

Postpartum Hemorrhage  
Community of Practice  
Special Topic Deeper Dive Series  
**PPH at Caesarean Section:  
Prevention and Management**

PPH Community of Practice Special Topic Deeper Dive  
August 27, 2020

# Agenda

- Postpartum hemorrhage at caesarean section
- Tanzania country experience/lessons learned
- Q&A
- Open discussion/shared learning

# Logistics

- Please **mute** and keep **video off when not talking**
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- **Raise your hand** when you want to **ask a question or to share your experiences/lessons learned**
- **Unmute** and turn **video on when speaking** (and mute when finished)
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Raise Hand

# Postpartum Hemorrhage at Caesarean Section: Prevention and Management

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PPH Community of Practice Special Topic Deeper Dive  
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# Outline

- Epidemiology
- Detection and diagnosis
- Management
  - Prevention at Caesarean Section (CS)
  - Treatment during and after CS
- Tanzania country experience/lessons learned
- Discussion: sharing experiences and lessons learned

# Epidemiology

- Definition at CS:  $\geq$  500 mL, 750 mL, **1000 mL**
- Severe PPH:  $\geq$  1500 mL; Massive PPH:  $\geq$  2500 mL
- $\geq$  1000 mL
  - Elective CS: 5% (approximately 3x higher than at vaginal birth)
  - Emergency CS: 7%
- $\geq$  1500 mL
  - Emergency CS: 3%

## Source:

1. Carroli G, Cuesta C, Abalos E, Gulmezoglu AM. Epidemiology of postpartum haemorrhage: a systematic review. *Best Pract Res Clin Obstet Gynaecol.* 2008;22(6):999–1012
2. Al-Zirqi I, Vangen S, Forsén L, Stray-Pedersen B. Effects of onset of labor and mode of delivery on severe postpartum hemorrhage. *Am J Obstet Gynecol.* 2009;201(3):273.e1-273.e2739. doi:10.1016/j.ajog.2009.06.007
3. Sobhy S, et al. Maternal and perinatal mortality and complications associated with caesarean section in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet.* 2019;393(10184):1973-1982. doi:10.1016/S0140-6736(18)32386-9

# Epidemiology: Average blood loss

All CS	38 studies (n=5512)	607mls
Elective CS	17 studies (n=2044)	606mls
Emergency CS	6 studies (n=1073)	700mls

# Epidemiology: CS Mortality

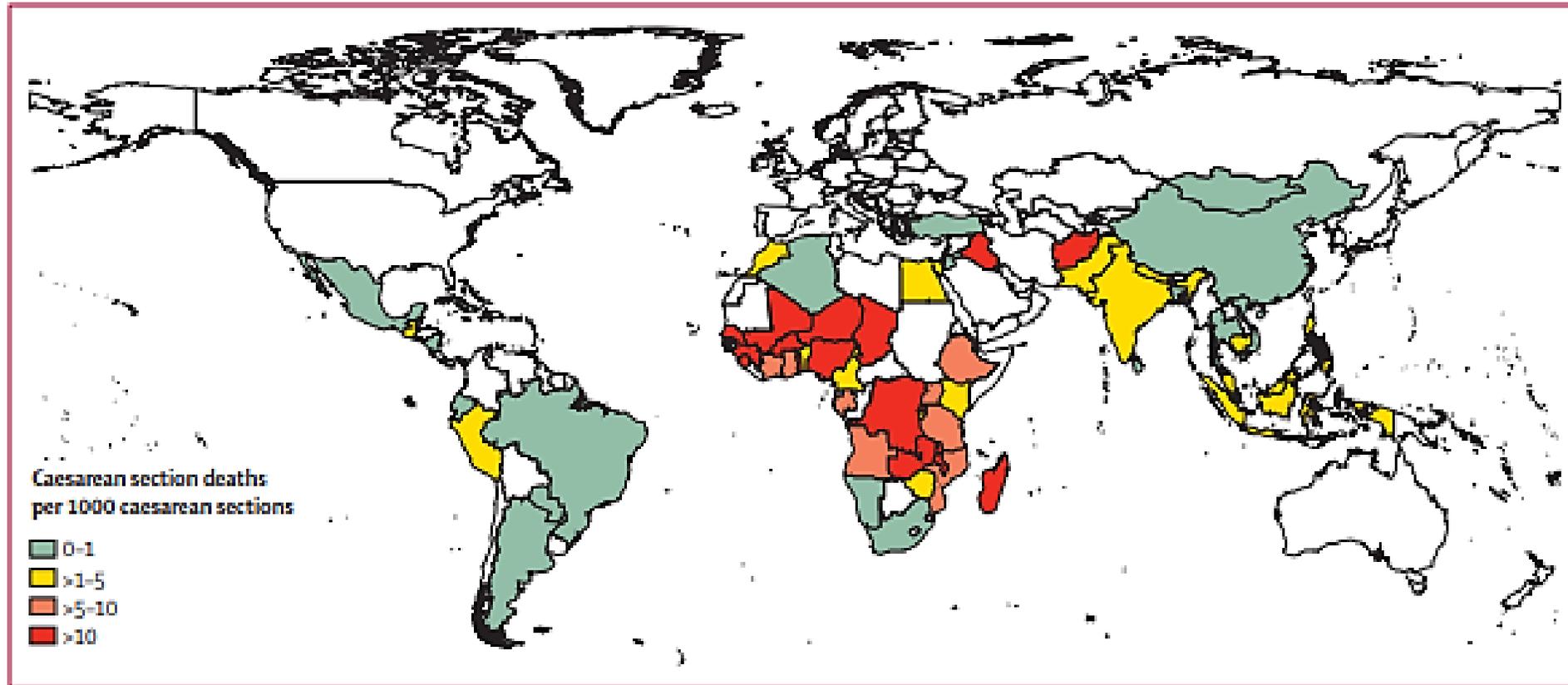


Figure 3: World map of maternal death risk following caesarean section in women from low-income and middle-income countries

