Peripartum Hemorrhage Management

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Agenda

- Pathoyphysiology!
- Therapeutic strategies
- Essential components of management protocols

Giving birth in a safe SPACE

- Disasters have no place
- „good medicine“
- Diagnostics are avoided
- “Medical vacuum“

Giving birth in a safe space

- Complications are catastrophic
- Our logistic is not designed for that situation
- We treat emotionally

Secret Recipe?

1 gr TXA+ Fib>2 + BLynch-Suture + Nalador = Happy Mom!

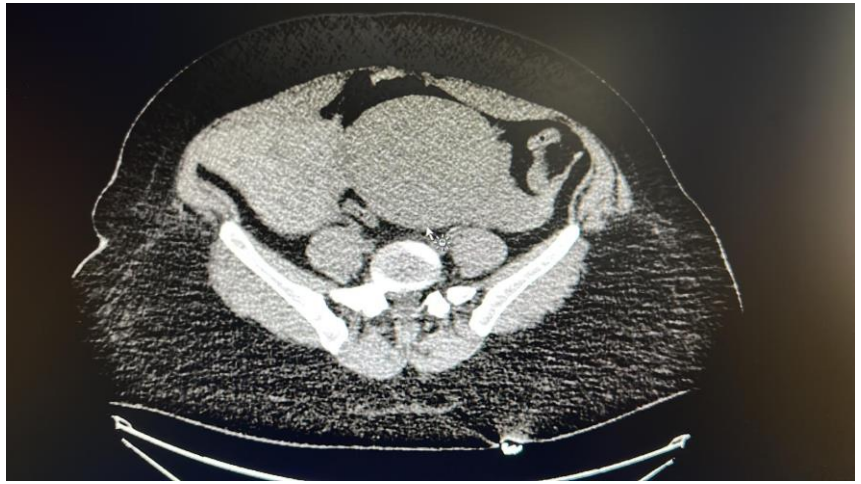
Treating severe PPH

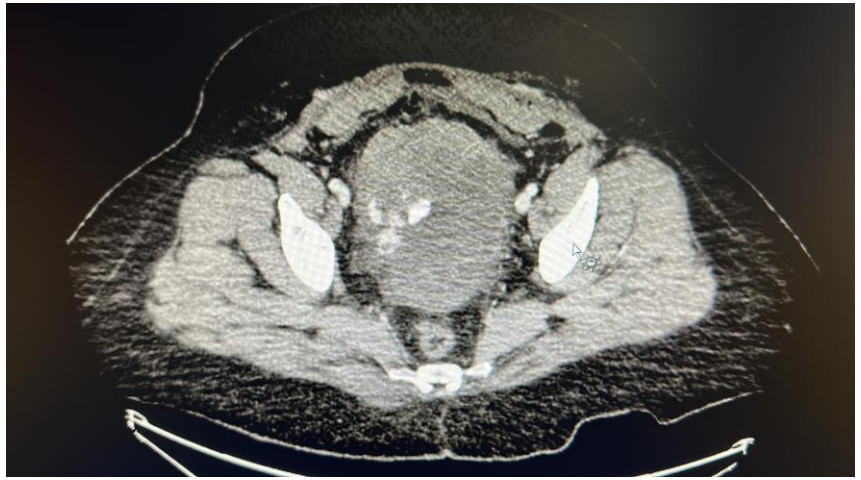
26.4.23

- 26 y Primipara
- Sectio (breech position)
- Monitoring in the recovery room by a midwife

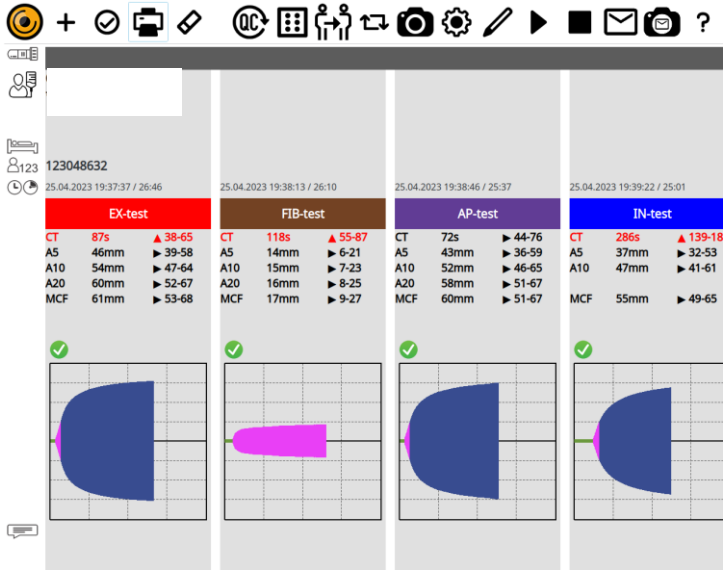
Acute hemodynamic instability

Resuscitation





- PPH protocoll activated
- 8 units EC
- 5 litre cristalloid solution
- 6 gramm Fibrinogen
- 1 gramm TXA
- Operative ligation of a bleeding uterine vessel



Too Little Is Done Too Late!

Lack of diagnosis

- Lack of consensus
- Misinterpretation of the severity of hemorrhage
- Lack of protocols
- Lack of training

Treatment failures

- Nonadequate use of uterotonics
- Prolonged decision for transfusion
- Ignorance of clinical signs and lab results
- Failures in decision-making

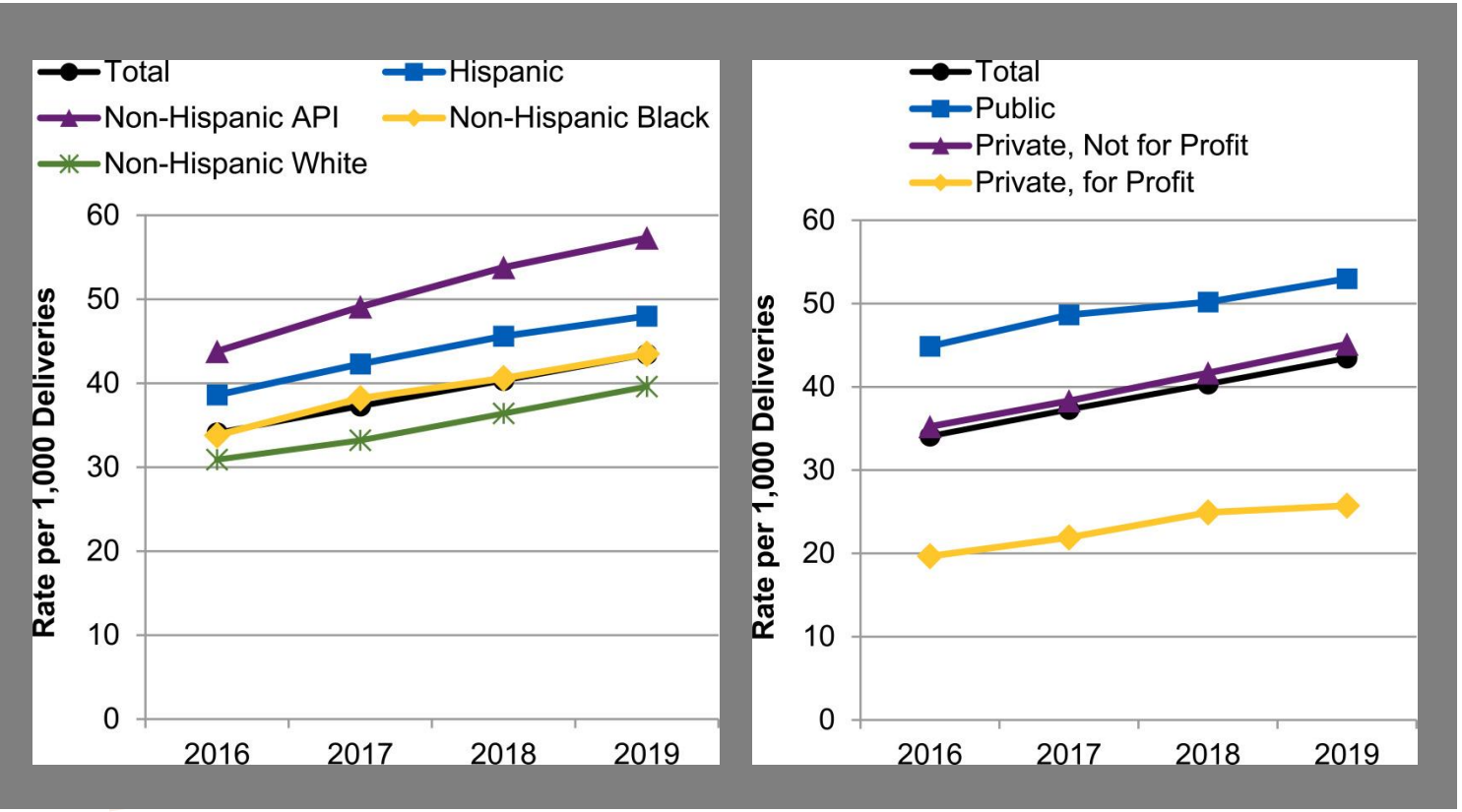
Structural failures

- Lack of adequate equipment
- Non-existing teamwork
- Communication failures

Too little is done too late!

- Rath W. Z Geburtshilfe Neonatol. 2011;215:177-81.

Be altert! The Incidence of Massive PPH is increasing!

