National Guideline for the Management

of

Postpartum Haemorrhage

Federal Ministry of Health and Social Welfare

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Foreword

Maternal mortality is a public health problem in the Low- and Middle-Income Countries (LMIC) such as Nigeria and it is one of the strongest indicators of a country's standard of living and maternity care. Every year, an estimated 14 million cases of PPH and 70,000 related maternal deaths are recorded globally. This implies that one woman dies of PPH every four minutes.

Postpartum haemorrhage accounts for 13.4 % of maternal deaths in high-income countries. In Asia and Africa however, it is responsible for 30.8 % and 33.9 % of maternal deaths, respectively. In Nigeria, PPH accounts for one-third of all hospital admissions due to complications of obstetric haemorrhage, and 42% of maternal deaths arise from these complications.

Maternal deaths death can be prevented through the implementation of evidence-based strategies as articulated in the National Safe Motherhood Strategy towards attainment of SDG target 3 on Maternal and Newborn Health (MNH). To operationalize the strategy, there is need to develop appropriate guidelines to address the major causes of maternal mortality and morbidity. This national guideline is developed to provide guidance for the management of Postpartum Haemorrhage at the National and sub-national levels of health care.

I therefore recommend this policy document for policy makers, health care providers, health professionals, professional associations, regulatory bodies, private sector, Non-Governmental Organizations, civil society groups, implementing partners, donor partners and other stakeholders in the Reproductive Health space at all levels of care in the country.

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Coordinating Minister of Health and Social Welfare.

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Acknowledgment

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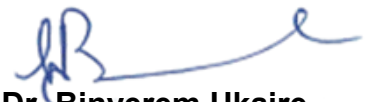
My special thanks to the Coordinating Minister of Health & Social Welfare for his visionary leadership, dedication and commitment to advancing maternal health in Nigeria.

I also wish to acknowledge the valuable inputs and expertise of the Safe Motherhood Sub-committee, Society for Obstetrics & Gynaecology (SOGON), Nigeria Society of Neonatal Medicine (NiSONM), Nursing and Midwifery Council of Nigeria (NMCN), public health experts, healthcare providers, maternal health advocates, development partners, and other key stakeholders whose knowledge and experience have shaped the guidelines. Your contributions have helped to ensure that these guidelines are relevant, evidence-based, and tailored to the specific needs of Nigerians.

The department of Family Health appreciates the immense contributions of all our partners in the maternal health space particularly Clinton Health Access Initiative, BMGF-TA Connect and WHO for their funding support that made development of this guideline a reality. Our appreciation also goes to National Primary Health Care Development Agency (NPHCDA) for their participation in the development of this document.

Finally, I commend the safe motherhood branch, Reproductive Health division and the entire Family Health department who contributed in one way or the other to make this task feasible.

This document serves as a crucial tool in our collective effort to prevent and manage postpartum hemorrhage, and we look forward to its implementation, which will ultimately contribute to reduction of maternal mortality in Nigeria.



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Acronyms

ACOG	American College of Obstetricians and Gynecologists
aOR	Adjusted Odd Ratio
AMTSL	Active Management of Third Stage of Labour
APH	Antepartum Haemorrhage
APTT	Activated Partial Thromboplastin Time
CCT	Control Cord Traction
DIC	Disseminated Intravascular Coagulopathy
E-MOTIVE	Early detection, Uterine Massage, Oxytocics, Tranexamic acid, Intravenous fluids, Examination and Escalation
EBL	Estimated Blood Loss
FIGO	International Federation of Gynaecology and Obstetrics
HELLP	Haemolysis, Elevated Liver Enzymes, Low Platelets
ICM	International Confederation of Midwives
LMICs	Low- and Middle-Income Countries
MDGs	Millennium Development Goals
MMEIG	Maternal Mortality Estimation Inter-Agency Group
MMR	Maternal Mortality Ratio
NDHS	Nigeria Demographic and Health Survey
ICPD	International Conference on Population and Development
INR	International Normalized Ratio
NASG	Non-Pneumatic Antishock Garment
OR	Odds Ratio