## Source:

3. Sobhy S, et al. Maternal and perinatal mortality and complications associated with caesarean section in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet*. 2019;393(10184):1973-1982. doi:10.1016/S0140-6736(18)32386-9

# Epidemiology: CS Mortality

- Maternal death after cesarean delivery is 50 -100x more in LMICs than in high-income countries<sup>3,4</sup>
- **25%** of all women who died in LMICs had undergone a CS
- **32%** of all maternal deaths following CS was attributed to **PPH**; 19% to pre-eclampsia/eclampsia and **22% to infection/sepsis**



## Source:

3. Sobhy S, Arroyo-Manzano D, et al. Maternal and perinatal mortality and complications associated with caesarean section in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet*. 2019

4. Bishop D, Dyer RA, Maswime S, et al. Maternal and neonatal outcomes after cesarean delivery in the African Surgical Outcomes Study: a 7-day prospective observational cohort study. *The Lancet*. 2019; 7: 513-522. doi: [10.1016/S2214-109X\(19\)30036-1](https://doi.org/10.1016/S2214-109X(19)30036-1)

# Common Causes of Severe PPH at CS

- **Tone - Atony** (due to, e.g., prolonged/obstructed labor, overdistended uterus, chorioamnionitis, placental abruption)
- **Tissue - Abnormal placentation** (e.g., placenta previa, placental abruption, placenta accreta/increta/percreta)
- **Trauma** (e.g., lacerations/tears, uterine rupture); impacted head
- **Thrombin - Abnormal coagulation** (e.g., severe preeclampsia/eclampsia, placental abruption, hypofibrinogenemia, DIC)



# Challenges with detection of hemorrhage at CS

- **Intra-op vs Post-op**
- **Measures and outcomes for detection vary** and may include: estimated or measured volume of blood loss, physiological changes and the need for intervention.<sup>5</sup>
- **Visual method** of estimating blood loss is **imprecise** and hindered by **subjectivity** and **does not** always **match** the **clinical status** of patients.<sup>6</sup>
- **Objective methods** such as measured blood loss by the use of graduated collecting drapes and weighing of swabs are increasingly being used.<sup>7</sup> Evidence on their use is evolving.

## Source:

5. Natrella M, Di Naro E, Loverro M, Benshalom-Tirosh N, Trojano G, Tirosh D, et al. The more you lose the more you miss: accuracy of postpartum blood loss visual estimation. A systematic review of the literature. J Matern Fetal Neonatal Med [Internet]. 2017/01/12. 2018 Jan;31(1):106–15. Available from:

<https://pubmed.ncbi.nlm.nih.gov/28002983>

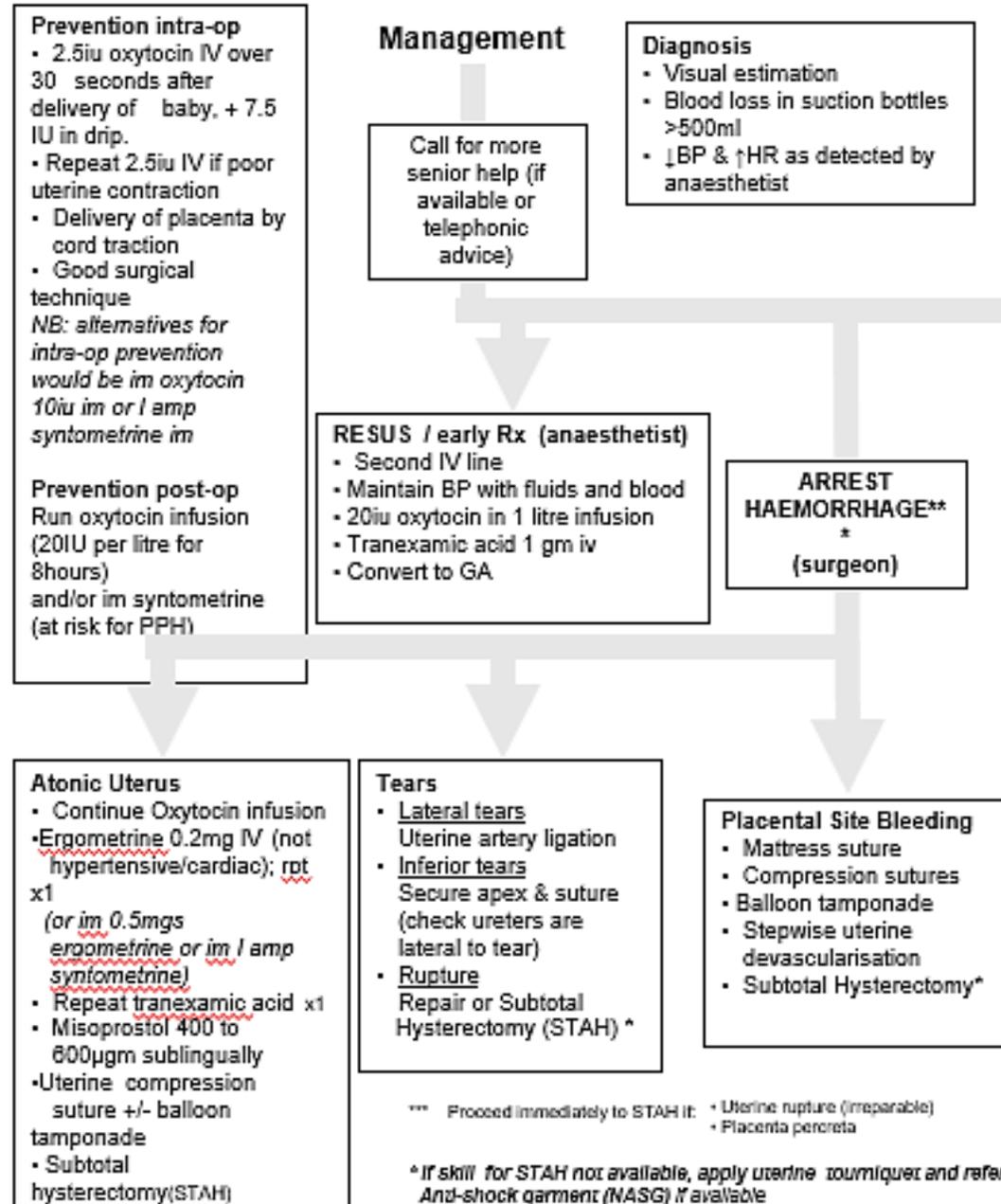
6. ACOG. Quantitative Blood Loss in Obstetric Hemorrhage. Obstet Gynecol. 2019;134(6):1368–9.