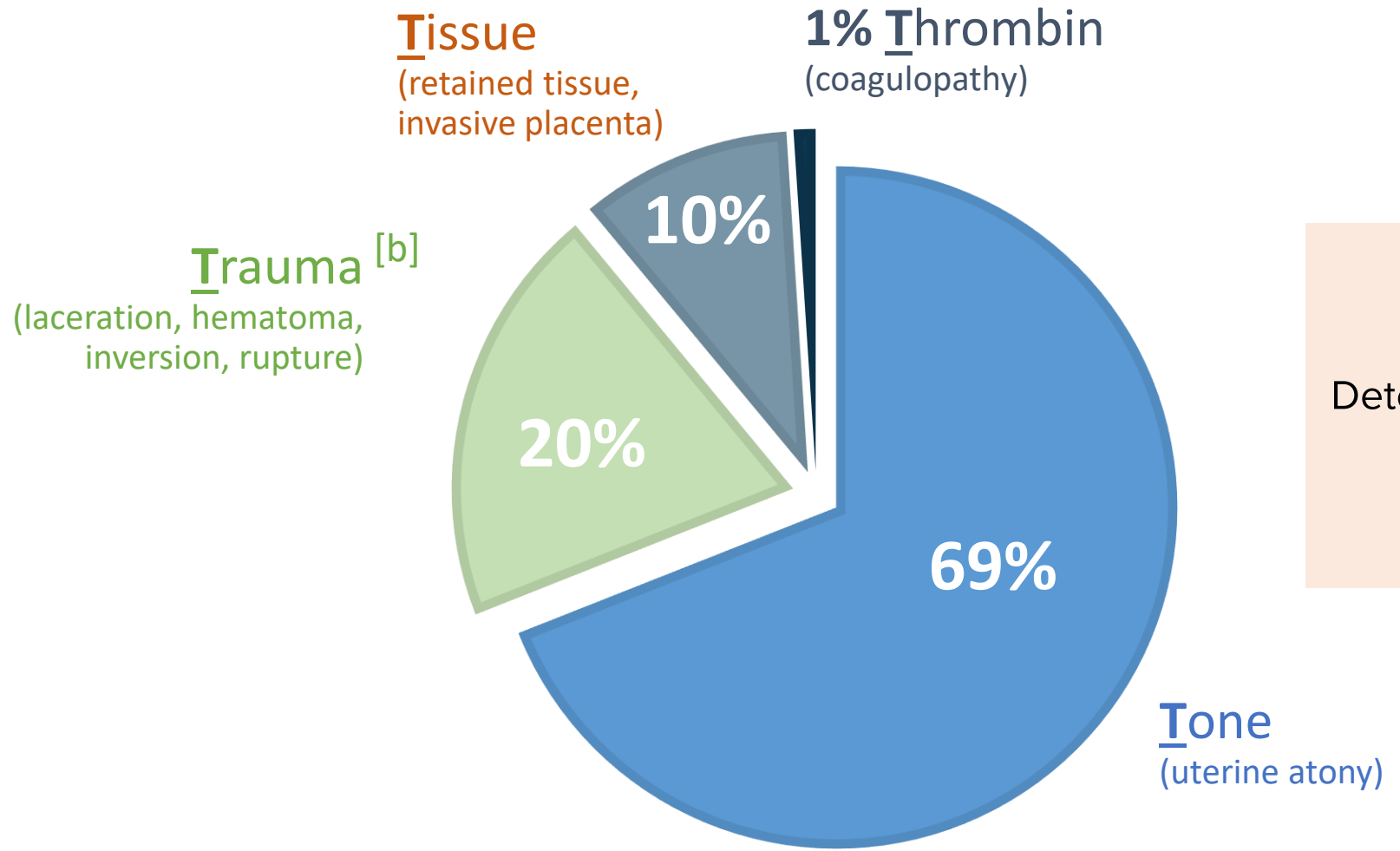


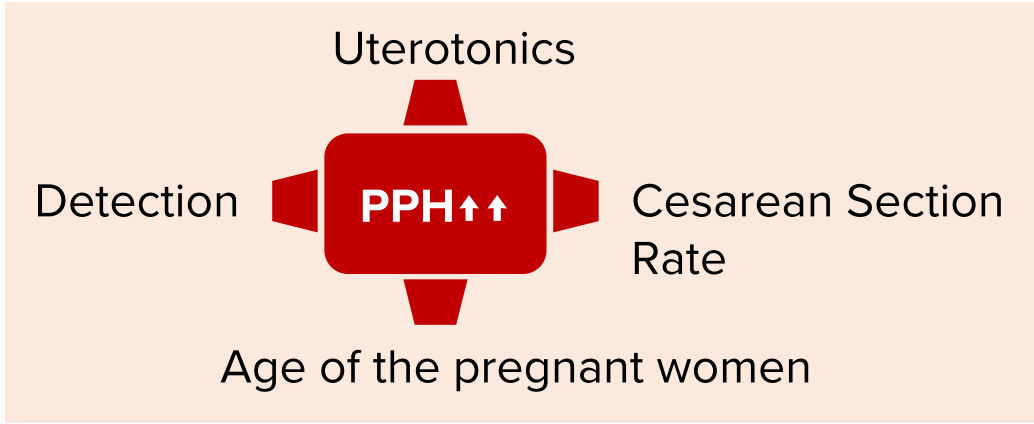
The United States has the highest maternal mortality rate of industrialized countries and this rate is increasing. Pregnant people from historically marginalized racial and ethnic groups have higher rates of maternal mortality and morbidity.

- 2022 National Healthcare Quality and Disparities Report [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2022 Oct. MATERNAL HEALTH.

What Causes PPH?

- PPH is the world's leading cause of maternal mortality with an estimated 127,000 deaths annually





- Hofer S, Blaha J, Collins PW, Ducloy-Bouthors AS, Guasch E, Labate F, Lança F, Nyfløt LT, Steiner K, Van de Velde M. Haemostatic support in postpartum haemorrhage: A review of the literature and expert opinion. Eur J Anaesthesiol. 2023 Jan 1;40(1):29-38.

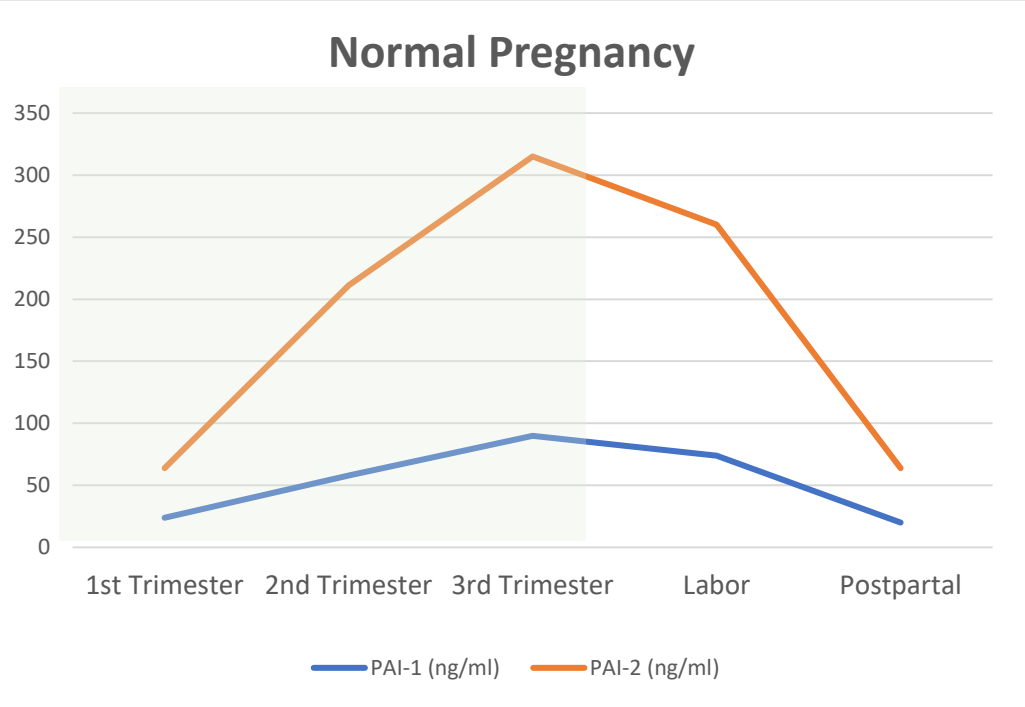
Points of Friction

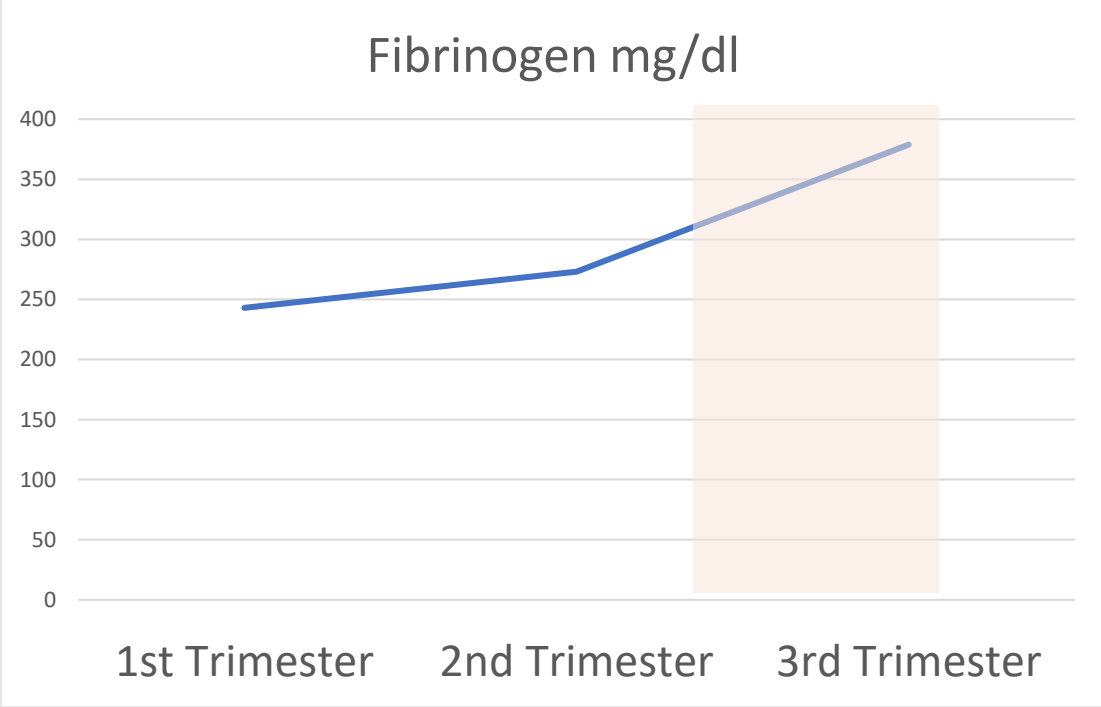
- Definition of PPH
- Use of uterotonics (dosage of oxytocin, use of prostaglandins)
- Monitoring of coagulopathy (standard lab vs POC)
- Fibrinogen replacement in PPH
- Blood component therapy (Hb target?, role of FFP…)

- POC, point of care.
- Muñoz M, et al. Blood Transfus. 2019;17:112-136.

Pathophysiology

Hemostase in Pregancy: It`s not that easy…

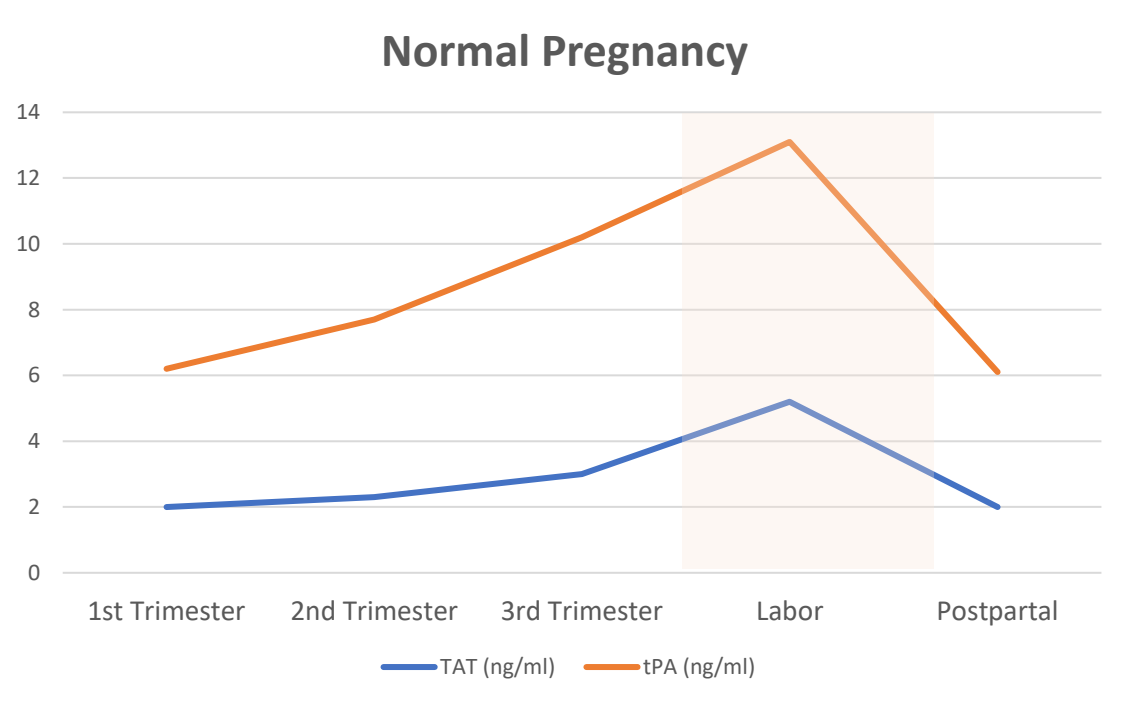


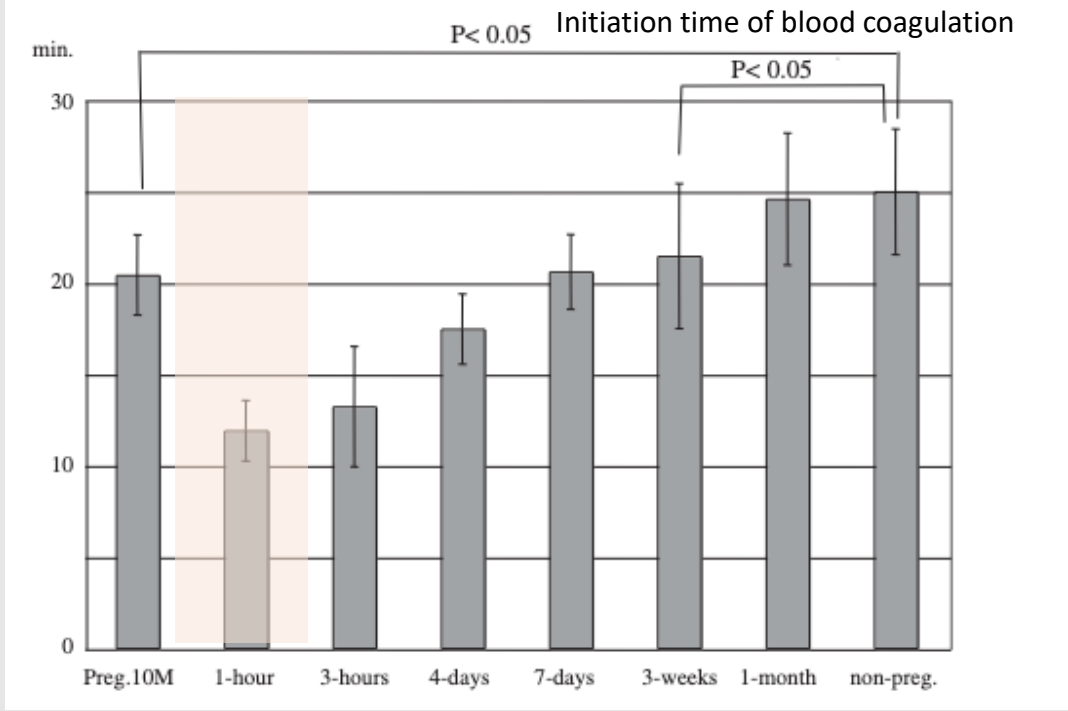


Procoagulatory Prevention

- Bellart J et al AMERICAN JOURNAL OF PERINATOLOGY/VOLUME 15, NUMBER 8 August 1998
- Abdelgadir R FIBRINOGEN LEVEL IN APPARENTLY HEALTHY PREGNANT WOMEN IN DIFFERENT TRIMESTERS; 2017