PAS	Placenta Accreta Spectrum
PPH	Postpartum Haemorrhage
PT	Prothrombin Time
PTTK	Partial Thromboplastin Time with Kaolin
RCOG	Royal College of Obstetricians and Gynaecologists
RR	Relative Risk
RCT	Randomized Controlled Trial
SBA	Skilled Birth Attendant
SDGs	Sustainable Development Goals
SOGON	Society of Gynaecology and Obstetrics of Nigeria
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
UNDESA	United Nations Department of Economic and Social Affairs
WHO	World Health Organization

Definition of terms

S/N	TERM	DEFINITION
1	**Postpartum Haemorrhage**	Blood loss of 500 ml or more from the female genital tract after childbirth
2	**Minor PPH**	Blood loss ranging between 500-1,000 ml
3	**Major PPH**	Blood loss >1,000 ml. Major PPH is further subclassified into moderate (1,000-2,000 ml) and severe (>2,000 ml) PPH
4	**Primary PPH**	Excessive bleeding that occurs from the genital tract within 24 hours of childbirth
5	**Secondary PPH**	Excessive bleeding that occurs from the genital tract at any time between 24 hours and six weeks postpartum

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CHAPTER 1:

Introduction

1.1 Background

Since the launch of the Safe Motherhood Initiative in 1987, multiple global efforts have been instituted, to reduce the unacceptably high maternal mortality ratio (MMR), especially in low- and middle-income countries (LIMCs). Some of these efforts include the International Conference on Population and Development (ICPD) in 1994 and the United Nations' Millennium Development Goals (MDG; 2000-2015). The MDG target 5a. aimed to reduce MMR globally by at least 75% over the MDG period. At the end of the MDG era in 2015, the global maternal mortality ratio (MMR) reduced to 303,000, representing a 44% reduction in the baseline MMR of 1990 (1). To sustain the global effort of maternal mortality reduction, the elimination of preventable maternal mortality was included as one of the targets of Goal 3 of the Sustainable Development Goals (SDG), which was launched in 2015.

Specifically, SDG target 3.1 aims to reduce global MMR to <70/100,000 live births, with no country having an MMR greater than 140/100,000 live births by 2030 (2). From 2000 to 2017, the global maternal mortality ratio declined from 342 to 211 maternal deaths per 100,000 live births. However, in Nigeria, the Nigeria Demographic and Health Survey (NDHS) of 2018 showed that the maternal mortality ratio was 512/100,000 live births; this was more than 2.5 times the global average. Midway into the SDG period in 2022, the United Nations Maternal Mortality Estimation Inter-Agency Group (MMEIG) reported that Nigeria, with an estimated 81,747 maternal deaths in 2020, contributed the largest proportion, 28.5% to the global burden of maternal mortality (4).

PPH is a leading cause of maternal mortality worldwide and in Nigeria. This underscores the urgent need for a comprehensive plan of action on the prevention, early diagnosis and management of PPH. The development, domestication, and implementation of context-specific and evidence-based guidelines on PPH at the national and sub-national levels will contribute to the reduction of maternal mortality in Nigeria.

1.2 Definition of Postpartum Haemorrhage

PPH is defined by the WHO as blood loss of 500 ml or more from the female genital tract after childbirth (7). However, WHO notes that this traditional cut-off of 500ml of blood loss for diagnosing PPH tends to underestimate the actual loss and is not always of great clinical significance. Consequently, they recommend that clinicians may decide that in the circumstances of their practice, a lower level of blood loss can be the cut-off for the institution of

therapeutic actions, for example, in cases when the mother is anaemic at the time of delivery or has other complicating medical conditions such as cardiac disease. (7).

1.3 Classification of PPH

Primary Postpartum Haemorrhage: This is defined as PPH that occurs within 24 hours of childbirth.

Secondary Postpartum Haemorrhage: This is defined as significant bleeding that occurs from the genital tract at any time between 24 hours and six weeks postpartum (7).

Based on the volume of blood loss, the Royal College of Obstetricians and Gynaecologists (RCOG) also classified PPH into:

A. Minor PPH, with blood loss ranging between 500-1,000 ml, and
B. Major PPH, with blood loss >1,000 ml. Major PPH is further subclassified into moderate (1,000-2,000 ml) and severe (>2,000 ml) PPH (10).