7. Diaz V, Abalos E, Carroli G. Methods for blood loss estimation after vaginal birth. Cochrane Database Syst Rev. 2018;2018(9).

# Developing algorithms for managing haemorrhage at CS

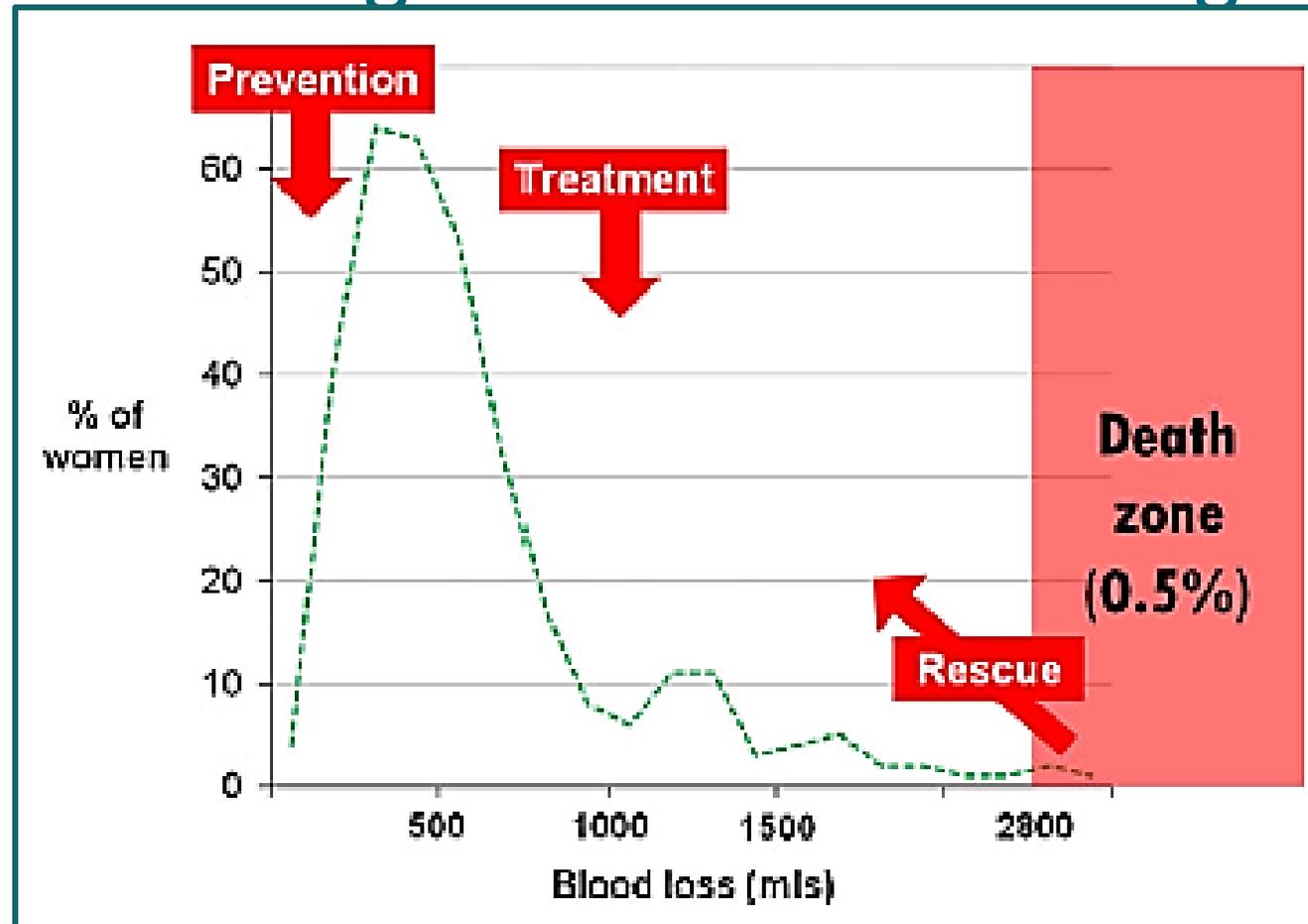
- Building the evidence
- Bringing all the pieces together
- Currently better evidence for preventing and managing PPH at vaginal birth than at CS

## Bleeding At Caesarean Section



S. Fawcus, 2013 & 2018  
And LSTM

# Importance of Anticipation, Early Recognition and Active Management of Haemorrhage



Source: Weeks A. BJOG 2015;122:202–210.