Hemostase in Pregancy: It`s not that easy…

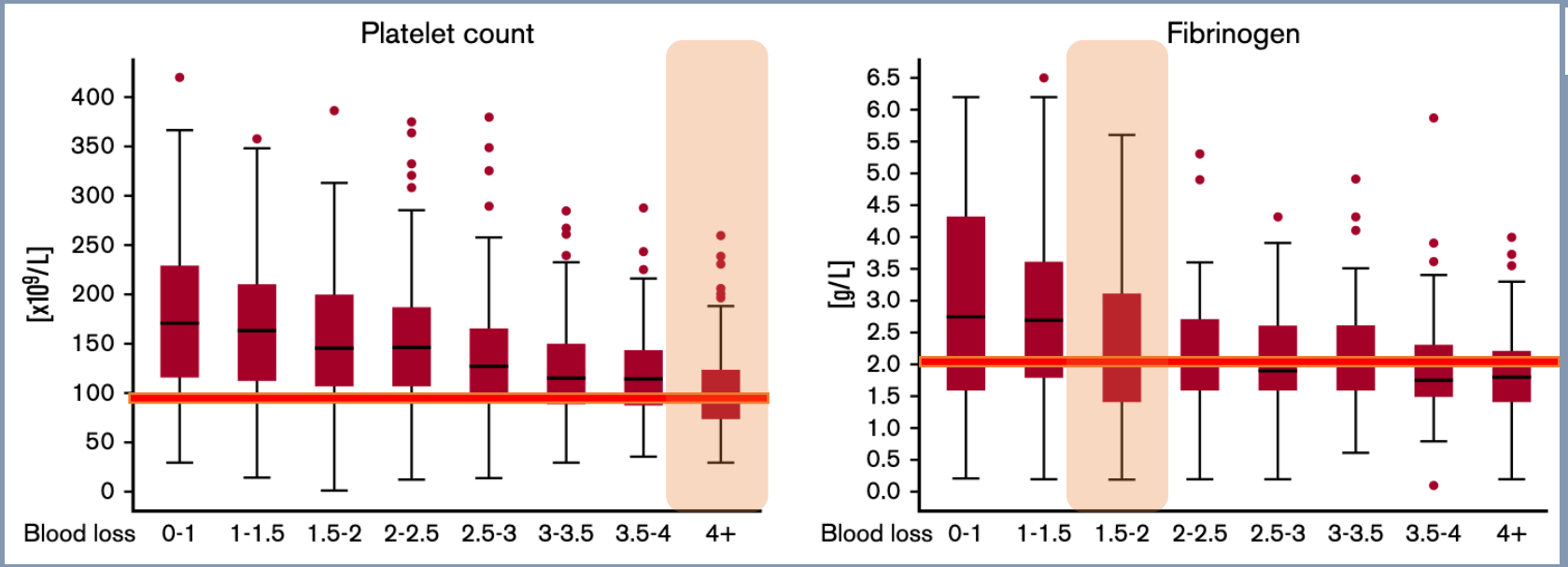


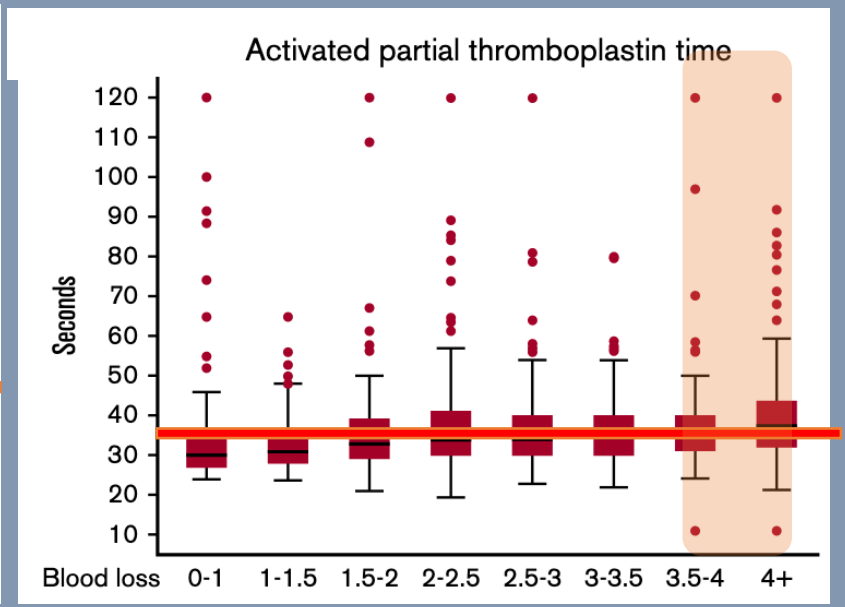


Activation of hemostase

- Toshiaki S: **Change of the initiation time of blood coagulation in pregnancy from 10-months to postpartum** Clinical Hemorheology and Microcirculation · April 2012
- Abdelgadir R FIBRINOGEN LEVEL IN APPARENTLY HEALTHY PREGNANT WOMEN IN DIFFERENT TRIMESTERS; 2017

Role of hemostasis in PPH





Never stop treatment, because of waiting für lab results!

- Gillissen A, et al. Blood Adv. 2018;2:2433-2442.

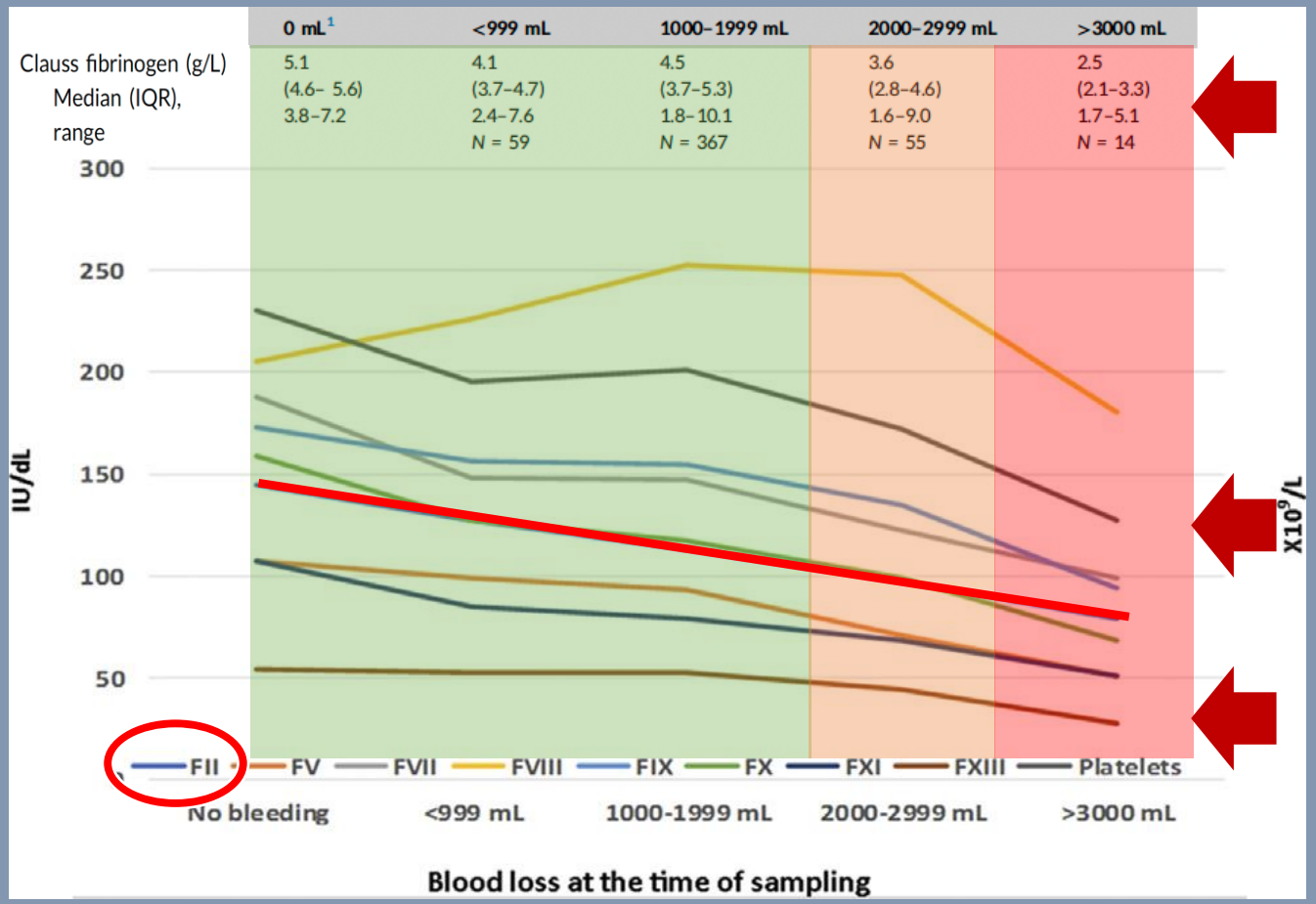
Pathophysiology of PPH

11.279 pregancies

4.6% with PPH (518)

- BL >1000ml
- AFE
- PA

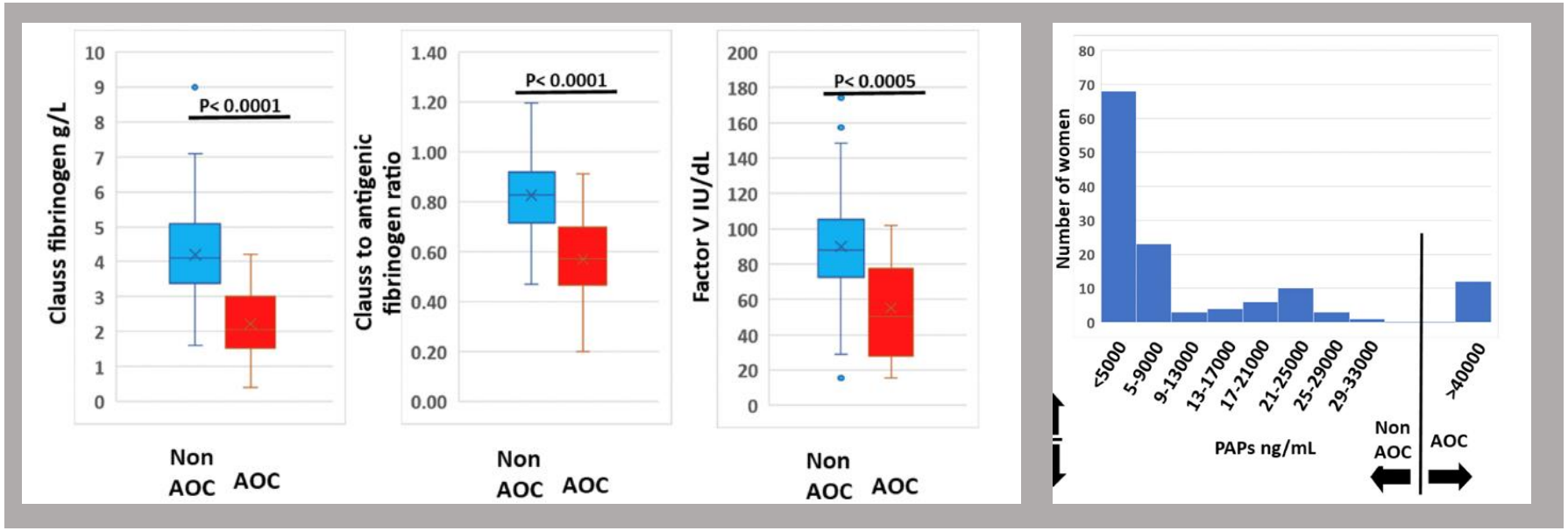
- TXA 1 gr at at least 1000 ml BL
- Fibrinogen: Fibtem A5 <12mm
- PC: Platelets < 75 10^9/l



- de Lloyd L.L. et al Acute obstetric coagulopathy during postpartum haemorrhage is caused by hyperfibrinolysis and dysfibrinogenaemia: an observational cohort study. J Thromb Haemost. 2023; 21: 862-879