1.4 Magnitude of the Problem

Globally, about 14 million cases of PPH and 70,000 related maternal deaths, equivalent to 27.1% of all maternal deaths are recorded annually. (12) This implies that one woman dies of PPH every four minutes.

Maternal morbidity and mortality from PPH are disproportionately higher in low- and middle-income countries. In Asia and Africa, PPH is responsible for 30.8 % and 33.9 % of maternal deaths, respectively, compared to 13.4% in high-income countries. (14) In Nigeria, PPH accounts for one-third of all hospital admissions due to obstetric haemorrhage (15), and is the second leading cause of hospital-based maternal deaths (5).

Aside from the immediate threat to maternal survival, PPH is also associated with significant long-term morbidity. Annually, 12% of women who survive PPH, representing 1.6 million women globally, suffer severe postpartum anaemia, requiring blood transfusion (7). Other associated morbidity includes multi- organ failure, clotting dysfunction, and hysterectomy in intractable cases (13).

The foregoing underscores the significant global, regional and local morbidity and mortality burden of PPH.

1.5 Risk factors for PPH

Identifying women with known risk factors for PPH can significantly mitigate maternal mortality and morbidity from PPH. It should, however, be borne in mind that many cases of PPH occur in women without obvious risk factors (16). All pregnant women should therefore be considered at

risk of PPH and measures to prevent PPH should be instituted from the preconception to the postpartum periods, as appropriate.

The “four Ts”, an often-used mnemonic, summarises the major causes of PPH viz:

- **T**one (uterine atony)
- **T**rauma (genital traction lacerations)
- **T**issue (retained placenta/product of conception)
- **T**hrombin (coagulopathy) (10,16).

All “Ts” should be considered when evaluating women with PPH.

Maternal antepartum anaemia is an independent risk factor for PPH and maternal mortality. (18) Whereas, healthy pregnant women can tolerate acute blood loss of up to 1,000 ml, as little as 250 ml of blood loss can result in significant haemodynamic compromise in severely anaemic women.(9,19) Anaemia causes PPH by various mechanisms, including hyperdynamic circulation from maternal tachycardia, increased cardiac output, and reduced blood viscosity of anaemic blood. Additionally, anaemic blood clots are more susceptible to fibrinolysis and uterine hypoxia from anaemia impairs myometrial contractility (18).

Table 1: Risk factors for PPH

Tone (70%)	**Socio-demographic factors**	**Advanced maternal age, high parity**
	Uterine overdistention	Polyhydramnios, multifetal pregnancies, fetal macrosomia, uterine fibroids
	Antepartum haemorrhage	Courvelaire uterus from abruptio placentae, Placenta previa
	Abnormalities of labour	Prolonged and obstructed labour, precipitate labour, injudicious use of oxytocics for augmentation of labour,
	Drugs	Tocolytics, general anaesthesia
	Acute uterine inversion	Poorly applied CCT, adherent placenta, non-use of oxytocics, fundal pressure.
	Obstetric conditions	previous history of PHH, Massive APH, HELLP syndrome, Amniotic fluid embolism
Trauma (20%)	Uterine rupture	Injudicious use of oxytocics, obstructed labour, fundal pressure, previous uterine surgeries
	Cervical injury	Premature bearing down before full cervical dilatation, operative vaginal deliveries (forceps and ventouse)
	Perineal lacerations	Poor guarding of the perineum, instrumental deliveries, fetal macrosomia
	Surgical	Lateral extension of uterine incision at Caesarean section, Durhssen incision, Episiotomy
Tissue (10%)	Adherent placenta	Placenta accreta spectrum, preterm births,
	Placental abnormalities	Succenturiate placenta, bilobed placenta
	Retained placenta	Inappropriate management of third stage, poorly applied CCT
Thrombin (1%)	Medical conditions	Pre-existing bleeding disorders (Haemophilia, von Willebrand disease, Thrombocytopaenia) Anticoagulant use Sepsis Chronic liver disease

References

1. World Health Organization, UNICEF, UNFPA, World Bank & United Nations. Trends in maternal mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations. 2015. Population Division. Geneva: WHO.

2. United Nations. Transforming our World: The 2030 Agenda for Sustainable Development. New York; UN: 2015

3. National Population Commission (NPC) [Nigeria] and ICF. 2019. 2018 Nigeria DHS Key Findings. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF.

4. Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. 2023; Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO.

5. Tukur, J., Lavin, T., Adanikin, A., Abdussalam, M., Kuti, B., Ekott, M. et al. Quality and outcomes of maternal and perinatal care for 76,563 pregnancies reported in a nationwide network of Nigerian referral-level hospitals. EClinical Med. 2022; 47: 101411. doi: 10.1016/j.eclinm.2022.101411.

6. Bienstock JL, Eke AC, Hueppchen NA. Postpartum Haemorrhage. N Engl J Med. 2021; 384: 1635-1645.

7. World Health Organization (WHO). The Prevention and Management of Postpartum Haemorrhage. Report of a Technical Working Group. 1989; Geneva: WHO, 1990.

8. Menard MK, Main EK, Currigan SM. Executive summary of the reVITALize Initiative: Standardizing Obstetric Data Definitions. Obstet Gynecol 2014;124(1):150-153.

9. Rath WH. Postpartum Haemorrhage- Update on Problems of Definitions and Diagnosis. Acta Obstet Gyn Scan 2011; 90(5): 421-428.

10. RCOG Green-top Guideline No. 52. Prevention and Management of Postpartum Haemorrhage. BJOG 2016; 124(5): e106-e149.

11. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller A-B, Daniels J, et al. Global Causes of Maternal Death: a WHO Systematic Analysis. Lancet Glob Health 2014; 2(6): e323–e333

12. WOMAN-2 Trial Collaborators. Maternal Anaemia and the Risk of Postpartum Haemorrhage: A Cohort Analysis of Data from the WOMAN-2 Trial. Lancet Glob Health. 2023; 11(8): e1249-e1259. doi: 10.1016/S2214-109X(23)00245-0.

13. Carolli 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.

14. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, von Look PF. WHO analysis of causes of maternal death: a systematic review. Lancet. 2006; 367: 1066–1074.

15. Sotunsa JO, Adeniyi AA, Imaralu JO, Fawole B, Adegbola O, Aimakhu CO, et al. Maternal Near-Miss and Death among Women with Postpartum Haemorrhage: A Secondary Analysis of the Nigeria Near-miss and Maternal Death Survey. BJOG 2019; 126(S3): 19-25.

16. American College of Obstetricians and Gynaecologists (ACOG). ACOG Practice bulletin no. 183: Postpartum Haemorrhage. Obstet Gynecol 2017;130:e168-e186.

17. Oyelese Y, Ananth CV. Postpartum Hemorrhage: Epidemiology, Risk Factors, And Causes. Clin Obstet Gynecol. 2010; 53: 147–156.

18. Mansukhani R, Shakur-Still H, Chaudhri R, Bello F, Muganyizi P, Kayani A et al. Maternal Anaemia and the Risk of Postpartum Haemorrhage: A Cohort Analysis of Data from the WOMAN-2 Trial. Lancet Glob Health 2023; 11(8): e1249-59.

19. Anger H, Durocher J, Dabash R, Winikoff B. How Well do Postpartum Blood Loss and Common Definitions of Postpartum Hemorrhage Correlate with Postpartum Anemia and Fall In Hemoglobin? PLoS ONE 2019; 14(8): e0221216.

20. Buseri FI, Uko EK, Jeremiah ZA, Usanga EA. Prevalence and Risk Factors of Anaemia among Pregnant Women in Nigeria. Open Haematol J. 2008; 2: 14-9.

CHAPTER 2:

Rationale For This Guideline

2.1 SITUATION ANALYSIS

In 2020, Nigeria had the highest number of maternal deaths worldwide. With an estimated 82,000 maternal deaths, Nigeria contributed up to 28.5% of global maternal deaths. Nigeria's Maternal Mortality Ratio (MMR) was quoted as 512 per 100,000 live births in the last Nigeria Demographic and Health Survey of 2018.[1-3] It is thus evident that to achieve the Sustainable Development Goals (SDG) Target 3.1 of reducing global MMR to less than 70 maternal deaths per 100,000 live births by 2030, improved efforts towards ending preventable maternal deaths must be sustained at national and sub-national tiers of health care in the country.

