale was 5/6 points. According to USE on 23.07.10, the diagnosis stated: Pregnancy of 40 weeks, oligohydramnios. Defective afterbirth was found during the puerperium. The manual examination of the uterus was conducted. The estimated blood loss made 600 ml in total. At 4.30 PM the records in the documentation (transfer registry) indicated that her condition was satisfactory, temperature – 36.6°C, blood pressure - 110/70 and 115/70 mm Hg. At 6.10 PM she was examined by a doctor on duty. Extremely severe condition, unconscious, photoreaction sharply weakened, eye pupils expanded, cyanotic skin, rare and noisy breathing. The pulse rate - 8-12 beats/min., single muffled heart sounds, pulsing on peripheral vessels not detected. The involuntary defecation was noted. The resuscitation had no effect. The preliminary diagnosis: early postpartum, PATE. Acute heart failure, pulmonary edema. On 23.07.10 the biological death was pronounced at 6.30 PM. The autopsy examination was conducted: Diagnosis: "Primary: thrombophlebitis of iliac and deep veins of lower extremities. Complication: PATE, acute respiratory failure – the full-term, eighth delivery, xerostomia, thrombophlebitis of iliac and deep veins of the lower extremities". Defective afterbirth, manual examination of the uterus". Total blood loss made 600 ml.

Case #81. A woman with the third pregnancy and second delivery (according to case history I – full-term delivery, without distinctions, first spontaneous abortion occurred in 2011). Arrived on December 23, 2011, at 3.00 PM with Diagnosis: "Pregnancy of 11 weeks, severe pregnancy related vomiting, colitis, chronic bronchitis". Prescribed - infusion, follow-up, antiemetics and aminophylline. The GP has diagnosed mild COPD, chronic obstructive bronchitis at the stage of partial remission, severe vomiting. Cardiologist indicated dyspnoea at rest. Blood pressure - 200/60, heart rate - 100 beats/min., - conclusion: COPD, chronic obstructive bronchitis. One day later, ie, December 26, at 09.00 AM – pain behind breast bone, coughing, dyspnoea, deterioration, single hemoptysis. At 12.00 a cardiologist and a therapist, having reexamined, found moist rale, stated double pneumonia and possibly PATE. Prescribed x-rays, Aminophylline, DXM, Digoxin, Verapamil, Angiosurgeon, having examined, recommended DUSS,

Fraxiparine - 0.4 by 1-2 times, bandage, Troxevasin gel, Flebodia 600 mg by 1 pill per one time, Rheopolyglucin, with possible transfer to the National Hospital. The ultrasound examination revealed acute mural thrombosis of the common iliac vein, on the radiograph - lower lobe pneumonia. On 27.12.2011 the board of doctors indicated the tests - blood clotting time 3.15., complete blood count - Hb 95 g/l, thrombocytes $232 \times 10^9/l$, leukocytes $4.2 \times 10^9/l$, stab cells - 7 per field of vision, added oxygen therapy, anticoagulants, CVP - 210 mm H₂O, on December 27 she was transferred to Vascular Surgery Department for a paid surgery to install a venous filter - preparing for repeated thrombembolia. In the afternoon on December 31 the patient was transferred to RICU of the maternity department in critical state for termination of pregnancy due to health reasons. The board of doctors having determined the longer gestation of 13-14 weeks, after considering the risk factors, jointly with a consultant, the patient and relatives opted to choose the pharmacological termination of pregnancy with pre-treatment of the uterine cervix by Mifepristone of 200 mg, (the anesthetic risk dominated the surgical one, i.e. all kinds of anesthesia in the background of pneumonia were risky). The patient had a spontaneous abortion occurred at night. The preventive interventions proved to be insufficient but that could not be a significant cause of death. A few hours later, closer to the morning, sharp deterioration has occurred, repeated massive thrombembolia after symptom-free interval with clinical CPA findings (clinical findings CPA were described with all criteria). The resuscitation was unsuccessful. No autopsy was performed. Cause of death - acute CPA due to massive pulmonary embolism. The situation was aggravated with inadequate diagnosis and treatment. Clinical evaluation of deep vein thrombosis and pulmonary thrombembolia is constrained to detect during pregnancy, and the diagnosis of suspected cases is rarely confirmed while using objective examination methods. The highest incidence is prevalent in the puerperium (if vena cava filter is installed the delivery can be vaginal).

Case #42. A woman with consecutive pregnancy (4th pregnancy), of 36 years of age, a nurse by education, was registered for dispensary follow-up since 16 weeks of gestation, although there were only 3 visits to the doctor. At 24 weeks the antenatal fetal death was diagnosed, sent to OMH. On 01.06.2010 at 4.00 PM (Tuesday) arrived in OMH following the referral, examined by a doctor on duty, recommended antibiotics therapy (Erythromycin), examination by the head of the department. Examined: ultrasound examination on 02.06.10: "Gestation of 16 weeks, dead fetus, premature separation of placenta". Hb -92 g/l, leukocytes $9 \times 10^9/l$, ESR - 5 mm/hour. On 02.06.10 she was examined by the head of the department in terms of Cytotec abort induction (drug was absent). On 02.06.10 at 11.40 AM- complaints on bloody spotting from the genital tract since 08.00 AM, oropharynx passes 2.5 cm. Following the readiness of the parturient canal and bloody spotting from the genital tract, it was decided to conduct single step uterus ejection operation. At 12.20 examined by an anesthesiologist, checked the allergic background (Penicillin, Ampicillin, Cefazolin cannot tolerate). At 12.40 the system with oxytocin was connected without extension of the cervical canal, the ovum was removed; the placental tissue was removed by abort forceps. The verification curettage of the uterus was conducted, blood loss was 200 ml and uterus contracted. At 12.55 at the end of the procedure the woman developed asphyxia, respiratory failure and cardiac arrest. Conducted resuscitation (intubation of trachea, connection to AVL - Ambu type, intracardiac introduction of adrenaline, Calcium Chloride, Prednisolone, Dopamine, closed-chest cardiac massage, defibrillation, pulse and blood pressure not determined. At 1.30 PM the biological death was pronounced. The death was caused by PATE. The

autopsy examination: "Gestation of 16 weeks, antenatal fetal death. Complications: PATE at the level of bifurcation and small branches of the pulmonary artery, acute ARF". Preventive measures during pregnancy and delivery were not implemented. The pre-operation discussion was held, the allergic background was determined.