Obstetric Acute Coagulopathy (OAC)

- 2.3 % (12/518) of the cases had massive hemostatic disturbanvce
- Massive Hyperfibrinolyse
- Signs of dysfibrinogenia and hypofibrinogenia
- Massive Reduction FV; FVII; FXIII
- Signs of massive DIC
- Association with placental abruption
- Association with fetal outcome



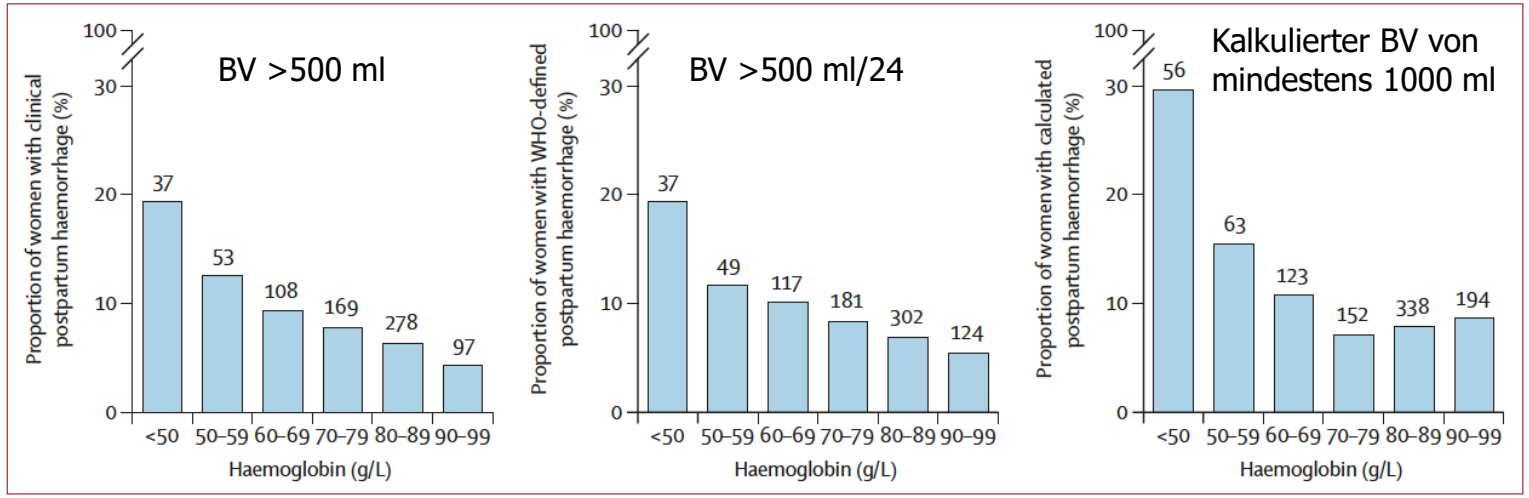
- OAC affects the severity and extent of severe hemorrhage
- Great variability in expression, intensity and triggering
- Can be dynamically mapped using POC diagnostics
- OAC should be seen as an independent clinical picture, independent of blood loss

- de Lloyd L.L. et al Acute obstetric coagulopathy during postpartum haemorrhage is caused by hyperfibrinolysis and dysfibrinogenaemia: an observational cohort study. J Thromb Haemost. 2023; 21: 862-879

Role of prepartal hemoglobin?

Prospective cohort analyses of the WOMAN-2 Trial: Prepartal Hb and probability of PPH

- 10561 pregnant women included (Pacistan, Nigeria, Tansania)



- Increased cardiac index?
- Activated sympathic system?
- Reduced blood viscose
- Anema caused clot instability with enhanced fibrinolytic rate (clot stability)
- Reduced oxygenation of the uterus?

Severe Anemia is associated with PPH (Hb<7 g/dl)

Maternal anaemia and the risk of postpartum haemorrhage: a cohort analysis of data from the WOMAN-2 trial The Lancet Vol 11 August 2023

Current status of the pathophysiology of PPH

- Severe substrate deficits due to consumption probably only occur with high levels of blood loss (>2-3 liters)
- The platelet deficite occurs at a late stage of PPH
- Fibrinogen substitution and use of TXA make sense from the pathophysiologic point of view
- There are hints in pathophysiology that the role of FXIII substitution in severe hemorrhage could be a therapeutic aspect
- OAC pathophysiology is complex: therapy and substitution should be monitored with POCdevices

- de Lloyd L.L. et al Acute obstetric coagulopathy during postpartum haemorrhage is caused by hyperfibrinolysis and dysfibrinogenaemia: an observational cohort study. J Thromb Haemost. 2023; 21: 862-879

Therapy measures: Everything processed?

PBM	Fire Drills	Uterotonics	Transfusions Bundle
Novo 7	REBOA	PPH Protocoll	POC
Cell Safer	Patient Safety	MoMo conference	Evaluation of blood loss
communikation	Surveillance - standards	Detection: Woman at risk!	Ultima Ratio Protocoll

PPH Protocol

Homework Done? Safety Bundles Established?

TABLE 2
California Partnership for Maternal Safety collaborative structure measures (N = 17)

Safety bundle elements (dates established or completed were reported)

Readiness domain	Recognition and prevention domain	Response domain
Hemorrhage cart/including instruction cards for intrauterine balloons and compression stitches	Assessment of hemorrhage risk (prenatal, admission, and other) (policy with time frames, mechanism for documentation)	Use of unit-standard, stage-based obstetrics hemorrhage emergency management plan with checklists
STAT access to hemorrhage medications (kit or equivalent)	Measurement of cumulative blood loss (formal and as quantitative as possible)	Support program for patients, families, and staff for all significant obstetric hemorrhages
Hemorrhage response team established (anesthesia, blood bank, advanced gynecological surgery, and other services)	Active management of third stage of labor (departmentwide protocol for oxytocin at birth)	Reporting and systems learning domain
Massive transfusion protocols established		Establish culture of huddles to plan for high-risk patients
Emergency release protocol established for O-negative and uncross-matched units of RBC		Postevent debriefing to quickly assess what went well and what could have been improved (agreed upon leader, time frame, with documentation)
Protocol for those who refuse blood products		Multidisciplinary reviews of all serious hemorrhages for system issues
Unit education to protocols		Monitor outcomes and progress in perinatal QI committee
Regular unit-based drills with debriefs for obstetric hemorrhage		

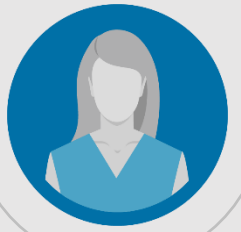
- Hemorrhage Card
- Evaluation of blood loss
- Plan your patients at risk
- Massive transfusion protocol
- Training of standards

Main EK, Cape V, Abreo A, et al. Reduction of severe maternal morbidity from hemorrhage using a state perinatal quality collaborative. Am J Obstet Gynecol 2017;216:298.e1-11.

Homework Done? Safety Bundles Established!

20.8% to 28.6% reduction of severe maternal morbidity

60% reduction of transfusion

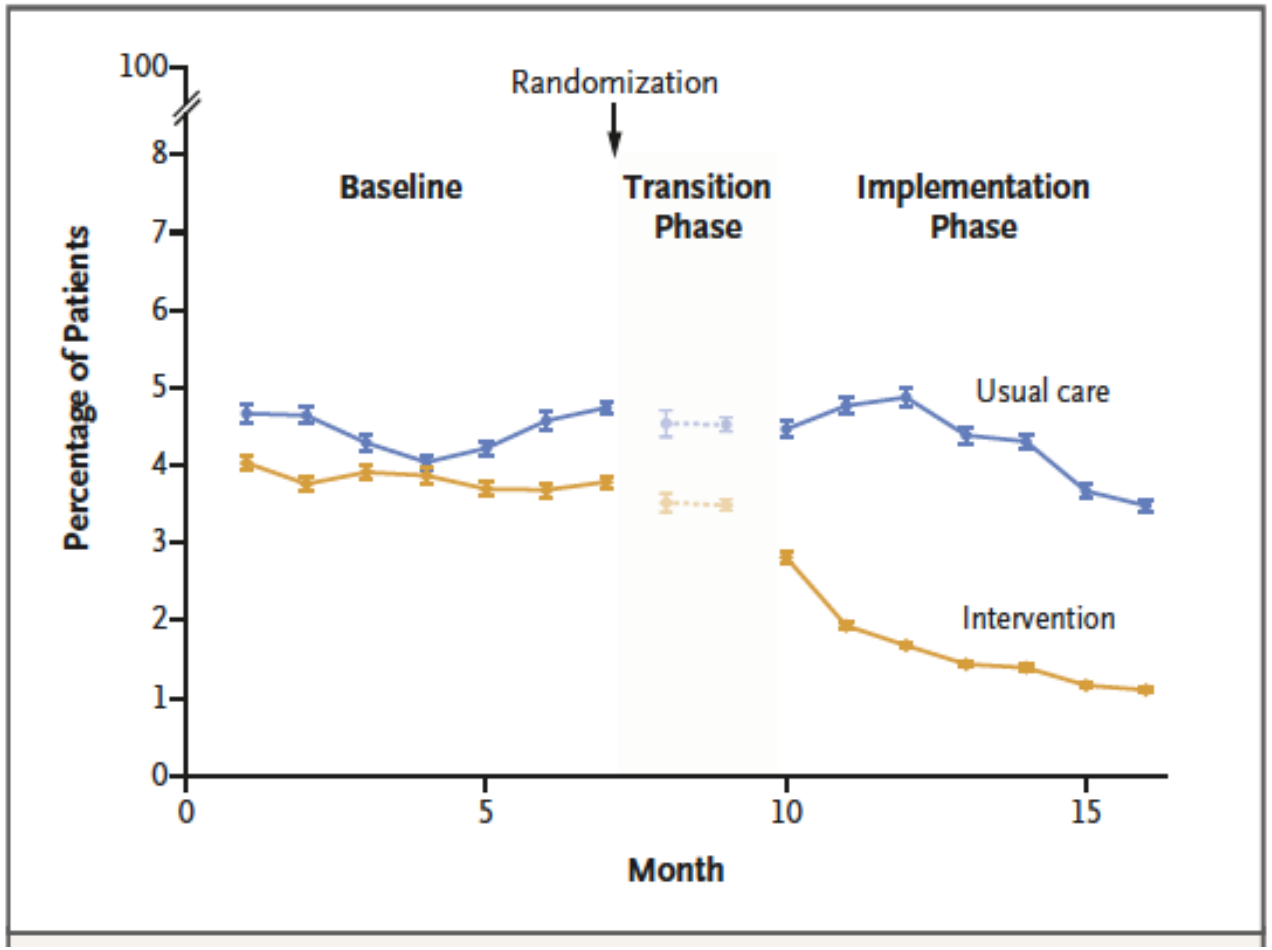


Improved outcome for all women independent of type of hospital

- Main EK, et al. Am J Obstet Gynecol. 2017;216:298.e1-11.