Postpartum Haemorrhage (PPH) remains one of the leading causes of maternal mortality. It complicates about 1-10% of births but is responsible for close to 25% of all maternal deaths globally, and up to 30-50% of maternal deaths in sub-Saharan Africa.[4–6] Even when the affected women survive, PPH may be a cause of significant maternal morbidity, with long-term clinical and psychosocial complications.[4] With the advent of new technologies and improving medical care, the incidence of deaths from PPH has reduced in developed countries over the past few decades. This is however not the case in low- and middle-income Countries such as Nigeria, where less than 43% of deliveries are conducted by a skilled birth attendant.[7,8] This means that a significant proportion of women receive inadequate care at birth, and may not receive a care package that involves the prevention, immediate recognition and treatment of PPH. There is an obvious need to refocus efforts at the prevention and treatment of PPH nationally. This guideline aims to provide a protocol for identifying women at risk of PPH, prevention of PPH in these women, and treatment of PPH in affected women. This will allow health care providers to offer optimal care to all women, regardless of their place of delivery, and contribute to the reduction of maternal mortality from PPH.

2.2 DESK REVIEW

As in all aspects of medicine, there have been advances in research towards the prevention and treatment of PPH. These new discoveries are reflected in the modifications of existing guidelines, and publication of new guidelines across different countries. With the global trend towards evidence-based medicine, practice in Nigeria must also be tailored in this direction.

Early approaches to preventing PPH were geared at preventing uterine atony, which is the most common cause of PPH. While there are identifiable predictors of PPH emanating from uterine atony, there is considerable evidence to support the fact that PPH from uterine atomy may occur among women without identifiable predictors, and therefore previously deemed as being at "low risk" for uterine atony. This led to the advent of a group of interventions labelled as the Active Management of the Third Stage of Labour (AMTSL), recommended to be offered to all women in the immediate postpartum period, irrespective of the perceived risk of uterine atony.

AMTSL has indeed been shown to reduce the incidence of PPH, compared to expectant management of the third stage of labour.[4] Despite this, there remains a lack of clarity about the components of AMTSL, which may lead to some confusion for health care providers. A joint publication by the International Confederation of Midwives/International Federation of Gynecology and Obstetrics (ICM/FIGO) in 2003 proposed the following:

1. Administration of a uterotonic within one minute of delivery of the baby,
2. Controlled cord traction, and
3. Uterine massage.

In 2012, WHO included delayed cord clamping as a replacement for early cord clamping, which had been previously proposed.[4,9,10] In their recent guidelines, however, the Royal College of Obstetricians and Gynaecologists (RCOG), and the American College of Obstetricians and Gynecologists (ACOG), concluded that serial uterine massage is of no benefit in preventing PPH, and have promoted the administration of uterotonic agents as the most important intervention for PPH prevention.[11,12] This exemplifies the recent changes in global practice with respect to PPH prevention.

There have been previous efforts at making recommendations for the management of PPH from Nigeria as well. In 2021, the Society of Gynaecology and Obstetrics of Nigeria published the "Guidelines for the Management of Postpartum Hemorrhage".[13] This paper highlighted the unpredictability of PPH and the need for anticipation of complications in all women. AMTSL was also promoted, with the following components: administration of oxytocin IM/IV bolus after delivery of the baby, and controlled cord traction. Diverse surgical options for the management of PPH were also widely discussed. There was however limited information about the use of heat-stable Carbetocin and tranexamic acid and, both of which are useful options for the prevention and treatment of PPH.[14,15]

2.3 FURTHER STEPS

This guideline also discusses the introduction of the 'patient care bundles' – defined as a limited set of evidence-based interventions for a defined patient population and care setting, procedure, or treatment.[16] With respect to PPH, it describes a series of interventions beyond the routine AMTSL, that should be administered to all women at birth, to prevent and/or ensure the early diagnosis and management of PPH when it occurs.[16,17] The E-MOTIVE Trial was a multi-country, randomized control trial which compared the efficacy of early detection of PPH through the use of calibrated drapes for all women postpartum, coupled with a treatment bundle that entails Uterine massage, Oxytocics, Tranexamic acid, Intravenous fluids, Examination and Escalation for women with PPH, with the conventional care. This intervention resulted in a 60% reduced risk of severe PPH, laparotomy, and maternal death from PPH.[18] As Nigeria was one of the countries included in this study, it is evident that the scale-up of such interventions in routine care may reflect similar outcomes outside a research setting.