Case 3a. The patient, born in 1975, residing in the city, a housewife. The sixth pregnancy, third delivery, previous delivery in 1999 resulted in spontaneous vaginal delivery with live birth and weight of 3 600 gr, second delivery in 2004 due to cephalopelvic disproportion resulted in Cesarean section with fetal weight of 4 150 gr., and 3 medicated abortions. According to the latter, the gestation at the time of admission has made 39 weeks, registered for dispensary follow-up at the city FMC at 23 weeks of gestation. During antenatal care she had 5 visits and diagnosis: "Anemia of the 1-st degree and sinusitis" made since 35 weeks of pregnancy and was prescribed anti-anemic medications. The data of urine culture for flora were not available, examinations of sub-specialists - no deviations. Arrived in the rayon TH on November 2 at 09.25 AM with Diagnosis: "Gestation of 39 weeks, the first stage of labor with xerotocia and incompetent uterine scar after the Cesarean section with a large fetus". Furthermore, the prescription of the uterine scar was more than eight years. Temperature is normal, contractions – 2 contractions within 10 minutes 25-30 seconds each, mouth of the womb opening is 5 cm. Examined by an anesthesiologist and received the consent of the patient and her family for surgery with premedication. Conducted laboratory tests as well (blood count with WCC (white cell count), urine analysis, biochemical analysis and coagulation system), the results showed a mild degree of anemia and slight leukocytosis up to $14 \times 10^9/l$, almost without stab dislocation, accelerated ESR up to 50 mm/h and a bit more fibrinogen to 4880 g/l. The Cesarean section was made 39 minutes after arrival and a full-term baby boy was extracted 3 minutes later weighing 4680 gr., 55 cm high, the Apgar scale 7/8 points. According to the records in the history of deliveries - after separation and isolation of placenta and uterus suturing during surgery, CPA occurred due the massive amniotic fluid embolism, cardiac arrest, and coagulopathy, the vasotonics administered, infusion reinforced and close-chest heart massage with AVL defibrillation. The cardiac activity alone was restored without adequate vascular tone resulted in a repeated cardiac arrest. The resuscitation failed to achieve the desired effect, leading to the death of the woman. The final diagnosis read: "Third delivery, Cesarean section, incompetent uterine scar, xerotocia, large fetus, massive amniotic fluid embolism, cardiopulmonary shock, acute cardio-respiratory failure, anaphylactic shock and PATE". The autopsy examination – specific features – there was a whitish frothy liquid with pinkish tinge in the lumen of the trachea and bronchi, single punctulated hemorrhage, under pressure the fluid flows during the discussion, the uterine cervix has small gaps (long time) on both sides to 0.3 cm and disclosure of the mouth of the uteri up to 5 cm. The lungs histology indicates the gaps of interalveolar septum at some places, homogeneous mass with the epithelium and hairs was found in the lumen of pulmonary vessels, amniotic fluid embolia. The histology of the uterus showed that there was a homogeneous mass with the epithelium and hairs in the lumen of some vessels. Histology of the placenta - signs of chorioamnionitis. According to questionnaires, there were problems with intubation, intubation position on the back, constrained manual AVL. Factors leading to death include: anaphylactic shock, PATE, Mendelson's syndrome and AVL anesthesia. The anesthesiologist had no experience, noted lack of cohesion between professionals, absence of a consultant, underestimated severity, wrong diagnosis and incorrect treatment.

Cases 72, 3a. Demonstrated a classical pattern according to the type of CPA. In the first case, CPA (PATE) pattern occurred in the multiparous women with thrombophlebitis of the lower extremities during the manual examination of the uterus.

In another case, intraoperative pattern of CPA occurred during the Cesarean section with a critical drop in blood pressure (the autopsy revealed AFE).

Specific Recommendations:

1. PATE treatment is complicated and not always can be successful, so special attention of obstetricians should be paid to prevention of PATE development. **Primary prevention is a set of interventions for prevention of venous thrombosis in the inferior vena cava system suggests to identify groups of pregnant women with high risk of phlebothrombosis development, elastic compression of the lower extremities, reduced duration of immobilization (bed rest), as early as possible mobilization of patient, moderate hemodilution, normal range thrombocytosis, pharmacological methods of prevention (comprehensive anticoagulation therapy).**

2. **The secondary prevention is recommended in case of developed PATE and is the integral element of treatment that suggests the administration of therapeutic doses of anticoagulants and surgical methods of prevention.** Surgical methods of prevention include thromboembolectomy, transvenous implantation of umbrella vena cava filters below the mouth of the renal veins, inferior vena cava plication by a mechanical stitch, deligation of the main veins. In order to provide an adequate care under cardiopulmonary shock due to PATE or AFE, it is necessary to conduct a clinical training, enhancing skills on training mannequins/dummies and case studies.