Detection and treatment! E-MOTIVE Trial

Primary outcome: Severe PPH, Laparatomy and death due to bleeding



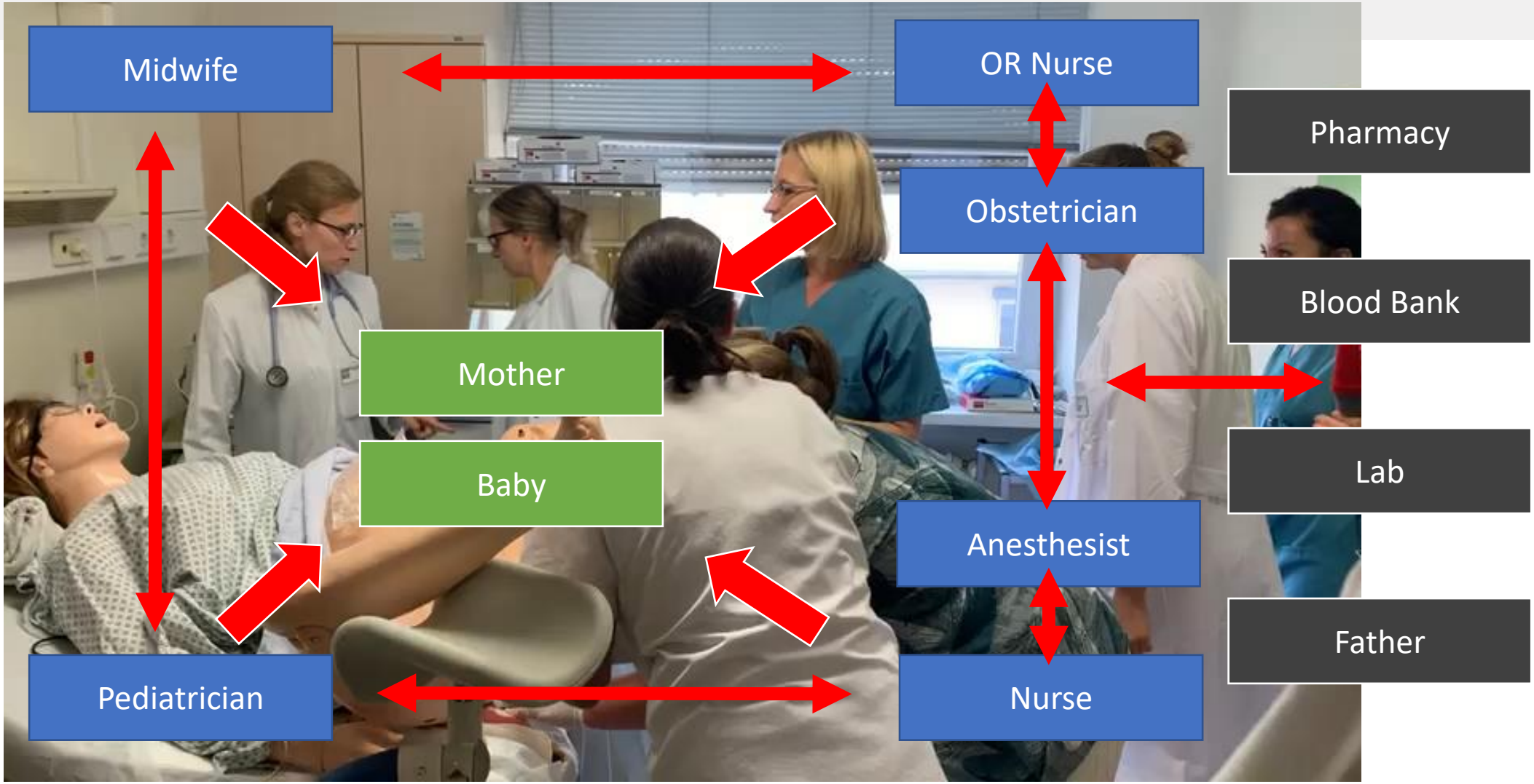
- 200.000 pregnancies: 100.000 included
- 7 months standard care
- 2 groups: Standard (40) vs. Training (40)
- 7 months intervention

- Detection PPH: 93.1% vs. 51,1%
- PPH >500 ml 8.5% vs. 16.7%
- 17 vs. 28 dead cases

- Gallos I et al:Randomized Trial of Early Detection and Treatment of Postpartum Hemorrhage N Engl J Med 389;1 nejm.org July 6, 2023

PPH-Drills!

• Simulation Center WKK Kaiserslautern



PPH Drills: Danger of Babylonian Confusion!
Expert's Perspectives

Who is the team leader?

Do we all know the algorithm?

Do we all have the same goals?

Do we have a plan, when our standard fails?

Interventional Radiology? ECMO? REBOA?

PUSH-PPH

Interprofessional Treatment Algorithm for Peripartum Hemorrhage PUSH
PPH: Proclamation of Hemorrhage; Uterotonic therapy, surgery and interventional measures, hemorrhage therapy

BASIC MEASURES: ✓
PPH: Blood loss >500ml

Evaluate Blood loss ____ ml

- ☐ Activate blood bank
- ☐ 14G i.v. line; arterial line
- ☐ 1gr Tranexamic Acid i.v.
- ☐ Team Time Out Obs./Anesth.
- ☐ Cell Saver possible?
- ☐ Warm touch
- ☐ Emergency lab or POC

CARDIOPULMONAL STABILIZATION

- **Cristalloid based volume replacement**
- **Vasopressor:**
  - Akrinor 2:8; 25–50 mg Boli
  - Noradrenaline 1:100; 10 µg Boli
  - Noradrenaline-Perfusor (10 mg/50 ml)

TARGETED MAP: 55 – 60 mmHg

SURGICAL PROCEDURES

- Mechanical measures
- Uterine tamponade
- Uterine compression suture
- Selective devascularization
- Uterine packing
- Hysterectomy

DIAGNOSED ATONY?

USE OF UTEROTONICS

- First line: oxytocin
- Second line prostaglandin
- Bakri balloon possible?
- Intracaval hemostatic agents possible?

Hysterectomy indicated?

- bleeding refractory to therapy
- interdisciplinary consens

HEMOSTATIC THERARAPY

- Dynamic Hb decrease
- Blood loss >1500ml

GOALS

- Fibrinogen: >2 g/l
- Platelets: >50–100/nl
- Hb: 7–9 g/l
- Normocalcemia >0.9 mmol/l
- Temperature >34.0°C
- pH >7.2
- Exclusion or blind therapy of hyperfibrinolysis

ROTEM

FIBTEM A5 >12 mm
LI <10 %

THERAPY WITH UTEROTONICS

CAVE: NO PARALLEL USE of Oxytocin and Sulprostone

Obligation to monitor! Maternal cardiovascular risk!

FIRST LINE: OXYTOCIN

Bolus: 3 Oxytocin slowly i.v.

Continuous infusion:
25 I.E./50 ml NaCl 0.9 % (1 I.E./2 ml)
Max: 100 ml/h (50 I.E./h)

CAVE: There is no clear definition of the maximum limits.
Max. dosage adapted to 16*103 IU/min

SECOND LINE: SULPROSTONE

500 µg/50 ml NaCl 0.9 % (10 µg/ml)
Maximum dosing 1000–1500 µg/24h

Clinically based scheme

Wash -in phase
3 min 50 ml/h (8.3 µg/min)

Reduction phase
7–15 min 10 ml/h (1.6 µg/min)

Maintenance phase
1–2 ml/h (0.16–0.32 µg/min)

Hysterectomy indicated?

- bleeding refractory to therapy
- interdisciplinary consens

If the total dose is > 25 IU oxytocin, switch to prostaglandin IV.

Evaluate Blood loss ____ ml

INITIAL RESCUE THERAPY

- 1g Tranexamsäure given?
- 4-(6)g Fibrinogenconcentrate
- Consider 1250 IE FXIII i.v.

PERSISTIEREND SEVERE HEMORRHAGE

- 2g Fibrinogenconcentrate/1000 ml BL
- EK: FFP: THK 4:4:1

EVALUATE IF PERSISTENT BLEEDING

- INR> 1.5; aPTT >40 s
- If there is a synthesis disorder (e.g. HELLP)
- 4FPCC 15–30 I.U. Kg/BW i.v.
  (Remember to measure AT levels in the ICU)

ULTIMA RATIO rFVIIa

- Recombinant FactorVIIa 60 µg/kg i.v.

- Failure of Uterotonic
- Before Hysterectomy
  Temp. >34.0°C; Fibrinogen >2g/l
  platelets> 50.000/nl

ULTIMA RATIO

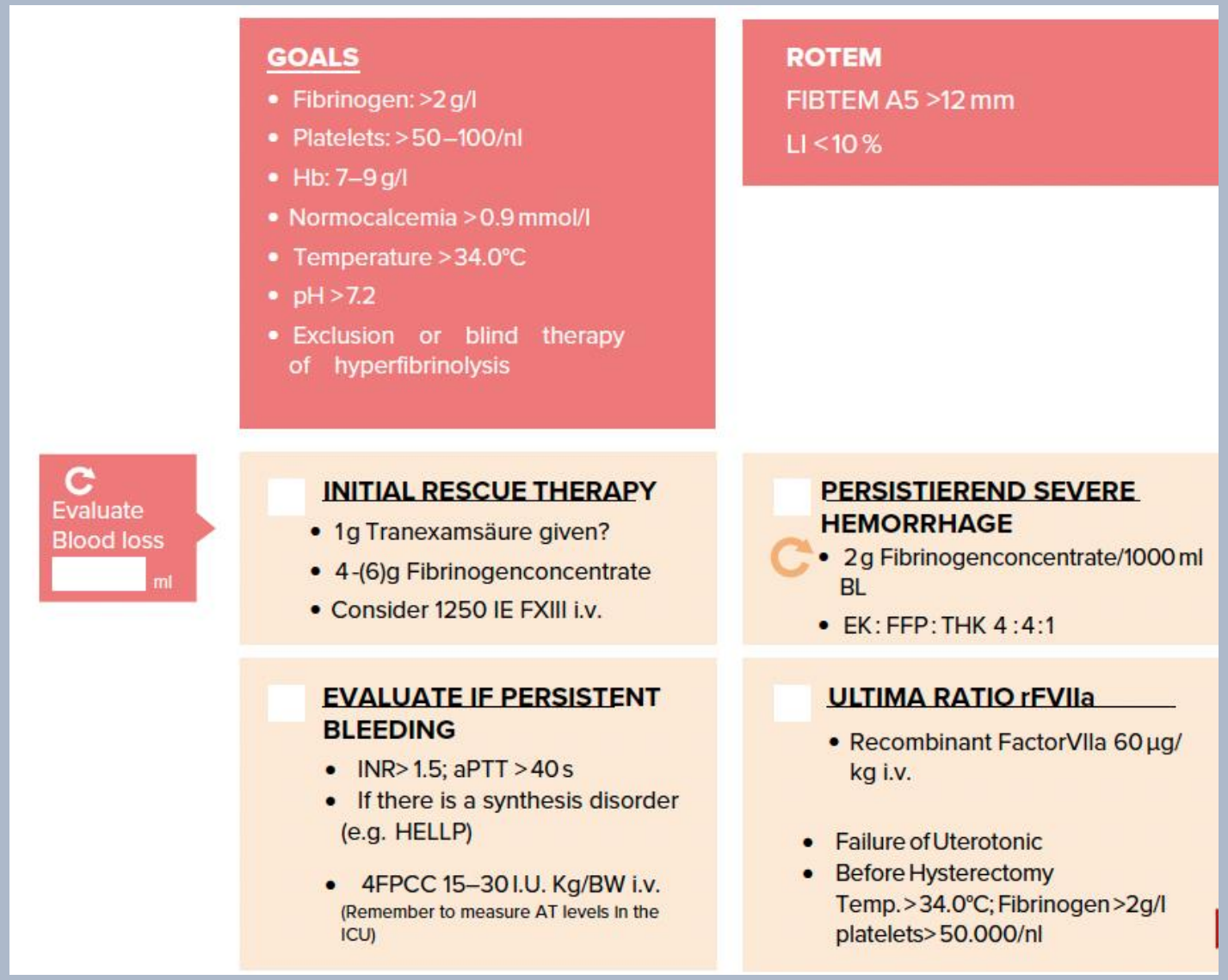
Radiological intervention possible?
- REBOA possible as a bridging solution?
- Massive transfusion still manageable ☐

NEIN

Interdisciplinary decision on hysterectomy

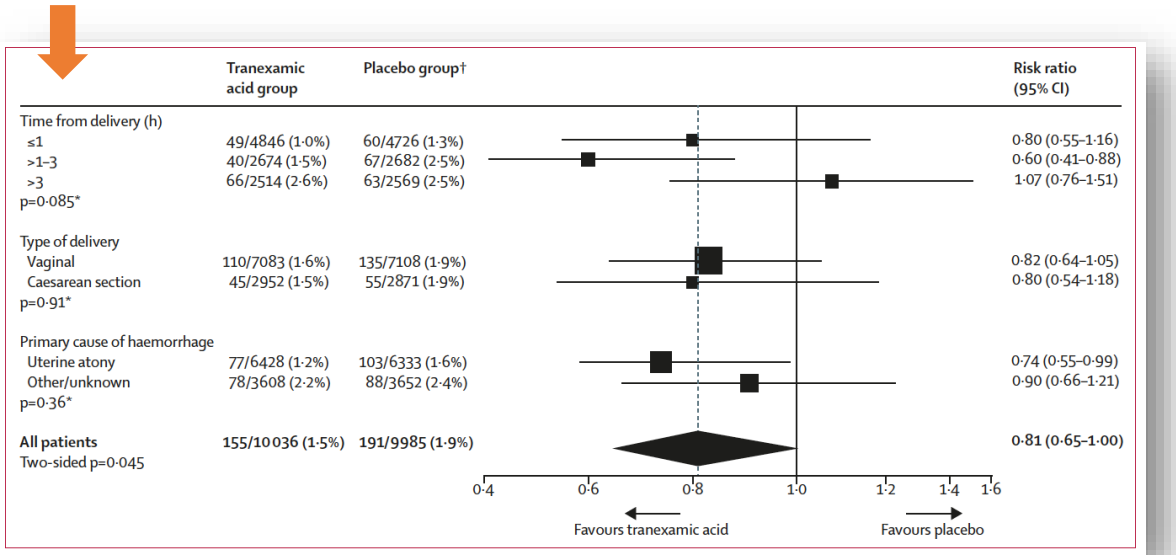
SOP Klinik Klinik für Anästhesie Intensiv-Notfallmedizin und Schmerztherapie Prof. Dr. med. Stefan Hofer; MHBA **Westpfalz-Klinikum GmbH**

The hemostatic part



ANTI-FIBRINOLYTIC THERAPY

WOMAN TRIAL



- n= 20.060 women under PPH
- Definition: blood loss > 500 ml after VB > 1000 ml after CS
- largest and best study on TXA and PPH to date.
- Significant reduction in "bleeding death" from TXA, but no effect on "death from any cause"
- Analogy to the CRASH-2 study (effect only within the first three hours after the onset of bleeding)
- Clinical consequence: 1 g TXA as soon as possible after diagnosis of PPH.