# Prevention of haemorrhage/PPH at CS

- **Incision:** Joel-Cohen (Misgav Ladich) incision in preference to midline incision or Pfannenstiel<sup>8,9</sup>
  - Shorter operating time, less use of suture, less blood loss, less post-operative pain, less wound complications
- **Delivery of deeply impacted head**, e.g. reverse breech extraction in preference to vaginal elevation of fetal head<sup>10</sup>
- **Placenta delivery:** Controlled cord traction or spontaneous delivery in preference to manual removal of placenta
  - decreased incidence of endometritis, decreased blood loss<sup>10</sup>

**Source:**

8. Dahlke JD, et al. Evidence-based surgery for cesarean delivery: an updated systematic review. *Am J Obstet Gynecol* 2013 Oct;209(4):294-306

9. Caughey AB, Wood SL, Macones A, Wrench IJ, et al. Guidelines for Antenatal and Preoperative care in Cesarean Delivery: Enhanced Recovery After Surgery Society Recommendations (Part 2) *Am J Obstet Gynecol* 2018; 219(6):533-544.

10. Jeve YB, Navti OB, Konje JC. Comparison of techniques used to deliver a deeply impacted fetal head at full dilation: a systematic review and meta-analysis. *BJOG*. 2016; 123:337-345

11. Cochrane 2008: Methods of delivering the placenta at caesarean section

# Prevention of PPH at CS

**Uterotonics** for prevention of PPH at CS:<sup>12,13</sup>

- **Oxytocin**
- **Ergometrine + Oxytocin**
- Consideration for **Carbetocin**, especially where quality of oxytocin is a concern
  - some evidence it is more effective than oxytocin

In some contexts using: Oxytocin + Misoprostol (600 mcg SL or oral)

Is there a role for **prophylactic TXA**? For all CS or for those at high risk?

- Blood loss, massive hemorrhage, transfusion requirements, and need for additional uterotonics all markedly reduced<sup>14</sup>

**Source:**

12. Gallos ID, Papadopoulou A, Man R, et al. Uterotonic agents for preventing postpartum haemorrhage: a network meta-analysis. *Cochrane Database Syst Rev*. 2018;12(12):CD011689. Published 2018 Dec 19. doi:10.1002/14651858.CD011689.pub3

13. Gallos I, Williams H, Price M, et al. Uterotonic drugs to prevent postpartum haemorrhage: a network meta-analysis. *Health Technol Assess*. 2019;23(9):1-356. doi:10.3310/hta23090

14. Wang Y, Liu S, He L. Prophylactic use of tranexamic acid reduces blood loss and transfusion requirements in patients undergoing cesarean section: A meta-analysis. *J Obstet Gynaecol Res*. 2019;45(8):1562-1575. doi:10.1111/jog.14013

# Surgical Management of PPH at CS

- When medical management of uterine atony fails
- When other causes are present (e.g., trauma - ruptured uterus/tears; abnormal placentation)

Note: Evidence for medical management of PPH at CS tends to be of higher quality than that for surgical management

# PPH at CS due to Uterine Atony

## Assess and Resuscitate

- Monitor vital signs
- Measure blood loss
- IV fluids (3:1 ratio)
- Blood transfusion as needed

## Medical Treatment

- Uterotonics
- TXA – 1 gm IV
- Uterine massage

## Surgical Management

- Uterine compression sutures (e.g., B-Lynch)
- Uterine devascularization
  - Utero-ovarian artery
  - Uterine artery (O'Leary stitch)
  - Hypogastric artery
- Hysterectomy (Subtotal)

### Uterotonics:

Continue **Oxytocin**: 40 IU/L over 8 hrs

**Methergine**: 0.2 mg IM every 2-4 hrs (or oxytocin-ergometrine)

**Misoprostol**: 800 mcg (range 600 - 1000 mcg) **SL, oral, PR**

# Keys to Successful Surgical Management of PPH at CS

- Teamwork and communication
- Anticipation and planning
- Use of CS adapted WHO Surgical Safety Checklist
- Early identification and management according to cause
- Situation awareness in the OT (teamwork and communication)
  - These non-technical skills have been shown to be essential for improved team performance and improved outcomes<sup>15,16</sup>
- Early decision to use compression sutures (e.g. B-Lynch) for uterine atony PPH
- Post-op care and monitoring – preventing the ‘failure to rescue’<sup>17</sup>, as well as use of modified early warning systems (MEWS).

## Source:

15. Stone JL et al. 2017. Effective Leadership of Surgical Teams: A Mixed Methods Study of Surgeon Behaviors and Functions. *Ann Thorac Surg.* 104(2):530–537.

16. Brogaard L, Kierkegaard O, Hvidman L, Jensen KR, Musaeus P, Uldbjerg N, Manser T. The importance of non-technical performance for teams managing postpartum haemorrhage: video review of 99 obstetric teams. *BJOG* 2019;126:1015–1023.

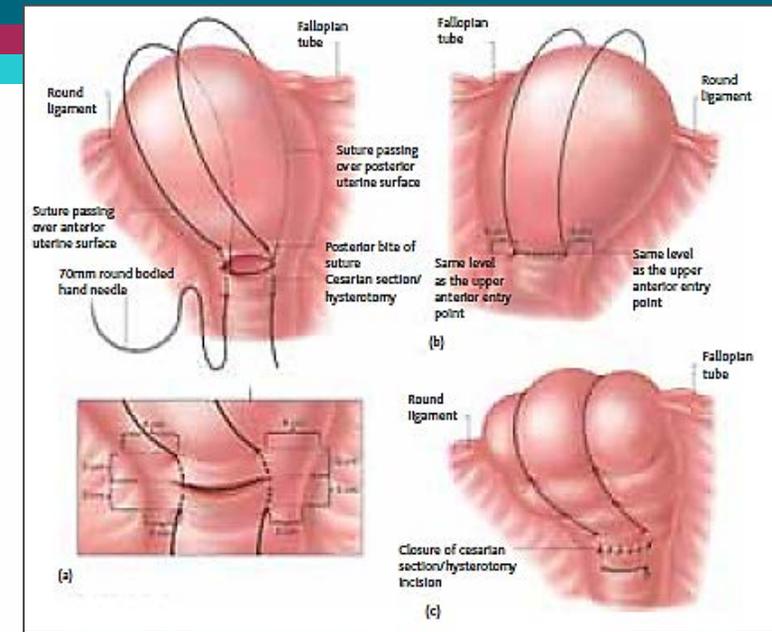
17. Biccari BM, Madiba TE, Kluyts HL, Munlemvo DM, *et al*, Perioperative patient outcomes in the African Surgical Outcomes Study: a 7-day prospective observational cohort study. *Lancet* 2018; 21;391(10130):1589-1598. doi: 10.1016/S0140-6736(18)30001-1