Other key features of this guideline include recommendations to combat the possible contextual challenges that may prevent its scale-up and integration into routine practice. Identification of these areas of concern, and mitigation of these problems are necessary to contribute to the reduction of morbidity and mortality from PPH.

REFERENCES

1. Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. Geneva: World Health Organization; 2023.
2. Oladapo OT, Adetoro OO, Ekele BA, Chama C, Etuk SJ, Aboyeji AP et al. When getting there is not enough: a nationwide cross-sectional study of 998 maternal deaths and 1451 near-misses in public tertiary hospitals in a low-income country. BJOG. 2016;123(6):928-38.
3. Tukur J, Lavin T, Adanikin A, Abdussalam M, Bankole K, Ekott MI et al. Quality and outcomes of maternal and perinatal care for 76,563 pregnancies reported in a nationwide network of Nigerian referral-level hospitals. EClinicalMedicine. 2022;47(1):1-16.
4. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. World Health Organization; 2012.
5. Forbes G, Akter S, Miller S, Galadanci H, Qureshi Z, Fawcus S et al. Factors influencing postpartum haemorrhage detection and management and the implementation of a new postpartum haemorrhage care bundle (E-MOTIVE) in Kenya, Nigeria, and South Africa. Implement. Sci. 2023;18(1):1-23.
6. Escobar MF, Nassar AH, Theron G, Barnea ER, Nicholson W, Ramasauskaite D et al. FIGO recommendations on the management of postpartum hemorrhage. Int J Gynaecol Obstet. 2022; 157:3-50.
7. Miller S, Lester F, Hensleigh P. Prevention, and treatment of postpartum hemorrhage: new advances for low-resource settings. J Midwifery Womens Health. 2004;49(4):283-92.
8. National Population Commission (NPC) [Nigeria] and ICF. 2019. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.
9. Oladapo OT, Akinola OI, Fawole AO, Adeyemi AS, Adegbola O, Loto OM, et al. Active management of third stage of labor: Evidence versus practice Active management of third stage of labour. Acta Obstet Gynecol Scand. 2009;88(11):1252–60.
10. International Confederation of Midwives (ICM), International Federation of Gynecology and Obstetrics (FIGO). Management of the Third Stage of Labour to Prevent Postpartum Hemorrhage. 2003.
11. Anderson JM, Etches D. Prevention, and management of postpartum hemorrhage. Am Fam Physician. 2007;75(6):875-82.
12. Postpartum Hemorrhage. ACOG Practice Bulletin. Clinical Management Guidelines for Obstetrician-Gynecologists. 2017.
13. Society of Gynaecology and Obstetrics of Nigeria. SOGON Clinical Practice Guidelines - Postpartum Hemorrhage. SOGON Clinical Practice Guidelines. 2021.
14. Shakur H, Roberts I, Fawole B, Chaudhri R, El-Sheikh M, Akintan A, et al. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. Lancet. 2017; 389(100):2105-2116.

15. Widmer M, Piaggio G, Nguyen TM, Osoti A, Owa OO, Misra S, et al. Heat-stable carbetocin versus oxytocin to prevent hemorrhage after vaginal birth. N Engl J Med. 2018;379(8):743-52.
16. Althabe F, Therrien MN, Pingray V, Hermida J, Gülmezoglu AM, Armbruster D, et al. Postpartum hemorrhage care bundles to improve adherence to guidelines: A WHO technical consultation. Int J Gynaecol Obstet. 2020;148(3):290-9.
17. Okonofua FE, Ekezue B, Ntoimo LFC, Ekwo C, Ohenhen V, Agholor K, et al. Effects of multifaceted interventions to prevent and manage primary postpartum haemorrhage in referral hospitals: A quasi-experimental study in Nigeria. BMJ Glob Health. 2022;7(4):1-10
18. Gallos I, Devall A, Martin J, Middleton L, Beeson L, Galadanci H, et al. Randomized trial of early detection and treatment of postpartum hemorrhage. N Engl J Med. 2023;389(1):11-21.

CHAPTER 3:

Prevention, Early Diagnosis And Treatment Of Postpartum Haemorrhage.