The Lancet: Published online April 26, 2017 http://dx.doi.org/10.1016/S0140-6736(17)30638-4

Tranexamic Acid (TA)

Why?

- Blocks Hyperfibrinolysis

Who?

- PPH > 1000 mL
- Hyperfibrinolysis

When?

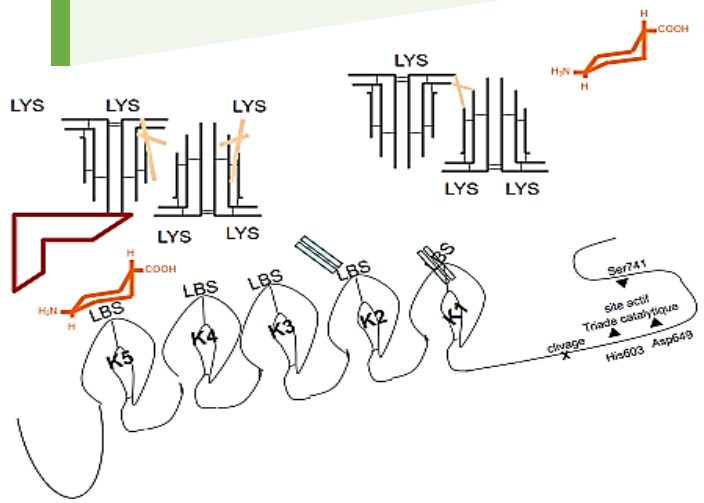
- As soon as detected
- Within 3 h after PPH onset

TA avoids plasmin-induced drastic **lysis** of

- Stabilized fibrin == > D-dimers
- Fibrinogen
- Factor V

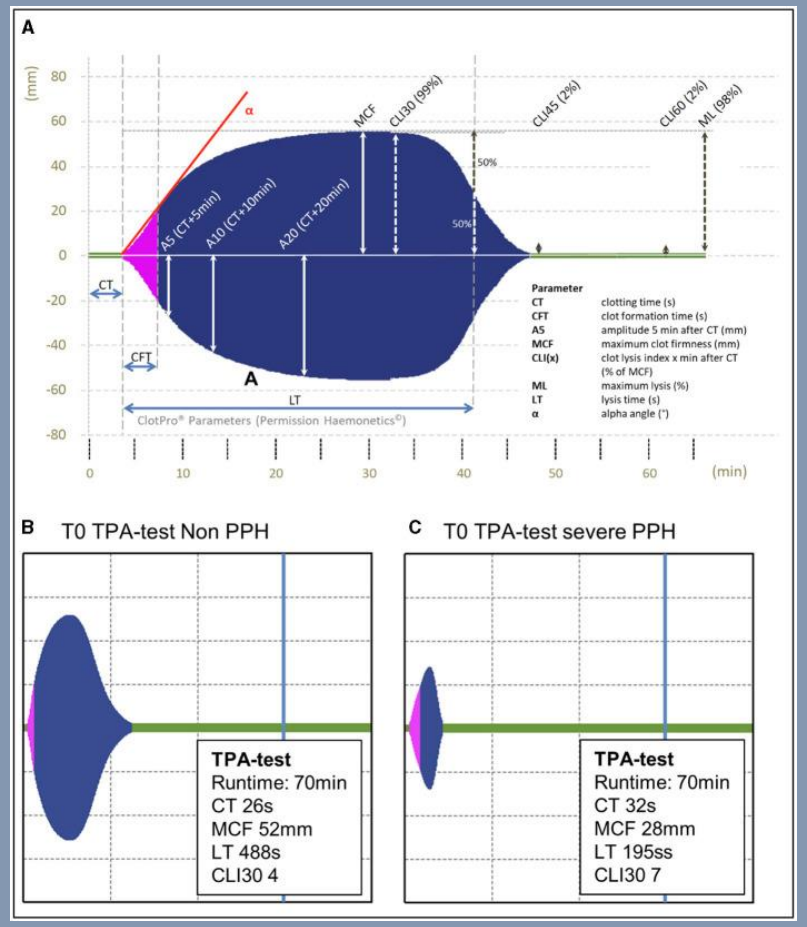
And **consumption** of

- Alpha2-antiplasmin == > PAP

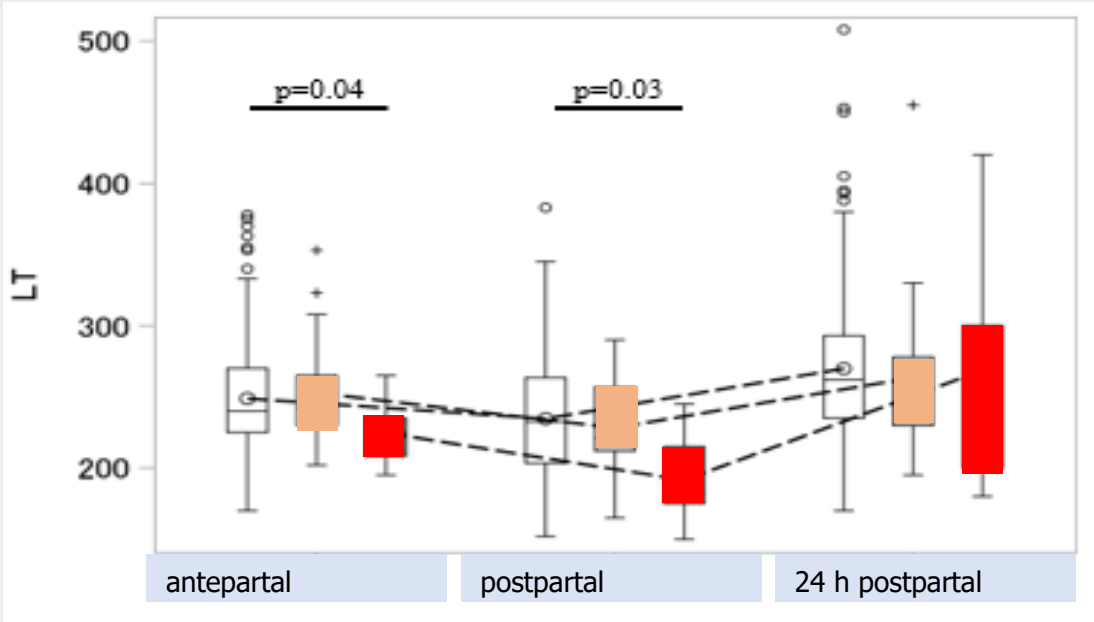


- Ducloy-Bouthors AS, et al. Br J Anaesth. 2016;116:641-8; WOMAN Trial Collaborators. Lancet. 2017;389:2105-2116; Shakur-Still H, et al. Wellcome Open Res. 2018;3:100; Gilliot S, et al. *Eur J Pharm Sci.* 2020;153:105486.

Fibrinolytic Potential ???
TPA Test



TPA Lysis Time (Clot Pro TPA-Test to assess fibrinolytic potential)



Non PPH
Milde PPH
Severe PPH

The clot lysis time characterizes the timespan between clot formation and 50% clot lysis

206 pregnant woman: antepartel and postpartel fibrinolytitic potential

- Gruneberg D et al Fibrinolytic potential as a risk factor for postpartum hemorrhage Front Med (Lausanne). 2023; 10: 1208103.

TXA: But! We have open Questions!

- Cortical renal necrosis associated with pregnancy can lead to chronic renal failure. Role of TXA?
- Initial dose, repetitive Dose?
- Fibrinolytic potential of the pregnant women? PPH Lysis Shut down?
- WOMAN-2: Prophylactic use of TXA

Role of Fibrinogen

Fibrinogen and severe PPH

Risk for severe PPH was **2.63-fold** higher for each 1 g/L decrease of fibrinogen.
The positive predictive value of a concentration **< 2 g/L** was 100%[a]

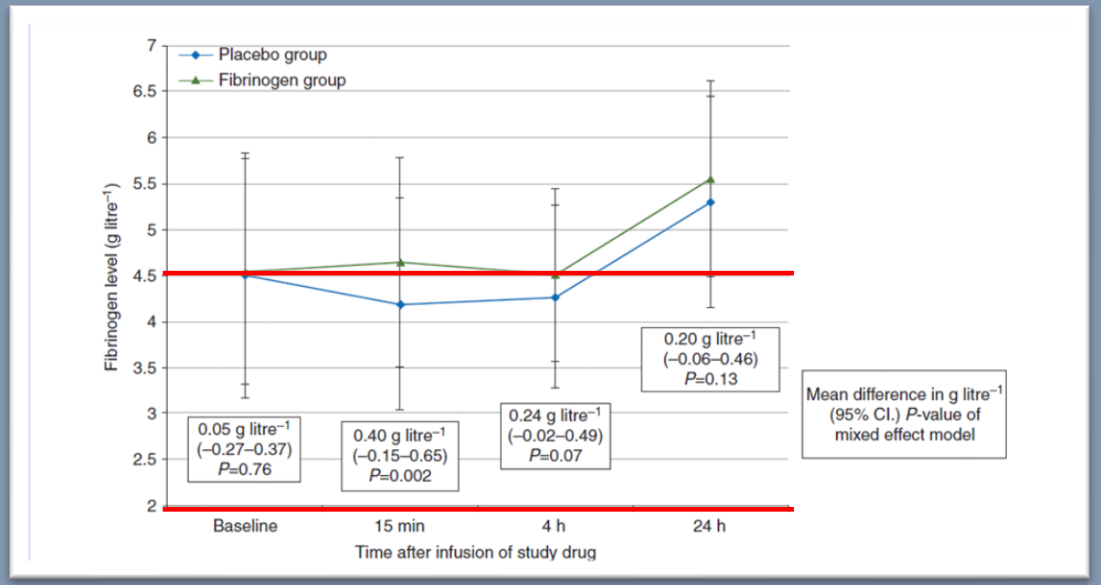
Fibrinogen plasma concentration at admission before labor **does not predict** severe PPH in a general obstetric population[b]

- a. Charbit B, et al. J Thromb Haemost. 2007;5:266-273; b. Karlsson O, et al. Br J Anaesth. 2015;115:99-104.

Substitution of Fibrinogen

Editor's key points

- Low fibrinogen is associated with excessive bleeding in postpartum haemorrhage.
- The effect of early empirical administration of fibrinogen concentrate on blood transfusion in postpartum haemorrhage was studied.
- In a multicentre, randomized trial of 249 subjects, pre-emptive administration of fibrinogen concentrate did not reduce red blood cell transfusion.