TRENDS IN PATHOLOGY - ANATOMICAL SERVICE AND REVIEW OF MATERNAL DEATHS FROM THE PERSPECTIVE THEREOF

The key functions of pathological-anatomical service for autopsy (post-mortem examination) are as follows:

1. To establish the primary and immediate cause of death, identify other pathological processes in patients died resulting from non-violent death (validation of pathological-anatomical diagnosis, conclusions of death, clinical and anatomical epicrisis, filling of medical certificate of death, coding according to ICD -10 of the primary causes of death);
2. To collate (verify) the findings of the autopsy - pathological-anatomical diagnosis - with the final clinical diagnosis and other data of ante mortem /intravital tests (review of lethal outcomes in collaboration with experts of other clinical specialties and administrative health workers; assess the quality of medical-diagnostic efforts of health facilities);
3. To develop autopsy materials in terms of applied evidence-based and scientific-methodological approach (statistical analysis of mortality and others, including participation in planning and implementation of health development programs).

To that end, the requirements to reliability of information provided by pathological-anatomical service are heightened as well as the incumbent responsibility of pathologists. The authenticity of data provided by pathological-anatomical service on causes of population death, including maternal deaths, and about quality of treatment and diagnostic efforts of health facilities, will depend on unification and precision of the wording rules and coding of clinical and pathological-anatomical diagnoses, principles of comparison of final clinical and pathological-anatomical diagnoses, strict compliance with the requirements for validation of the medical certificate of death.

The autopsy in the Kyrgyz Republic is governed by Articles 43 and 44 of the Law "On protection of health of citizens in the Kyrgyz Republic" as of January 9, 2005, decrees of the Ministry of Health KR # 492 as of November 14, 2005, #179 as of May 12, 2005, #45 as of February 3, 2004.

According to the Article 43 of the Law "On protection of health of citizens in the Kyrgyz Republic", in cases of explicit ante mortem/intravital diagnosis and availability of written statements of family members, relatives or legal representative of the deceased, the heads of health facilities and pathological-anatomical office, a corpse may be provided without the autopsy. The second part of this article of MOH KR prescribes to determine the list of diseases in case of death thereof the autopsy should be mandatory.

The Decree of the Ministry of Health # 492 as of November 14, 2005, determines the list of diseases, when the dead body should undergo autopsy on a mandatory basis, including cases of maternal death. Nonetheless, we have encountered with great challenges in practice in terms of implementing the Decree of MOH KR related to maternal deaths. The relatives and family members of the deceased refuse

from autopsy referring to the 1st part of Article 43. If prior to adoption of this law, the relatives of the deceased refused on religious grounds, now relatives refer to this Article of the Law.

Thus, out of 98 deaths there were 34 cases of autopsy, which makes only 34.6%. 64 cases of maternal deaths were left without autopsy, amounting to 65.4%, furthermore, the reasons of refusal from autopsy were indicated in the medical documents in none of the cases.

The autopsy in cases of obstetric pathology should be performed only by highly qualified specialist-pathologist or forensic expert. Owing to large set of obstetric manuals, surgical treatments, massive therapeutic and resuscitation interventions makes a pathologist, investigating deaths with pathologies in pregnancy, deliveries and puerperium face highly complex, often a tough challenge of delineating morphological manifestations of obstetric pathology and modifications resulting from health care.

The Pathologist's Performance should be Assessed from two Perspectives:

1. In evaluating the autopsy technique, the ability to diagnose and analyze pathological processes at the autopsy table and under the microscope, to evaluate thanatogenesis and cause of death, to explain course and manifestations of disease in every individual case.
2. In assessing quality of pathological-anatomical documentation. The validation of pathological-anatomical documentation in many cases has left much to be desired. The evaluation of the autopsy protocol texts has showed significant gaps in presenting anatomical findings. Presentation of autopsy data is performed sequentially according to a certain common pattern, when anatomical modifications are described according to systems that has been followed not in all cases, although the pathological-anatomical documentation had protocols, executed in due manner. The reason behind such variation in validating we see in different qualifications of pathologists, as there are no full-time pathologists in some regions, pathologist's position is combined with other professionals' – often forensic experts, among the secondary/part-time employees are surgeons, traumatologists and even ENT - specialists. The country has 110 positions of pathologists; there are only 28 full-time pathologists, including 13 in Bishkek. There is no pathologist in Batken or Naryn. The graduates of medical schools and KSMA prefer specialties with the scope for informal earnings, apart from that, Kyrgyz people does not accept autopsy. In recent years the percentage of autopsies is universally reduced. Reduction in the number of autopsies they try to explain as the necessity of taking into account the rights of the patient and his/her relatives, religious grounds, significant improvement of ante mortem diagnosis, etc. The underlying reason behind this is the lack of appreciation of the importance of autopsy for practical medicine. This lack of understanding is verified by the fact that the legal regulations relating to autopsies are developed by incompetent persons. The articles 43 and 44 of Law "On protection of health of citizens in the Kyrgyz Republic" in 2005 testify to that, which in effect impede further development of the pathological anatomy under the pretext of observing the human rights it is universally permitted to prohibit autopsy following various requests of relatives. To be honest: all or many excuses to provide the corpse of dead women without autopsy are prompted by the desire to reduce the number of incorrect diagnoses that led to the incorrect treatment. This is evidenced by the frequent facts of refusal from autopsy of the death case that occurred on the surgery table during or shortly after the surgery; death of the patients in cases when the clinical diagnosis of doctors themselves were forced as the nature of the disease that

led to the death remained unknown. The physical and logistical infrastructure of the pathological-anatomical service of the Kyrgyz Republic is poor, and many prosectoriums have outdated equipment, there is virtually no supply of the new equipment and reagents, which led to closure of many histological laboratories. For this reason, cases of maternal deaths in the regions are not examined histologically that adversely affects the quality of pathological findings.

According to the Decree # 179 as of May 12, 2005 of the Ministry of Health the diagnosis in a medical certificate of death should be inserted in the autopsy protocol, whereas that was performed only in the part of the autopsy reports.