3.1 Background

Postpartum hemorrhage (PPH) is an important cause of maternal mortality, accounting for about a quarter of maternal deaths worldwide. Beyond the mortality, there is associated significant morbidity, due to delayed diagnosis, inadequate skills at managing PPH, poor quality and inadequate medical supplies, non-availability of safe blood and transfusion services in emergency situations, and the high prevalence of antepartum anaemia. It is good clinical practice to screen pregnant women for antenatal predisposing factors to PPH and make appropriate preparations to prevent PPH in high-risk women (1,2).

3.2 Prevention of PPH

In recognition of the significant risks of morbidity and mortality that are associated with PPH, all pregnant women should have antepartum risk assessment for uterine atony, as well as other common predisposing factors to PPH in the antenatal and intrapartum periods. Such women should be counselled appropriately about the need to present early in labour, to a facility with skilled birth attendants and blood transfusion services as necessary (1,2)**.**

It is good clinical practice to have a comprehensive plan of care for women at risk of PPH, as soon as the risk factors are identified. This should be clearly documented in their records. Irrespective of the perceived risk however, measures to estimate blood loss, prevent PPH, recognize it early in the postpartum period, and institute treatment of PPH as soon as a diagnosis is made, should be universally applicable to all parturients.

3.2.1 Antenatal and intrapartum anaemia

Antenatal and intrapartum anaemia should be investigated and treated to reduce morbidity that is related to PPH. (FIGO) Based on findings from the WOMAN Trial (3)**,** the risk of clinical postpartum haemorrhage almost doubles among women with moderate and severe anaemia (6·2% in women with moderate anaemia vs 11·2% in women with severe anaemia). A 10 g/L reduction in antepartum haemoglobin concentration led to a rise in the risk of clinical postpartum haemorrhage. Compared with moderate anaemia, severe anaemia was associated with seven times increased odds of death or near miss (OR 7·25 [95% CI 4·45–11·80]) than anaemia of moderate severity. Moderate-severe anaemia should therefore be investigated and corrected antenatally in all pregnant women to forestall the associated morbidity and mortality.

3.2.2 Placenta previa and placenta accreta spectrum (PAS)

Women with risk factors for placenta accreta spectrum, such as history of placenta accreta in previous pregnancy, previous Caesarean section, and other uterine surgeries, as well as repeated endometrial curettage should be evaluated for PAS. The risk of PAS rises as the

number of prior Caesarean sections/uterine surgery increases. Antenatal diagnosis of PAS is crucial to planning the intrapartum management and has been shown to reduce maternal morbidity and mortality. All women with anteriorly sited placenta previa and previous uterine surgery should be evaluated for PAS using 2D and colour Doppler ultrasonography (4). When properly performed, the diagnostic capabilities of ultrasonography and Magnetic Resonance Imaging are comparable.

Multidisciplinary plan of care should be put in place before delivery is instituted among women with PAS, in order to reduce morbidity and mortality. This should include senior Obstetricians and Anaesthetist, and delivery should preferably be conducted in a tertiary center.

When feasible, arrangement should be made for Intraoperative cell salvage (autologous blood transfusion), due to the risk of significant intra-operative haemorrhage among patients with placenta praevia or placenta accreta(5).

3.3 Uterine atony

Uterine atony is the most common cause of PPH; due to the inability to predict women who may develop this complication, prophylactic measures against atony should be instituted for all parturients in the immediate postpartum period.

3.3.1 Active management of third stage of labour (AMTSL)

AMTSL is associated with about 70% reduction in the risk of blood loss > 1,000 ml or more (relative risk [RR] = 0.3; 95% CI, 0.1 to 0.9) compared with expectant management. There is also the additional benefit of reduction in maternal postpartum anaemia haemoglobin concentration < 9 g per dL at 24 to 72 hours postpartum (1,6).

The World Health Organization, the Royal College of Obstetricians and Gynaecologists and the Society of Obstetricians and Gynaecologists of Canada define AMTSL as follows (7):

i. Administration of uterotonic agent (preferably 10 IU of oxytocin via slow intravenous injection if an intravenous access is feasible) within one minute following the delivery of the fetus.
ii. Delayed cord clamping, regarded as cord clamping within 1-3 minutes of birth while essential newborn care is ongoing.
iii. Controlled cord traction, defined as the gentle pulling of the clamped umbilical cord, with upward, manual support of the uterus as a means of delivering the placenta.