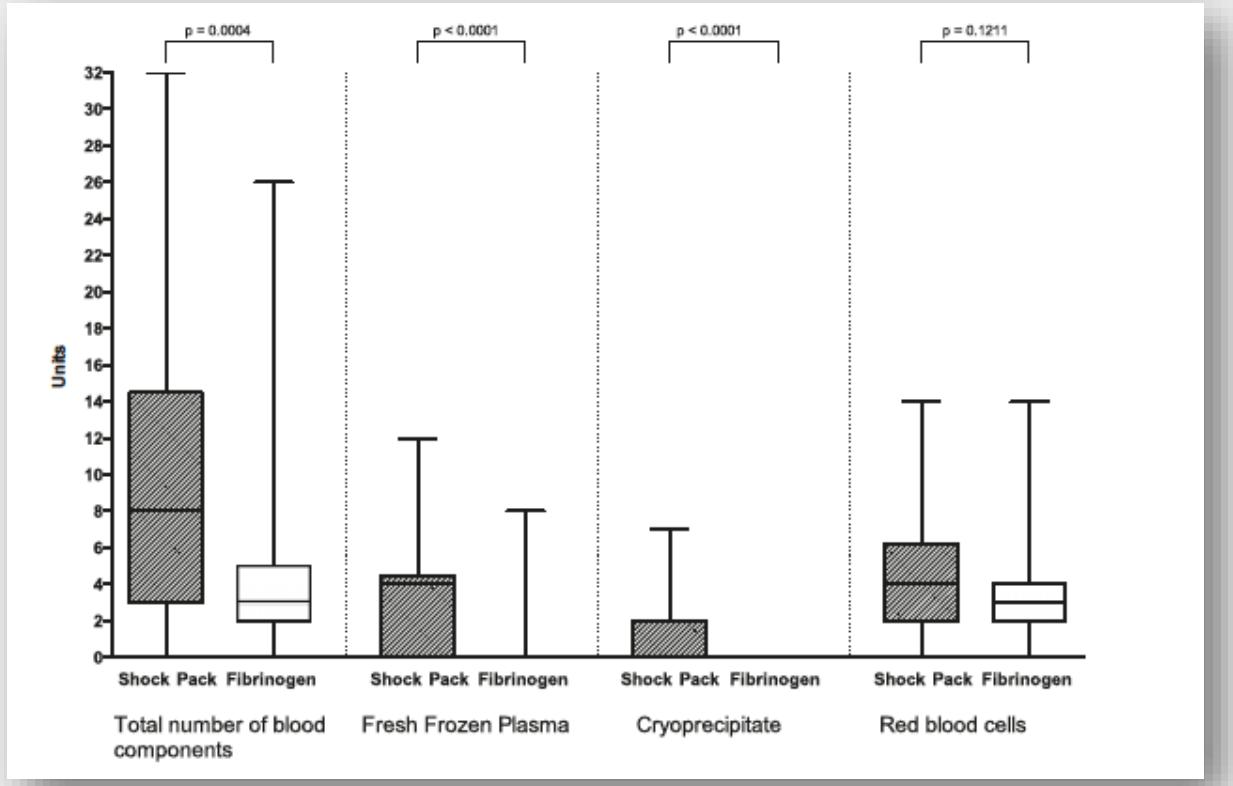


Incidence of initial hypofibrinogenaemia (baseline fibrinogen <2 g litre^{-1} with Clauss method)†	Fibrinogen <2 g litre^{-1}	1 (1%)	4 (4%)
	Fibrinogen >2 g litre^{-1}	119 99%	107 96%
Initial fibrinogen concentration (g litre^{-1})†	Mean (SD)	4.5 1.1	4.5 1.3

•Wikkelsø AJ et al: Pre-emptive treatment with fibrinogen concentrate for postpartum haemorrhage: randomized controlled trial†. Br J Anaesth. 2015 Apr;114(4):623-33. doi: 10.1093/bja/aeu444. Epub 2015 Jan 13.

POC Guided Fibrinogen Substitution

- Prospektive Study
- Evaluation of a clinical pathway before and after fibrinogen-dominated therapy (FIBTEM A5 >7 mm)



- Mallaiah S et al: Introduction of an algorithm for ROTEM-guided fibrinogen concentrate administration in major obstetric haemorrhage; Anaesthesia 2015, 70, 166–175

Fibrinogen Substitution

- The exact threshold for intervention to replace fibrinogen is still unclear, although a **fibrinogen level above 2g** l−1 appears to be adequate for haemostasis during PPH
- Lower fibrinogen levels before birth do not necessarily require treatment, but special attention!
- If the plasma fibrinogen concentration in PPH is lower than 2g l^{-1} substitution through cryoprecipitate or fibrinogen concentrate is needed
- Similar to FFP, cryoprecipitate needs to be administered in larger volumes in comparison with fibrinogen concentrate to restore fibrinogen levels.
- Currently there is no evidence that either fibrinogen concentrate or cryoprecipitate is a more effective treatment in patients with fibrinogen plasma level above 2g l^{-1}

- Hofer S, Blaha J, Collins PW, Ducloy-Bouthors AS, Guasch E, Labate F, Lança F, Nyfløt LT, Steiner K, Van de Velde M. Haemostatic support in postpartum haemorrhage: A review of the literature and expert opinion. Eur J Anaesthesiol. 2023 Jan 1;40(1):29-38.

FXIII

- Targeted hemostatic therapy via concentrates
- Fibrinogenconcentrat, FXIII
- PPSB
- FX III 20 I E / kg KG
- Goal: F XIII- Aktivität > 60 %

Leitlinienprogramm

Deutsche Gesellschaft für Gynäkologie und Geburtshilfe (DGGG)

Österreichische Gesellschaft für Gynäkologie und Geburtshilfe (OEGGG)

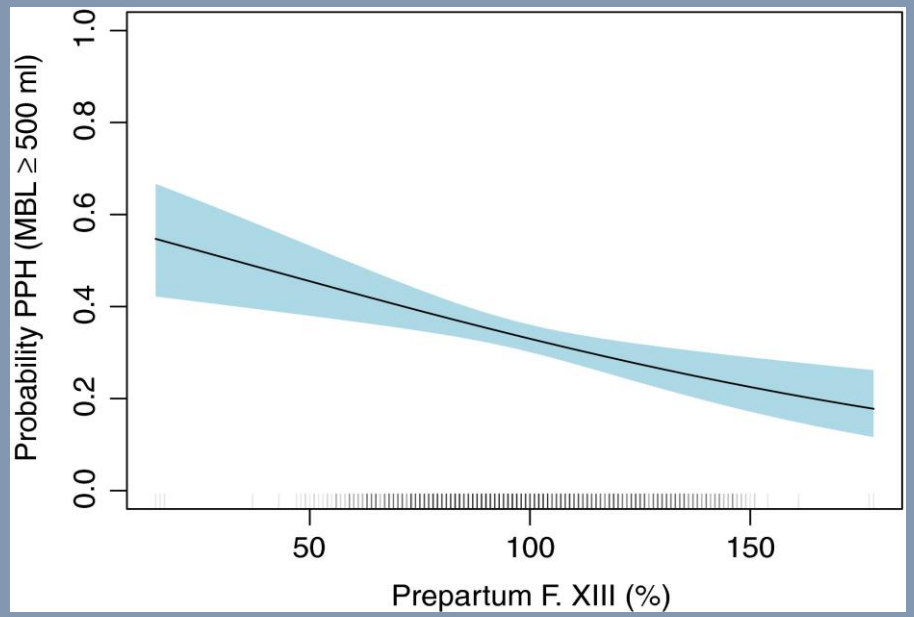
Schweizerische Gesellschaft für Gynäkologie und Geburtshilfe (SGGG)

Peripartale Blutungen, Diagnostik und Therapie

PPH and FXIII

- Prepartale FXIII had a sigfnificant effect on postpartal blood loss
- Question: Impact on negative outcome of fibrinogen driven therapy studies?
- Clinical SOP`s should be adopted to FXIII levels
- Postulation of a **Enzyme-before Substrat Strategy** (stabilization of the clot)

1300 woman
Prepartale detection of F13



Prevalenz of PPH in the context of prepartal F13 levels

- Haslinger C et al: The impact of prepartum factor XIII activity on postpartum blood loss Volume18, Issue6 June 2020 Pages 1310-1319

Time point of substitution?

SUBSTITUTION IF THERE IS A SUGGESTED OR PROVEN LACK OF FXIII IN AN ONGOING PPH

EARLY SUBSTITUTION (OVERSUBSTITUTION) WITH THE AIM TO OPTIMIZE THE ENZYMATIC REACTION OF CLOT FORMATION AND STABILIZATION

Pendulum Effect: rFVIIa (Novoseven)

About NovoSeven® in severe postpartum haemorrhage

NovoSeven® has been evaluated in severe PPH across a multicentre, open label clinical trial assessing 84 women with severe PPH in whom uterotonics (sulprostone) had failed. In the trial, patients were randomised either to treatment with a single dose of 60 µg/kg of NovoSeven® combined with standard of care (N=42) or to standard of care alone (N=42). Results indicated that fewer women in the NovoSeven® arm (21 vs 35) underwent an invasive procedure to stop the bleeding, corresponding to a 40% relative reduction in risk for the NovoSeven® arm compared to standard of care alone. In the trial, there were two non-deadly venous thromboembolic events in NovoSeven® treated patients. Both women recovered following anticoagulant treatment.[3]

- Failure of uterotonics
- Before Hysterectomy
- 60 µg/kg rFVIIa

- Fibrinogen
- Platelets
- Temperature
- pH

> 2g/l
> 50.000 nl
> 35°C
>7.2
Expert Opinion

- https://ml-eu.globenewswire.com/Resource/Download/552aad78-3aae-4cb4-8570-f8b3ac391058

Recombinant Factor VIIa

Severe PPH after vaginal birth or CS
Bloodloss >1500 ml/ 24h
Fail of Sulproston 1h after start of therapy
60 myg rFVIIa (Therapy group)

Hb >8 g/dl
Platelets>50x 10^9/l
Fibrinogen >1g/l
Free use of TXA
Kristalloid based volume regime
No fixed substitution scheme

Table 3 Efficacy outcomes

Outcomes	Standard arm ($N = 42$) n (%)	Intervention arm ($N = 42$) n (%)	Absolute difference [95% CI]	Relative risk [95% CI]	Mean NNT	P
Primary efficacy outcome	39 (93)	22 (52)	41% [18; 63]	0.56 [0.42; 0.76]	2.6	< 0.0001
Arterial embolization	24 (57)	12 (29)	28% [−4; 61]	0.5 [0.29; 0.86]	3.5	0.0082
Arterial ligation	12 (29)	9 (21)	8% [−30; 44]	0.75 [0.35; 1.59]	14	0.45
Peripartum hysterectomy	8 (19)	3 (7)	12% [−28; 52]	0.38 [0.11; 1.32]	8.4	0.11
Others*	6 (14)	4 (10)	4% [−36; 44]	0.67 [0.20; 2.19]	25	0.50
B-lynch sutures, Bakri Balloon and variants with hemostatic intention						

- Lavigne-Lissalde G et al: Recombinant human FVIIa for reducing the need for invasive second-line therapies in severe refractory postpartum hemorrhage: a multicenter, randomized, open controlled trial Volume 13, ISSUE 4, P520-529, April 2015

Be prepared

Dear Prof. Hofer,

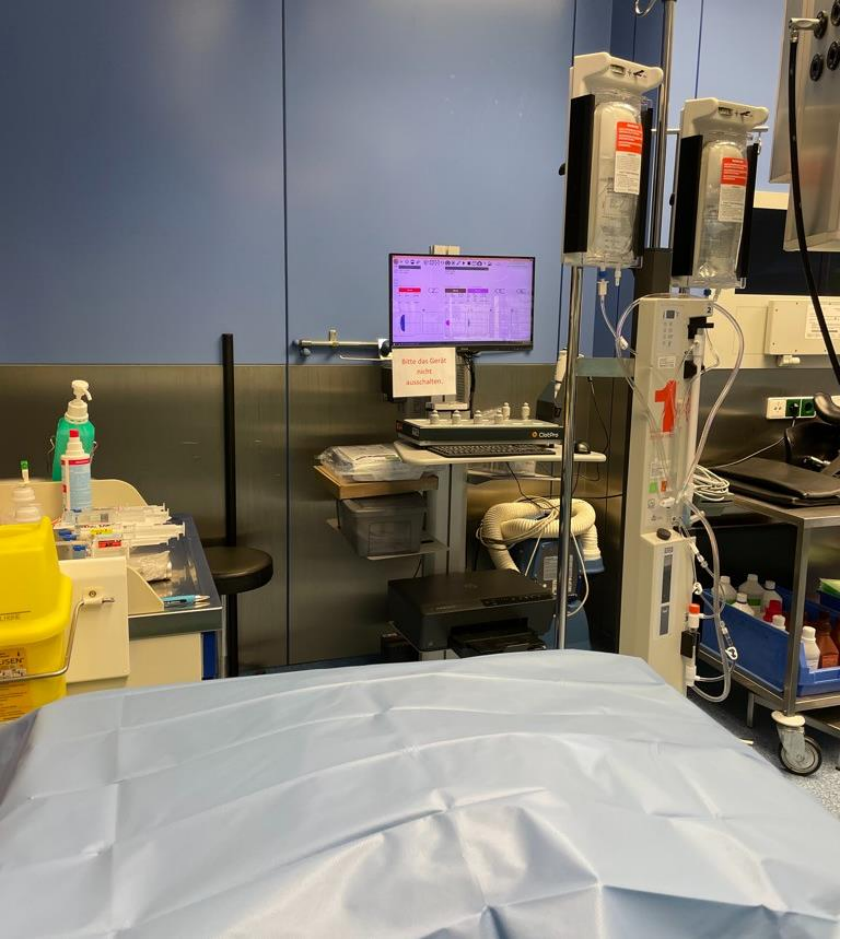
We are planning a CS on Monday at a 37th week pregnancy with a high risc of placenta increta

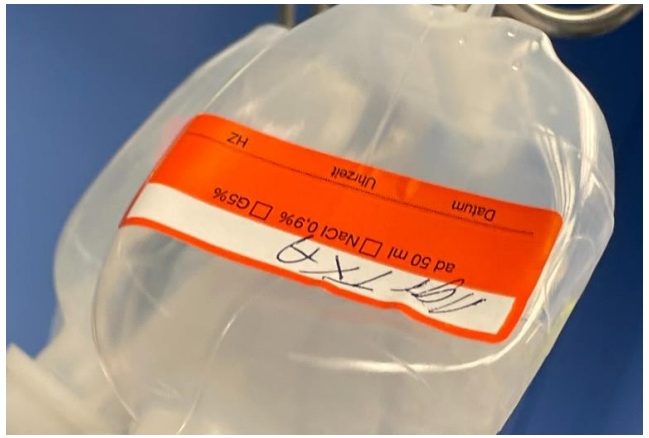
Ist a risc CS with a high probability of massive hemorrhage.