The maternal deaths are divided into two groups:

1. Death directly related to obstetric causes: Death resulting from obstetric complications of the pregnant state (pregnancy, delivery or postpartum), interventions, omissions, incorrect treatment or a chain of events resulting from any of the above.
2. Death indirectly related to obstetric causes: Death resulting of previously existing disease or from disease that developed during pregnancy and that was not due to direct obstetric causes but aggravated by physiological effects of pregnancy.

To classify certain maternal death from the perspective of the pathologist is deemed impossible as:

- Only 34.6% of maternal deaths had autopsy;
- ICD-10 requirements are not followed during formulation of the final Dx;
- The histological data are often missing.

The extremely low percentage of autopsies in hemorrhage - 13.6%, rupture of uterus - 20.0%, pre-eclampsia - 36.4% and extragenital pathology - 33.3% is noteworthy, although most of maternal deaths - 62 cases (or 63.2%) resulted from hemorrhage, pre-eclampsia and extragenital pathology. As it is known the final clinical diagnosis in the case history (delivery) the pathological-anatomical diagnosis is formulated following unified principles and in terms pursuant to ICD-10 and the following columns should be mandatorily filled out:

1. Primary disease
2. Underlying/background disease
3. Complications resulting from primary disease
4. Comorbidities

The primary disease is a disease (nosological form) that depicts the primary cause of death. In obstetrics and gynecology it is defined as the disease or iatrogenic cause entailing the chain of events that directly led to the death of a woman in pregnancy, delivery and postpartum. The heading "Primary disease" in the structure of the final clinical diagnosis reflects the rationale and substantiation of doctor's actions – whether the obstetrician correctly or incorrectly has depicted the main link in the chain of pathological processes, whether all necessary set of therapeutic and diagnostic activities were utilized.

The most common errors in identifying by an obstetrician of the cause of death in the final clinical diagnosis were the following:

1. The final clinical diagnosis presented a chronological list of clinical conditions, surgical interventions and complications presented without following the above stated columns. Such diagnoses are regarded as wrongly put and are not valid for statistical analysis and comparison with postmortem diagnosis.
2. Frequently the heading "primary disease" contains not a nosological form (disease) but the complication including non-fatal complications of pregnancy such as a state of physiological immaturity, early amniotic fluid discharge, primary uterine inertia or disthyroidism, breech presentation, contracted pelvis, etc. For example, Case #33, where the diagnosis "pneumonia with septic complication" is put after autopsy. According to ICD-10, in this case "sepsis" should be stated as the primary disease.
3. The less severe implication of the disease is indicated prior to more severe in the column "Primary disease", for example, as it reads: "Fourth pregnancy; 33-34 weeks. Prolonged edema of pregnant woman in the background of obesity. Eclampsia". In this case one would specify only eclampsia as eclampsia is more severe, potentially lethal disease and absorbs non-lethal form of edema of pregnant women.

The complications of the primary disease - syndromes, set of symptoms and pathological processes which are pathogenetically (directly or indirectly) associated with the primary cause of death. Among them one should first detect the lethal complication (direct cause of death). In this section, one must not specify mechanics of thanatogenesis (intoxication, heart failure, multiple organ failure, etc.). The list of complications should not be chronological or random. The sequence of complications of the primary disease set by an obstetrician should outline the first and foremost should reflect the practices pathway of treatment. The clinical and pathological-anatomical diagnoses of almost all cases of MD under the column "complications" contained such definitions as "cardiac failure" and "multiple organ failure".

The review of autopsy cases has showed that ICD-10 requirements in some cases were not followed in terms of putting the final pathological-anatomical diagnosis. For example, the Case 20-a – the complication was specified as the primary disease - thromboembolia of pulmonary artery - without identifying the source of embolia. The varicose veins of lower extremities albeit indirectly indicates a possible source of thromboembolia but a prosector does not indicate whether varices with or without phlebitis. In general, this diagnosis is not consistent and doesn't qualify for comparison with the final clinical diagnosis. Or another Case (25-a), when a pathologist indicate all signs of severe pre-eclampsia, however, not stated preeclampsia in the diagnosis. In some autopsy cases the comparison of clinical and pathological-anatomical diagnoses makes believe that the pathologist is trying to conceal the true cause of death of the puerpera. For example, case 54, with clinically stated diagnosis: "Rupture of uterus, hemorrhage", while describing the removed uterus the rupture was not specified.

An obstetrician-gynecologist and a pathologist should "speak the same language". We are talking about unified approach to assessment of functional implications of disease and structural changes in organs and tissues, using common conventional terms, uniform registration of nosological form of diseases and pathological processes, and finally unified type structure of diagnoses. The autopsy protocol should meet the professional concerns of obstetricians and gynecologists. The history of delivery and individual prenatal records of pregnant women, and in cases of surgeries, anesthetic support records should contain a factual data for clinical and anatomical comparisons. It is evident - the basis for pathological-

anatomical diagnosis and clinical-anatomical epicrisis is not only data on structural modifications of organs and tissues, obtained in the result of autopsy and histology, but also the information about the history of the disease and its functional implications, clinical epicrisis and clinical diagnosis.

In the context of modern active therapy, often changing the "morphological face" of the disease, a skilled post-mortem diagnosis of the disease and decoding of thanatogenesis is often possible only with mandatory registration of the clinical data.

Comparison of clinical and pathological-anatomical diagnoses. The purpose of comparison of clinical and pathological-anatomical diagnoses is the registration of clinical diagnosis errors and treatment of patients in every specific case, and in broader terms - evaluation of therapeutic and diagnostic efforts of the maternity department staff. A pathologist compares diagnoses at the autopsy table; heads of departments or together with other competent professionals compare diagnoses in cases of disputes. Under all conditions the final decision remains with the pathologist.

Categories of assessment in comparison the diagnoses:

1. Concurrence of the main clinical and anatomical diagnoses
2. Discrepancy between the main clinical and anatomical diagnoses
3. Discrepancy between diagnoses on major complications significantly affected the course of the primary disease or attributed the nature of the cause of death.
4. Discrepancy between diagnoses on the most important comorbidities.