# Why B-Lynch Suture?

- Fast to perform: < 2 minutes
- Easy to learn – easy to practice on simulator
- Does not require special equipment or supplies
- Effectiveness: generally **75 – 90%**<sup>18,19</sup>
- Most studied method ( compare to Cho, Hayman, other modifications)
- No apparent impact on infertility

## Considerations:

- Do *not* use permanent suture – risk of bowel herniation/strangulation
- Some concerns regarding risk of uterine necrosis if combined with devascularization sutures



## Source:

18. Kaya B, Tuten A, Daglar K, et al. B-Lynch uterine compression sutures in the conservative surgical management of uterine atony. *Arch Gynecol Obstet.* 2015;291(5):1005-1014. doi:10.1007/s00404-014-3511-2
19. El-Sokkary M, Wahba K, El-Shahawy Y. Uterine salvage management for atonic postpartum hemorrhage using "modified lynch suture". *BMC Pregnancy Childbirth.* 2016;16(1):251. Published 2016 Aug 27. doi:10.1186/s12884-016-1000-2

# Key points

- CS is a significant risk for hemorrhage and maternal mortality
- It is essential that PPH programs include surgical management of PPH and managing hemorrhage at CS
- Evidence is building for the most appropriate CS PPH bundles and algorithms, but more research is needed
  - current research efforts on risk stratification, package of evidence-based interventions, targeted post-op monitoring, and making difficult deliveries safer (e.g., ASOS-2, ASOS-3, C-SAFE).
- Successful implementation requires non-technical competencies
- B-Lynch uterine compression suture is an attractive surgical method to include in any program that provides CS services, especially where non-specialists work

# Tanzania Country Experience with PPH at CS

Leopold Tibyehabwa, MD, MMed – OBGYN

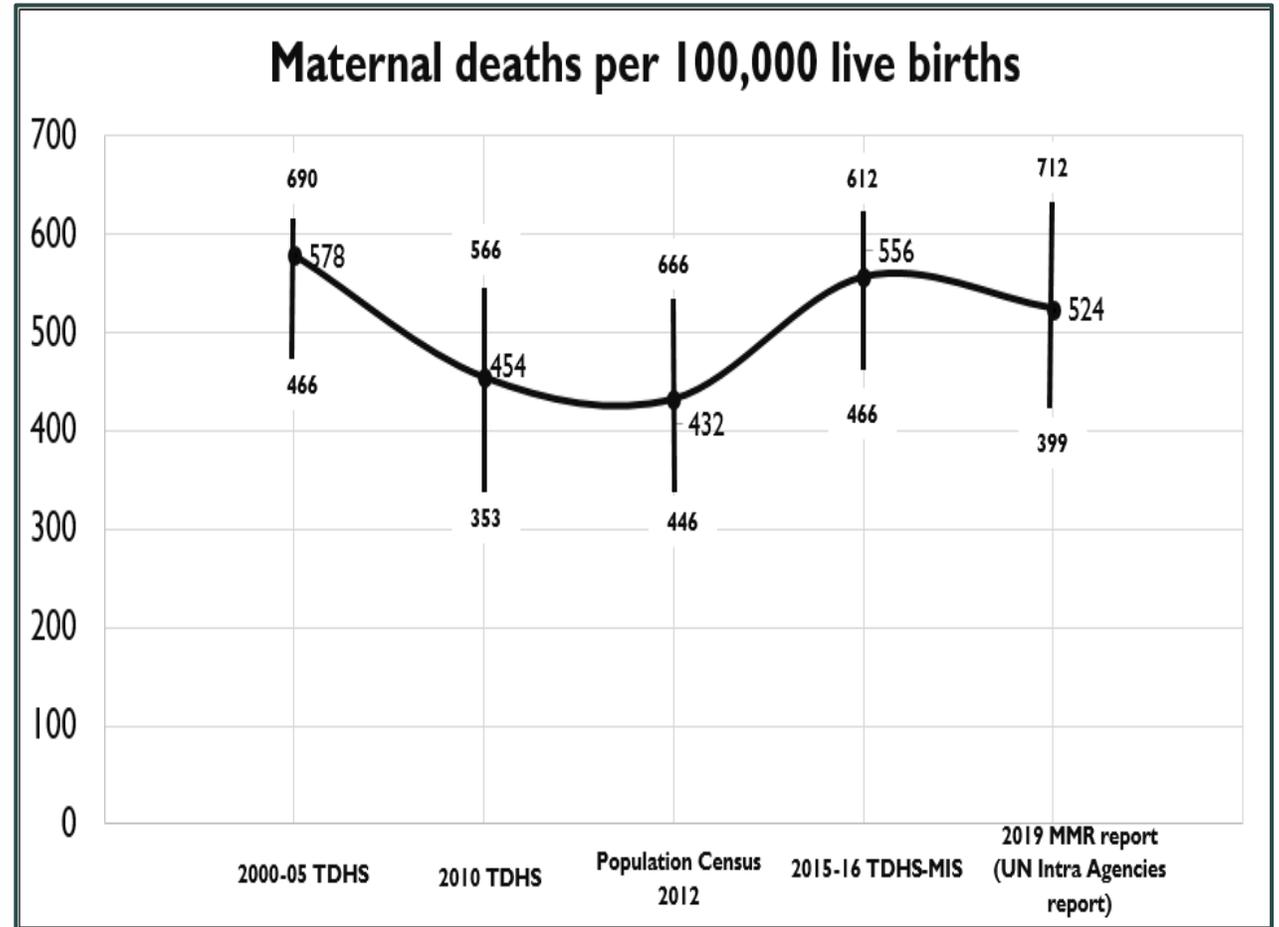
Augustino Hellar, MD, MMed - Surgery, MBA