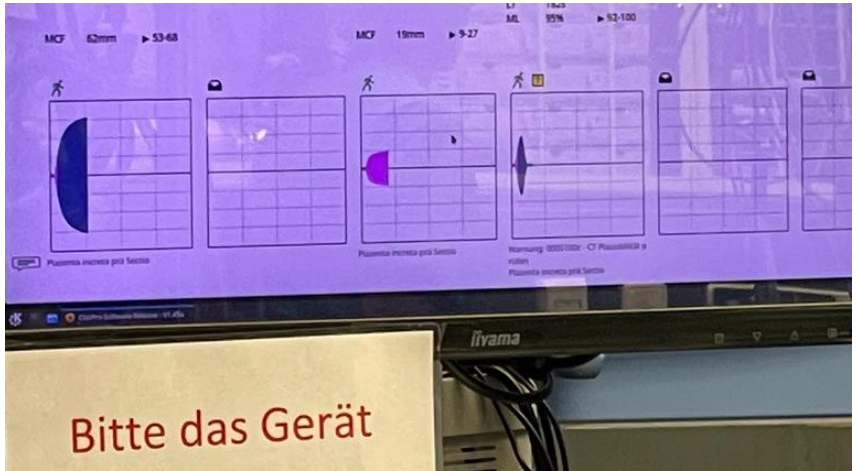
We are plannig a hysterectomy if needed.

Kind regards

H.

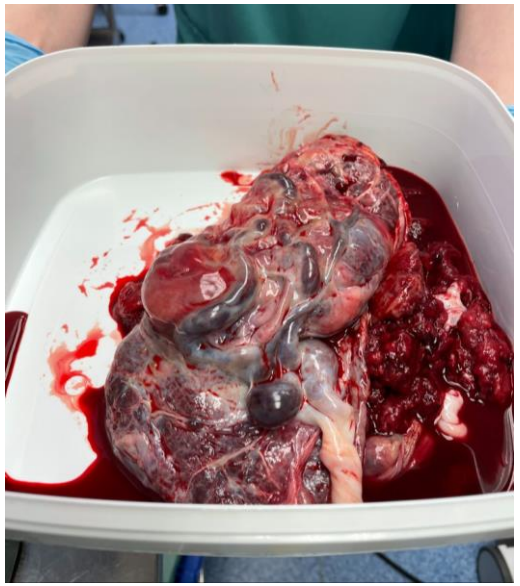






Management of expected PPH

- REBOA catheter placed in local anesthesia
- Clotpro; Cell Safer; Hemostyptica
- TXA prophylactic
- Prepared: Fibrinogen via iv pump; Nalador
- Blutbank in alert



Managementof expected PPH

- 4500 ml blood loss
- 1800 ml retransfusion via Cell Safer
- 8 gramm Fibrinogen
- 1 gr TXA
- Uterotonic therapy via Nalador

Some actual summaries…

ELSEVIER

Best Practice & Research Clinical Anaesthesiology

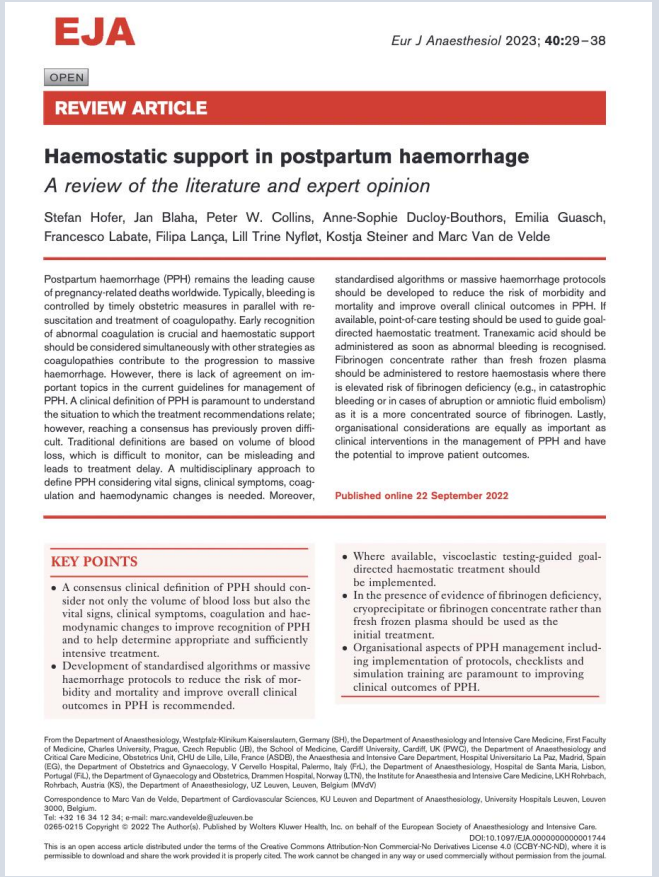
Volume 36, Issues 3–4, December 2022, Pages 323-324

Preface

Women at risk: An interdisciplinary perspective on optimizing postpartum hemorrhage systems

Stefan Hofer, Jeanette Bauchat

SOP
Simulation
Hemostatic Therapy
Surgical Approach
PBM
…



EJA

Eur J Anaesthesiol 2023; **40**:29–38

OPEN

REVIEW ARTICLE

Haemostatic support in postpartum haemorrhage

A review of the literature and expert opinion

Stefan Hofer, Jan Blaha, Peter W. Collins, Anne-Sophie Ducloy-Bouthors, Emilia Guasch, Francesco Labate, Filipa Lança, Lill Trine Nyfløt, Kostja Steiner and Marc Van de Velde

Postpartum haemorrhage (PPH) remains the leading cause of pregnancy-related deaths worldwide. Typically, bleeding is controlled by timely obstetric measures in parallel with resuscitation and treatment of coagulopathy. Early recognition of abnormal coagulation is crucial and haemostatic support should be considered simultaneously with other strategies as coagulopathies contribute to the progression to massive haemorrhage. However, there is lack of agreement on important topics in the current guidelines for management of PPH. A clinical definition of PPH is paramount to understand the situation to which the treatment recommendations relate; however, reaching a consensus has previously proven difficult. Traditional definitions are based on volume of blood loss, which is difficult to monitor, can be misleading and leads to treatment delay. A multidisciplinary approach to define PPH considering vital signs, clinical symptoms, coagulation and haemodynamic changes is needed. Moreover, standardised algorithms or massive haemorrhage protocols should be developed to reduce the risk of morbidity and mortality and improve overall clinical outcomes in PPH. If available, point-of-care testing should be used to guide goal-directed haemostatic treatment. Tranexamic acid should be administered as soon as abnormal bleeding is recognised. Fibrinogen concentrate rather than fresh frozen plasma should be administered to restore haemostasis where there is elevated risk of fibrinogen deficiency (e.g., in catastrophic bleeding or in cases of abruption or amniotic fluid embolism) as it is a more concentrated source of fibrinogen. Lastly, organisational considerations are equally as important as clinical interventions in the management of PPH and have the potential to improve patient outcomes.

Published online 22 September 2022

KEY POINTS

- A consensus clinical definition of PPH should consider not only the volume of blood loss but also the vital signs, clinical symptoms, coagulation and haemodynamic changes to improve recognition of PPH and to help determine appropriate and sufficiently intensive treatment.
- Development of standardised algorithms or massive haemorrhage protocols to reduce the risk of morbidity and mortality and improve overall clinical outcomes in PPH is recommended.
- Where available, viscoelastic testing-guided goal-directed haemostatic treatment should be implemented.
- In the presence of evidence of fibrinogen deficiency, cryoprecipitate or fibrinogen concentrate rather than fresh frozen plasma should be used as the initial treatment.
- Organisational aspects of PPH management including implementation of protocols, checklists and simulation training are paramount to improving clinical outcomes of PPH.

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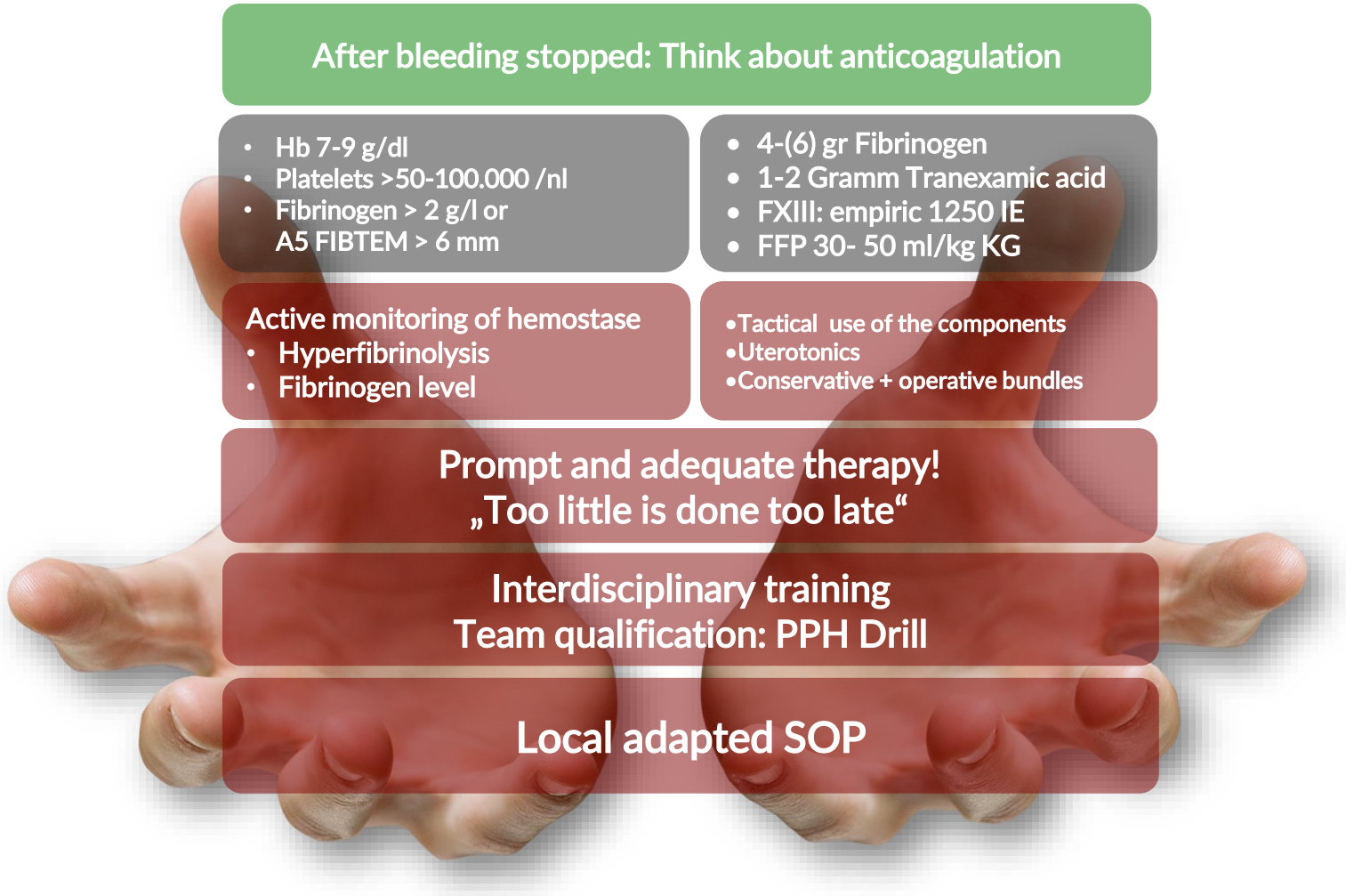
Hofer S, Blaha J, Collins PW, Ducloy-Bouthors AS, Guasch E, Labate F, Lança F, Nyfløt LT, Steiner K, Van de Velde M. Haemostatic support in postpartum haemorrhage: A review of the literature and expert opinion. Eur J Anaesthesiol. 2023 Jan 1;40(1):29-38.

Short summary



Thank You!

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