Out of 34 autopsy cases, 11 cases evidently followed the principles of pathological- anatomical diagnosis, allowing a comparison of clinical and pathological-anatomical diagnoses. In other 23 cases, the final pathological-anatomical diagnosis lacks the headings of columns of diagnoses, making the collation of diagnoses difficult. Out of all 34 cases, only one case has recorded discrepancy of diagnoses on the primary disease - clinically not determined PATE, which raises some doubts of the objectivity of clinical and anatomical collations at all, as obstetricians-gynecologists by no means would miss the PATE clinic, secondly, the PATE diagnosis is quite often included in clinical diagnosis – justified or unjustified.

In 33 cases, the clinical and pathological-anatomical diagnoses were concurrent. The concepts of "concurrency" or "discrepancy" of diagnoses are applicable only in collating the primary disease, so it is important to divide into columns/categories (divide diagnosis statements into subsections) final clinical diagnosis in line with the primary disease, complication of the primary disease and comorbidities.

The review of 34 cases of maternal deaths has shown lack of unified principles for collating the final clinical and pathological-anatomical diagnoses, compliance with legal and logistical requirements of autopsies of pregnant, parturient women and puerpera. Should such guidelines are developed they would have enabled to:

- 1) align filling of medical certificates on maternal death with identification of the primary cause;
- 2) improve quality of investigation of maternal deaths by the commissions to review MD;
- 3) identify diagnostic and therapeutic gaps.

Therefore, out of 95 cases of maternal deaths, 16 cases (16.8%) have been reclassified that makes - 20.3% of all death cases due to direct causes.

Role of Socio-Economic Factors Affecting Maternal Health

Kyrgyzstan is a newly emerged state, where against the background of high birth rate, unfortunately, there are still high rates of maternal mortality. The deterioration of indicators of reproductive health of women and adolescents, affecting the status of pregnant, parturient and puerpera women largely determine the high rates of maternal mortality in the country. Maternal mortality, being one of the main indicators of socio-economic development of the country, causes irreparable losses at the level of family and society as a whole and predetermines the development of healthy and able-bodied population.

Hitherto the social causes and risk factors that affect the level of maternal mortality are insufficiently clarified and generalized. The maternal mortality is not only one of the main criteria of quality and degree of organizational management of obstetrical organizations, but also reflects the level of development of the national health system as a whole. According to experts the maternal mortality rate is largely affected by economic, social and cultural factors. Medical and social factors are recognized as conventionally unavoidable, exogenous, not critical in reducing maternal morbidity and mortality, but require mandatory consideration in identifying groups "at risk" in terms of maternal mortality.

Maternal mortality in Kyrgyzstan over the last decade varied + - 45 per 100,000 live births and did not tend to decrease down to the Target of the Millennium Development Goals - 15 per 100,000 live births – that the country has committed to achieve by 2015. The deaths representing irreparable losses of vital potential of population are fundamentally different from mortality of other age groups, as women and unborn children are an invaluable human capital. In review of CEMD the majority of maternal deaths fell to the share of able-bodied citizens, which accounted for 92%. The age of deceased women ranged from 15 to 46 years of age. 34 women out of them were young women at the age of under 35 years and 21 women older than 35 years. It should be noted that 41 of them were primipara women. Women died in the pride of their lives: they were so crucial to the society and the economy. In terms of employment, out of 95 cases, only 4 women had permanent employment. In one case, a woman was even homeless. In 95.7% (91 deceased women) of cases, the deceased women were housewives.

The review of medical records and questionnaires enabled to identify several causes of medical, social and economic nature.

One of the key socio-economic causes is the poverty. The interview sheets included 23 women with the socio-economic disadvantaged status and poor living conditions. The review has identified 16 women who lived in extreme poverty (lack of money necessary to purchase food products). Out of them, the majority of women (22) and their relatives had encountered challenges with the transportation (no transport or no money to pay for transport). In 3 cases, the questionnaires indicated geographical challenges (remoteness) in accessing health facilities. In one case of maternal mortality rate the husband had a disability of the 3-d category, and they had no money to buy required additional blood products. Undoubtedly, the progress in reducing maternal mortality can be undermined given the situation of neglecting the concerns of socially disadvantaged women, the burden of mortality thereof is much greater.

Reduction in household income and insufficient support of the government to protect the vulnerable groups of female population largely undermine the health of women. Normally, it leads to undernourished women and

causes chronic diseases among women of reproductive age, aggravates the course of gestation, delivery and postpartum period. The questionnaires identified 21 pregnant women with anemia, which is the implication of improper nutrition and low awareness of women themselves of adequate nutrition requirements during pregnancy.

Unfortunately, the majority of personal data lacked sufficient information on education of deceased women, both employed and housewives, as critical information on social status of women. The education plays a crucial role in reducing the incidence of early marriage among teenage girls, and as a result, preventing early pregnancy. Thus, there were two cases of child births among teenage girls (15-19 years). Owing to biological, psychological and social immaturity the body of a teenage girl is not ready for motherhood. Although the rate of teenaged child births is insignificant, however, this category should be taken into account while developing social policy programs. With the birth of a child, young teenage mothers tend to find themselves in a situation of complete and long-term psychological and socio-economic dependence on their parents, forced exclusion from peers and native communication environment. Teenage parents have doubtful prospects in terms of their future family life, with restricted scope for education and professional choice to ensure satisfactory financial conditions. Owing to many challenges young mothers are more likely to have poor quality of life, limited social and economic prospects, and their children will be distinguished due to poor health indicators.

In many cases there was a need for reasonable family planning, primarily in most-at-risk women as well as perinatal risks. Every family should have clear idea of childbirth age boundaries, birth spacing and intended number of children.