Joseph Massenga, MD, MPH

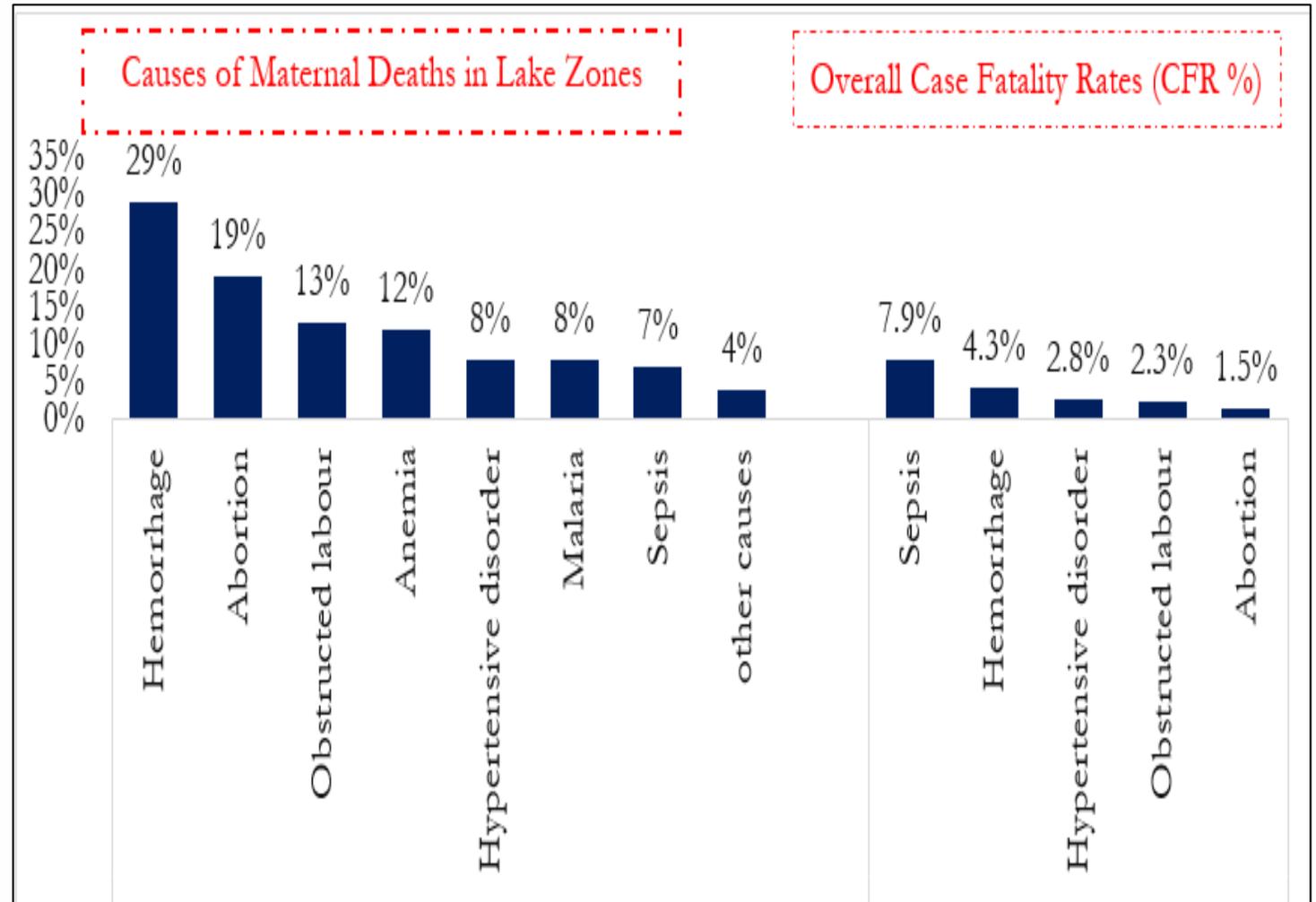
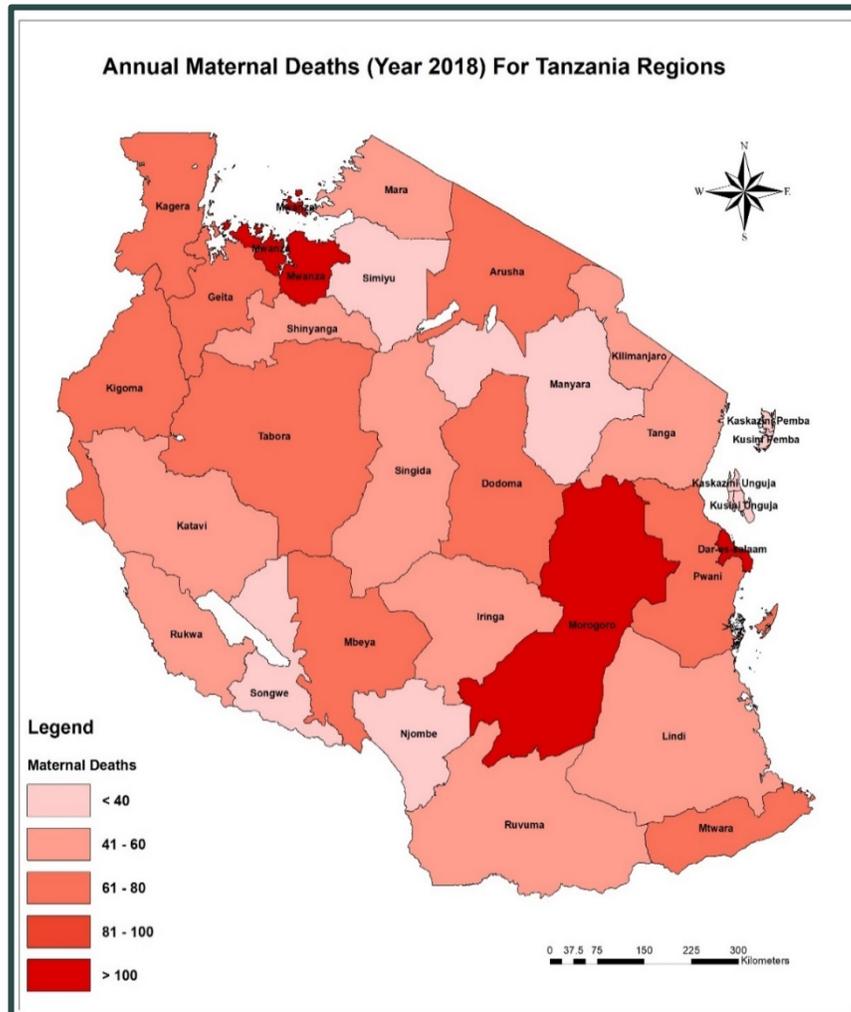
# Background