The responsible attitude towards their health, bad habits and awareness of reproductive health are important factors in promoting maternal health. One woman appeared to be a chain smoker for a long of time and even using alcohol and drugs (1%). In 6 interview sheets the relatives of deceased women agreed that pregnancy was contraindicated and the deceased women should have followed the doctors' recommendations. Among all deceased women in 11 cases they refused to cooperate with health professionals. In two cases, women use methods of alternative medicine. For example, in Case of №21 the woman was admitted in 2 weeks following the first birth in severe condition with a temperature of 39 degrees, unconscious, lethargic photoreaction, stiff neck, dry wheezing and left-sided hemiparesis. The interview sheets revealed that the patient was sick for over a week, did not seek professional care, practiced self-medication and was taking antibiotics, at times she felt delusions and hallucinations. The woman was provided alternative (religious) care by a priest. As the case history reads: back in the childhood she has suffered from acute cerebral blood flow impairment and was monitored at FAP during her pregnancy. Despite the initiated treatment at the hospital, they failed to recover a woman from cerebral coma and she died with a postmortem Dx: Sepsis with cerebral complications and suspect for multiple organ failure. Three women were admitted to HF with already decompensated cirrhosis, 11 - with cardio-pulmonary decompensation, 2 - in cerebral coma of III category (epilepsy), and despite the efforts of doctors and provided treatment, they all died.

The assessment showed that 6 (6.3%) of deceased women never visited a doctor during their pregnancy. Twelve women (12.6%) among the deceased women were the migrants. Five pregnant women used to reside in Russia and arrived in the country almost right before the childbirth; one woman was forced to work in the capital and got registered for monitoring at 34 weeks of gestation. It is noteworthy that the five women who arrived from Russia had BOH. Women, in most cases, visit the Health Facility right before the delivery and admitted in a very severe, almost agonizing condition. Women in search of decent jobs, higher earnings and better living standards were engaged in shuttle business that imply laboring jobs, without adequate access to antenatal monitoring.

One of the social causes behind maternal mortality is the violence against women - a concern that needs immediate addressing. For the woman to decide to confide in her past exposure to violence, she should trust her doctor, be confident to rely on appreciation and professional care in response to narrated story. The professional attitude of health workers to victims of gender-based violence is the key to gaining the trust of patients. In 10 cases, the interview sheets indicate family problems. In four cases there were instances of violence against women, including psychological, physical and sexual violence and financial control. The violence during pregnancy is associated with increased risk of miscarriage, stillbirth, pregnancy termination or low birth weight of infants, depression, anxiety, possible substance abuse, etc. In one case, the post-mortem Dx read that one of the side effects was the poisoning by the Aconitum and, perhaps, in the result of self-harming or probable awkward use.

Children Left without Mothers

The need to have a family, both a father and a mother is one of the most essential requirements of any child. In the course of drafting of this report altogether 209 children became orphans eligible for public social security. 95 deceased mothers gave live birth to 77 children, nonetheless, 31 newborns died in the early neonatal period. Every child whose mother has died will encounter much worse inception period in their lives, and the fact that many of such children will live in foster families or in care of someone heightens the crucial dimensions of public health. The case of mother's death, especially if it occurred owing to emergence of a new life is one of the most tragic events. A newborn becomes an orphan and the family loses the possibility of having children.

Special Recommendation on Social Factors

- 1. The public programs focused on poverty reduction and social protection of vulnerable groups of population (rural women, migrants, adolescents, persons with disabilities, etc.), should be endorsed and enhanced to ensure their sustainability;**
- 2. It is necessary to develop the mechanisms of providing complementary protection and support to families separated due to migration. It is critical to raise the awareness of labour migrants of their rights and obligations in terms of timely seeking care while migrating;**
- 3. Women survived from gender-based violence should have access to adequate services that ensure security, housing, legal aid, post raping psychosocial support, emergency contraception, post-contact prevention and STIs diagnostics;**

Final Recommendations for the Ministry of Health, Mandatory Health Insurance Fund and Health Systems Managers

- 1. To develop and implement the effective system of emergency care for patients in obstetric near-miss conditions: (a) to develop local protocols and standards of managing massive hemorrhage, severe preeclampsia and sepsis; (b) to identify clear functional responsibilities for each member of the team of professionals; (c) to conduct a training with frequent evaluation of knowledge and practical skills, while making hospital managers responsible for coordination of the care delivery process.**
- 2. To intensively raise the awareness of local communities and women of antenatal, postpartum care as well as care in labor is fully covered by the health insurance system.**

For Public Medical Universities

(KSMA, KSMIT&CE, KSU, OHSU)

- 1. The chairs of obstetrics and gynecology should provide the course on emergency obstetric care under the programs of training and continuous education with intensive evaluation of knowledge and skills of professionals.**
- 2. The chairs of anesthesiology should develop a special course on anesthesiology and emergency care in obstetrics based on lessons learnt and recommendations of the 1st CEMD Report. To conduct a training for all anesthesiologists engaged in delivery of obstetrics-gynecology care. Each anesthesiologist employed at maternity hospital should be trained on Regional Anesthesia**

For Professional Associations

- 1. To develop national protocols on prolonged labor and management of pregnant women with pneumonia.**
 - 2.To develop the list of criteria and conditions for transportation in case of emergency obstetric care from the primary level up to tertiary level of health care (Associations of anesthesiologists, obstetric-gynecologists, midwives).**

Annex No 1

RECOMMENDATIONS ON AUTOPCY IN MATERNAL DEATHS

In obstetric pathology the principles of postmortem diagnosis and the rules of validating the medical certificate of death ensured by the provisions of the International Classification of Diseases, Injuries and Causes of Death of 10th Edition are fully maintained (ICD-10).

These provisions suggest the following important recommendations:

1. All cases of maternal death are subject to autopsy. The mother deaths that occurred outside the health facility or at the admission unit of the health facility are subject to forensic medical examination.
2. The autopsy in case of maternal death should only be conducted by highly qualified pathologist or forensic medical examiner. One should not delegate the proceedings of such cases to clinical residents, master students, graduate students or other secondary job employees.
3. The autopsy of mother death cases should be conducted under the National Autopsy Center, in oblasts – at Oblast Autopsy Offices (OAO).
4. The autopsy in obstetric pathology should be preceded by detailed assessment of clinical data which is recommended to conduct together with clinicians engaged in monitoring and treatment of the deceased woman at all stages. This will enable to update a number of issues, insufficiently or ambiguously reflected in medical documentation. The clinicians must attend the autopsy.
5. The autopsy in MD cases should be conducted as early as possible (up to 24 hours) following the death, as the delayed autopsy prevents from conducting essential post-mortem biochemical, bacteriology and other complementary tests that back-up the validity of diagnosis and statements of death causes.
6. The autopsy examination in case of MD should be as complete as possible. Furthermore, it is recommended to use the approaches that provide easy and sparing access to examined organs and prevent from artificial effects during the autopsy.
7. The findings of sectional examination of the dead body should be backed up by complete histology, virology and bacteriology tests.
8. The autopsy examinations of a dead body should be mandatorily followed by the discussion of findings of the parts examinations jointly with clinicians. The attending physician if needed should be entitled to make a written statement as well as with regard to the autopsy findings. This document is unenforceable but may appear quite useful in subsequent debriefing on this case.
9. The histologic specimen and blocks should be kept for not less than a year as according to requirement of health authorities and law enforcement agencies the recurrent revision of microslides and blocks may be required.

The nosological forms or complications can cause maternal death that meets the definition of mother's death and listed in the XV ICD-10 "Pregnancy, childbirth and the puerperium (O00 - O99)".

While putting a postmortem diagnosis in cases of MD due to direct causes the column "Primary disease" contains the information on pathology of pregnancy, childbirth and puerperium, with the obligatory specification of parity, gestational or postnatal period. It includes the records of conducted surgeries (specifying date and time thereof), as well as intensive care and curative interventions, if they entailed complications.

Under the column "Complications" the primary disease complications are listed, as well as complications caused by post-operative, post-intensive care and post-therapy conducted with regard to primary disease. If surgery,

resuscitation, therapeutic interventions were conducted due to complications caused by primary disease, their nature and complications are recorded in the category: "Primary disease complications".

The column "Comorbidities" indicate pathological processes of pathogenetic nature not related to the primary disease. In case of MD due to indirect causes the disease not associated with obstetric pathology of the disease and lead to death is indicated as the primary disease. Furthermore, in the column "Primary disease" the period of gestation whereof the death occurred is specified as underlying/pre-existing disease. In rare cases, the primary disease can be combined (or the competing diseases or comorbidities should be indicated).

The pathology of fetus and afterbirth is specified in the special line. The time from delivery to death is indicated in hours or full days.

Filling the Medical Certificate of Death. The medical certificate of death is concurrently a medical, legal and statistical document. In cases of death of a woman in a hospital it is always filled by a pathologist or in transfer of a dead body for forensic examination - by forensic examiner. While filling the medical certificate of death, according to WHO recommendations out of set of interacting diseases it is necessary to indicate the pathological process, which directly led to death and those diseases that contributed to lethal outcome and adversely affected the course of the primary disease. The death certificate item "Cause of death" has two main parts. The part 1 is represented by 3 lines (a, b, c). The line "a" indicates the immediate cause of death (fatal complication). The symptoms and conditions conducive to occurrence of death are not included in this line (thanatogenesis), such as cardiac arrest, respiratory failure, multiple organ failure, etc. The line "b" is used to record the intermediate pathological conditions which led to occurrence of immediate cause of death. The primary disease or the condition that caused the onset of disease processes resulting in death (primary cause of death) is indicated in the bottom of filled lines ("c"). In case of comorbidities the line "c" indicates only the first nosological form, and it is only taken into account by the medical statistician, the second nosological form is transferred to Part II.

Part II is designed for registration of competing diseases, comorbidities or underlying disease in case of the combined primary disease as well as other critical conditions conducive to death, but not related to the primary disease. It also specifies the gestation term (if death occurred during pregnancy), the duration of puerperium (abortion, ectopic pregnancy) in hours or full days; the surgeries are listed with specified dates.

According to ICD-10 maternal deaths causes are recorded as follows:

1. O00-O08 Pregnancy with abortive outcome (often ectopic pregnancy, post-abortion complications).
2. O10-O16 Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium
3. O20-O29 Other maternal disorders predominantly related to pregnancy.
4. O30 O48 Maternal care related to the fetus, amniotic cavity, placenta and possible delivery problems.
5. O60-O75 Complications of labor and delivery.
6. O80 O84 Delivery.
7. O85-O92 Complications predominantly related to the puerperium.

Specific Recommendations

1. The detailed macroscopic description of all organs and systems, especially the pelvic organs and their topographical linkages with pregnant uterus or its cervical stump. The macro- and microscopic examination of uterus with a detailed description of the placental site is crucial. If the uterus is removed and histologically examined at other health facility, the pathologist or forensic examiner should include this information in macro-

and microscopic description of organs, request microslides of removed uterus, review them again and make sure they are taken into account when putting the final postmortem diagnosis.