- Tanzania MMR
  - Is high and stagnant
  - At 524 with annual rate reduction (ARR) 2.9% (WHO, UNICEF 2019)
- PPH is the leading cause of maternal deaths at 29%
- Proportion of facility births received uterotonics 89.6% (DHIS2 2015)
- PPH incidence 0.8%(DHIS2 2015)
- The national RMNCAH strategic plan indicates improving Quality of Care (QoC) for obstetric emergencies

## Trends in maternal mortality ratios in Tanzania



# Background cont...

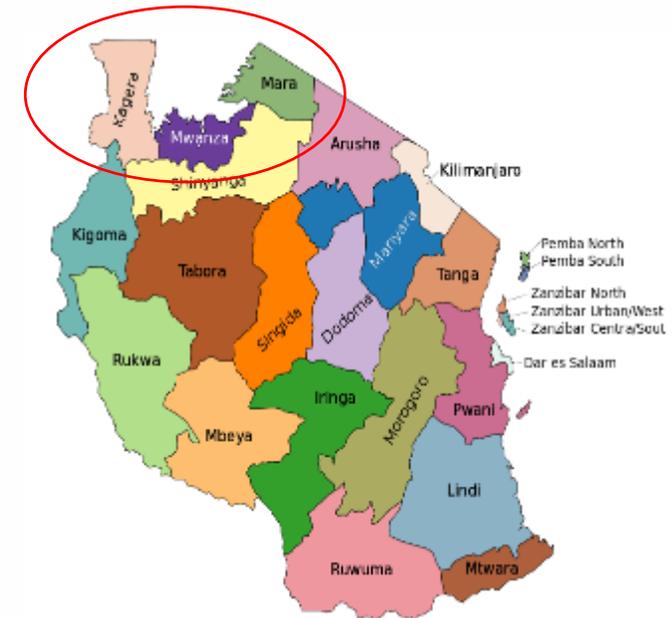


# Improving Access to Safe CS Services in Mara and Kagera

- 2016: National strategy - upgrade public Health Centres to provide CEmONC services by non-specialists
- USAID Boresha Afya: expand CEmONC services in Kagera and Mara starting 2016.
- Safe Surgery program: 40 sites in Mara and Kagera
  - non-specialist surgical and anesthesia providers

## Challenges

- Workforce density issues Non-standardized skills, e.g., surgical technique, IP bundles, management of PPH at CS
- Team cohesion/teamwork and communication
- Uterotonic quality/availability; TXA availability and use



# Safe Surgery/Safer Cesarean Birth Program

- Project dates: Feb 2018 – Current
- Focus on **Team Performance**
- **Build non-technical skills**, such as teamwork and communication
- Evidence-based **surgical skills updates**
  - Joel-Cohen incision
  - Spontaneous/controlled cord traction placenta delivery
- Implement **WHO Surgical Safety Checklist**
- Incorporate an **infection prevention bundle** (prophylactic antibiotics, vaginal cleansing, abdominal surgical prep)
- Integrate **medical and surgical management of PPH**, e.g. **B-Lynch suture**