2. In pre-eclampsia and eclampsia pay attention to morphological modifications in target organs - in kidneys (glomerular endotheliosis, hyalinosis and sclerosis of arterioles of cortical substances, necrosis of tubules epithelium) in myometrial segments of uterus-placental arteries (incomplete gestational restructuring), in placenta (phenomenon of chronic placental failure), in liver (foci of hemorrhage, necrosis), in cerebrum (ischemic and / or haemorrhagic infarctions).
3. In obstetric hemorrhage – histotopographic examination of uterus placental bed (placenta previa, atonic bleeding), objective assessment of the volume of blood loss, summing up the volume of blood imbibition of uterine wall and surrounding tissue, case of retroplacental hematoma with detailed description of the site of placental abruption (abruptio placentae), case of uterine rupture (spontaneous or forced, partial and complete, perforating), as well as morphological manifestations of DIC syndrome and hemorrhagic shock (shock organs). In purulent septic diseases - pay attention to morphological modifications in uterus, as the entry point of infection process, the case of spleen hyperplasia and pyaemic foci (endocardium and myocardium, lungs, kidneys, pancreas) as well as mandatory bacteriological tests of blood and specimen of necropsy material. In obstetric peritonitis – it is necessary to pay attention to line disruption of suture on post cesarean uterus or perineum.

The autopsy and detailed description of the fetus (including placenta) are mandatory, especially, in case of a death of pregnant woman.

Annex # 2

Definitions of Maternal Mortality and its Indicators, Methods of Estimating Maternal Mortality, Basic Health Condition and Maternal Mortality Trends, MD in Urban and Rural Settings

The causes of Mother's Death (MD) can be both direct - such as obstetric complications in pregnancy, childbirth and the puerperium, and indirect - for example, previously existing disease or disease that occurred during pregnancy, aggravated by pregnancy. The MD can be estimated based on data of census, households sample surveys (DHS) and Multi-Cluster Indicator Survey with a large representation (MICS), survey of respondents about their sisters, verbal autopsies (verbal enquiry into lethal outcomes of women who died outside the health facility). The so called method of Reproductive-Age Mortality Studies, RAMOS, can also be used which involves the identification and investigating the causes of all deaths of women of reproductive age in a given area or population (vital records, documentation of health facilities, funeral services and others.). Almost all of these methods enable to obtain, rather, the number of pregnancy related deaths and not mother deaths, that is, without disaggregation of causes of death of women into direct, indirect, and external and incidental. The maternal mortality rates are unevenly distributed across the regions of Kyrgyzstan and size of population of women of reproductive age in these regions is disproportionate.

The Republican Medical and Information Center keeps records of all deaths, regardless of causes, that occur during pregnancy and the first year following the post-termination of pregnancy at hospital.

Maternal Mortality Ratio (MMR) – is the number of maternal deaths during a given time period per 100 000 of live births. This indicator depicts the risk of maternal death relative to the number of live births.

Number of mother deaths during pregnancy, childbirth and postpartum within 42 days of pregnancy termination

$$\text{MMR} = \frac{\text{Number of mother deaths during pregnancy, childbirth and postpartum within 42 days of pregnancy termination}}{\text{Number of live births}} \times 100\,000$$

Maternal Mortality Rate (MMRate) – is the number of maternal in a given period per 1000 women of reproductive age. It captures both the risk of maternal death per pregnancy or per total birth (live birth or still birth), and the level of fertility in the population.

Number of mother deaths during pregnancy, childbirth and postpartum within 42 days of pregnancy termination

$$\text{MMRate} = \frac{\text{Number of mother deaths during pregnancy, childbirth and postpartum within 42 days of pregnancy termination}}{\text{Number of women of fertile age}} \times 100\,000$$

The Maternal Mortality Ratio should be estimated based on the data of the National Statistics Committee of the Kyrgyz Republic (official reported data of regions).

Structure of Causes of Maternal Deaths is Estimated as Follows

Number of women that died from this cause

Percentage of women in pregnancy, delivery and postpartum that

died from this cause in the total number of those who died in % = $\frac{\text{Number of women that died from this cause}}{\text{Total number of all women that died from all causes}} \times 100\%$

Total number of all women that died from all causes

Along with identifying the structure of mortality it is critical to estimate the intensive indicator of mortality resulting from particular causes. The incidence of death resulting from particular causes is estimated as follows below:

$$\text{Hemorrhage related maternal death} = \frac{\text{Number of women who died from hemorrhage}}{\text{Number of live births}} \times 100\,000$$

To estimate the maternal mortality rate by causes, the number of this particular cause related deaths per 100 000 live births should be divided by the total number of live births. The specified intensive indicators enable to determine the rate (incidence, prevalence) of a particular cause of death. It enables to compare the rates of mortality from specific causes in different administrative areas and assess their trends.

Maternal death	The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.
Pregnancy related direct maternal deaths	Death resulting from obstetric complications of the pregnant state (pregnancy, delivery or postpartum), interventions, omissions, incorrect treatment or a chain of events resulting from any of the above.
Non-pregnancy related indirect maternal deaths	Death resulting of previously existing disease or from disease that developed during pregnancy and that was not due to direct obstetric causes but aggravated by physiological effects of pregnancy.
Late maternal death	Death resulting from abortion, miscarriage or childbirth occurring from the 43 ^d day until the end of the first year post termination of pregnancy. The causes may be both direct and indirect.
Pregnancy related maternal deaths cases	Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of causes of death
Death resulting from accidental or incidental causes	Death during pregnancy or in the postpartum period of the cause, which had no relation to the pregnancy.

Annex No 3

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14	M. Omurzakov	Executive Representative, United Nations Population Fund
15	Ch. Asambaeva	Team Leader , Regional Program "Health in Central Asia" in KR, German Society for International Development
16	N. Smankulova	Reproductive Health Analyst, United Nations Population Fund

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According to the WHO *Beyond the Numbers* methodology, the entire information used to draft this report was obtained confidentially from various sources. In order to comply with the principle of confidentiality and prohibition to use for other purposes, the collected medical records and questionnaires were destroyed following the implemented enquiry.

For further information and references to this report, please contact the National CEMD Committee.

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