SURGICAL SAFETY CHECKLIST		
Registration Number: _____	Date of Surgery: _____	
Patient Name: _____		
Before Anesthesia Procedure	Before Skin Incision/Procedure	Before Patient Leaves Room
<b>SIGN IN</b> (to be read out loud)	<b>TIME OUT</b> (to be read out loud)	<b>SIGN OUT</b> (to be read out loud)
<b>VERIFY:</b> <input type="checkbox"/> All operating team members have been mobilized <input type="checkbox"/> For C-S, includes newborn provider <input type="checkbox"/> Level of urgency for surgery <input type="checkbox"/> Patient has confirmed her identity, procedure(s), and consent  <input type="checkbox"/> Anesthesia machine and medication check complete <input type="checkbox"/> Pulse oximeter on the patient and functioning  Patient has known allergy <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> Antibiotic prophylaxis given 15-60 minutes before expected skin incision <input type="checkbox"/> Antacid prophylaxis has been given <input type="checkbox"/> N/A  Patient has a difficult airway or aspiration risk <input type="checkbox"/> No <input type="checkbox"/> Yes, and equipment/assistance available  Risk of >500 mL blood loss (7 mL/kg in children) <input type="checkbox"/> No <input type="checkbox"/> Yes, and adequate IV access and fluids planned <input type="checkbox"/> Blood is available <input type="checkbox"/> N/A  <input type="checkbox"/> Haemoglobin results <input type="checkbox"/> Other critical lab results <input type="checkbox"/> N/A <input type="checkbox"/> Blood group/Rh <input type="checkbox"/> N/A  <input type="checkbox"/> For C-S, newborn resuscitation equipment and assistance available	<b>SURGICAL TEAM VERIFIES:</b> <input type="checkbox"/> All team members state their name and role <input type="checkbox"/> Correct patient, correct site and correct procedure. <input type="checkbox"/> Written consent on the chart  <b>NURSING VERIFIES:</b> <input type="checkbox"/> Sterility of equipment and instruments <input type="checkbox"/> Skin prep with Chlorhexidine-alcohol or iodine-based solution For C-S <input type="checkbox"/> Vaginal prep with povidone-iodine (if ruptured membranes and/or in labor)  <b>SURGEON VERIFIES:</b> <input type="checkbox"/> Anticipated critical or unexpected steps <input type="checkbox"/> Anticipated procedure level of difficulty and duration <input type="checkbox"/> Anticipated blood loss <input type="checkbox"/> Any patient-specific concerns <input type="checkbox"/> Essential imaging is displayed <input type="checkbox"/> N/A  <b>ANESTHETIST VERIFIES:</b> <input type="checkbox"/> Any patient-specific concerns <input type="checkbox"/> ASA score  For C-S <b>NEWBORN PROVIDER VERIFIES:</b> <input type="checkbox"/> Any newborn-specific concerns	<b>SURGICAL TEAM MEMBERS VERIFY:</b> <input type="checkbox"/> Name of procedure(s) <input type="checkbox"/> Instrument, sponge, and needle counts are correct <input type="checkbox"/> All specimens are labeled and forms completed per protocol <input type="checkbox"/> Equipment/Instrument problems to be addressed <input type="checkbox"/> Where patient will be immediately recovered followed by ward for post-op care  <b>SURGEON, ANESTHESIA, AND NURSE REVIEW:</b> <input type="checkbox"/> Any key concerns for recovery and management of patient. <input type="checkbox"/> For C-S, reviewing team includes newborn provider
Based on the WHO Surgical Safety Checklist		



# Integrating B-Lynch Suture

- Both medical and surgical management of PPH are part of Safer Caesarean Births (SCB) training in the Safe Surgery program
- B-Lynch uterine compression suture-simulation done in class sessions and coaching on clinical cases during practicum sessions and going mentorship at health facilities
- Easy to learn and do even by non-specialist doctors.
- Can use improvised simulators
- Ongoing mentorship support provided



# Findings

- Teamwork and communication improved
- Anticipation/discussion of potential complications improved
- Surgical Safety Checklist adherence rates improved from near 0% to >90%
- Perioperative Mortality Rate (POMR) decreased from 0.42% to 0.21% (50% decrease)

*“The Surgical Safety Checklist is changing practice and culture in surgery.”*

*“The patient doesn’t belong to one person.”*

## Teamwork and Communication Indicators

- **Improved between 39% and 59%** from baseline  
e.g. Risk of blood loss/anticipated difficulties discussed – increased 56%



## Findings: B-Lynch procedures

- Since training-practitioners have reported reduced incidences of subtotal hysterectomies for PPH unresponsive to medical management following SVD or CS
- Total of **57 B-Lynch procedures** were performed in 2 regions under safe surgery program
  - **Kagera region -33**
  - **Mara region -24**
- Done at both Health Centres and Hospitals – vast majority done by non-specialist Doctors.
- **53/57 (93%) success rate**
- No complications



# Tanzania key lessons

## Successes

- Non-technical skills, e.g., teamwork and communication, are essential for team building and improving team performance
- The Surgical Safety Checklist is an important patient safety tool to improve surgical outcomes, and can be successfully implemented in different contexts in Tanzania, and can help build a culture of patient safety
- The B-Lynch suture is an easy and effective procedure to integrate into a Safe CS program
- Demonstrated improvement in maternal/surgical outcomes

# Tanzania key lessons

## Challenges

- HMIS lack data element for PPH at cesarean section, creating challenges in tracking PPH outcomes
- Inadequate dissemination of guidelines on TXA
- Shortage of TXA particularly at lower level facilities, i.e., District Hospitals and Health Centres
- Lack of competency on surgical management of PPH among health care providers especially B-Lynch uterine suture

# Tanzania key lessons

## Recommendations

- Improve availability and use of TXA to improve the quality of care in prevention, detection and management of PPH
- Introduce PPH data capture into HMIS-(For both vaginal birth and CS)
- Strengthen provider skills on surgical management of PPH
- Strengthen practical skills on surgical management of PPH during preservice training
- Improvement in maternal/surgical outcomes requires a multicomponent intervention, and programs should be designed and implemented that way

# Experience from a Tertiary-level Hospital in Tanzania

Dr. Albert Kihunrwa

Obstetrician/Gynaecologist

Head of Department, Bugando Medical Center, Mwanza

Lecturer, Catholic University of Health and Allied Sciences, Mwanza

Thank You/Asante Sana!

Questions?

# Open Discussion

## Sharing of experiences and lessons learned

### Questions for consideration

- Do guidelines or protocols exist for PPH at CS? If YES, are they followed?
- What uterotonics or combination of uterotonics is used for prevention of PPH at CS and treatment of PPH at CS
- Is TXA readily available in facilities that provide CS? If YES, is it used according to guidelines/protocols?

### Also share experiences and lessons learned (challenges and successes) around:

- Prevention of PPH at CS
- Early identification and medical management of PPH at CS
- Surgical management of PPH at CS
- Tracking and use of data for PPH at CS