Early cord clamping is no longer recommended unless there is an urgent need for immediate resuscitation of the newborn, and in HIV-positive mothers (1,7)**).**

Note: It is important to ensure that there is no other fetus in the uterus prior to the administration of oxytocics.

3.3.2 Prophylactic oxytocics in third stage of labour

Prophylactic uterotonics should be offered routinely in the third stage of labour for all births, as it reduces the risk of PPH (1,8). Oxytocin, 10 IU IV, or IM where IV is not feasible, is the recommended uterotonic for the prevention of PPH; attention should be paid to the procurement of quality products, and the maintenance of cold chain during transportation and storage of oxytocin, which should be at a temperature of 2 – 8 degrees C for effective outcome when it is used (8,9).

In situations where women giving birth vaginally already have intravenous access, the slow intravenous bolus administration of 10 IU oxytocin is recommended in preference to intramuscular administration (10).

Oxytocin-Ergometrine combination (5iu/0.5mg) may be used in the absence of hypertension in pregnant women at increased risk of haemorrhage as it reduces the risk of PPH between 500–1000 ml (1). Ergometrine in isolation, or fixed dose combination with oxytocin, is contraindicated in patients with preeclampsia, chronic hypertension and cardiac failure.

Heat stable Carbetocin (HSC), a synthetic oxytocin receptor agonist in the myometrium is heat stable and has a four-fold longer uterotonic activity that lasts up to 2hrs, compared with oxytocin. WHO and FIGO recommend HSC (100 µg, intramuscular or intravenous [IM/IV) for prevention of PPH for all births in contexts where the cost is comparable to other effective uterotonics, if oxytocin is not available or the quality of storage of oxytocin cannot be guaranteed (5,7,9). Beyond its oxytocic effect, HSC may also promote blood coagulation (11). Administration should be done with caution in patients with asthma and advanced pulmonary pathology (12).

In settings where skilled birth attendants are not present and oxytocin is not available, the administration of oral misoprostol, 600µg, by community health workers or lay health workers is recommended for prevention of PPH (8).

Note: Conventional injectable uterotonics such as oxytocin and/or ergometrine are preferrable to oral (misoprostol) or injectable (carboprost) prostaglandins (1,13).

Table 2: Characteristics and Pharmacokinetics of Uterotonic Agents

Drug	Characteristic	Route of administration	Dose	Onset of action	Pharmacokinetics	Half-life	Storage
Oxytocin	Synthetic cyclic peptide form of the naturally occurring posterior pituitary hormone	IV	10IU	30-60 seconds	Peak after 30minutes.	1- 6minutes	Cold chain (2 – 8 degrees C)
Oxytocin		IM	10IU	3-7 minutes	Effect lasts up to 60 minutes	1– 6minutes	Cold chain (2 – 8 degrees C)
Heat Stable Carbetocin	Long-acting synthetic analogue of oxytocin with agonist properties	IV	100ug	2 minutes	Sustained contractions:6mins Rhythmic contractions: 60 minutes	40 minutes	Heat stable
Heat Stable Carbetocin		IM	100ug	2minutes	Sustained contractions:11min Rhythmic contractions: 120 minutes	40 minutes	Heat stable
Misoprostol	Synthetic prostaglandin E1 analogue. Also inhibits	Oral, sublingual, vaginal, rectal	600ug	9 – 15 minutes	Lasts 2-4hours, depending on route of administration	20 – 40 minutes	Heat stable

	gastric acid secretion.						
Ergometrine	Ergot alkaloids	IM	0.5mg	2 – 3 minutes	3 hours	30-120 minutes	Cold chain
Ergometrine	Ergot alkaloids	IV	0.5mg	60 seconds	45 minutes	30-120 minutes	Cold chain
Syntometrine (Oxytocin + Ergometrine combination)	Synthetic oxytocin combined with ergot alkaloid (ergometrine)	IV, IM	5IU/0.5mg	2-5 minutes	Lasts up to 3 hours	30-120 minutes	Cold chain

Figure 1: Deciding which uterotonic to take

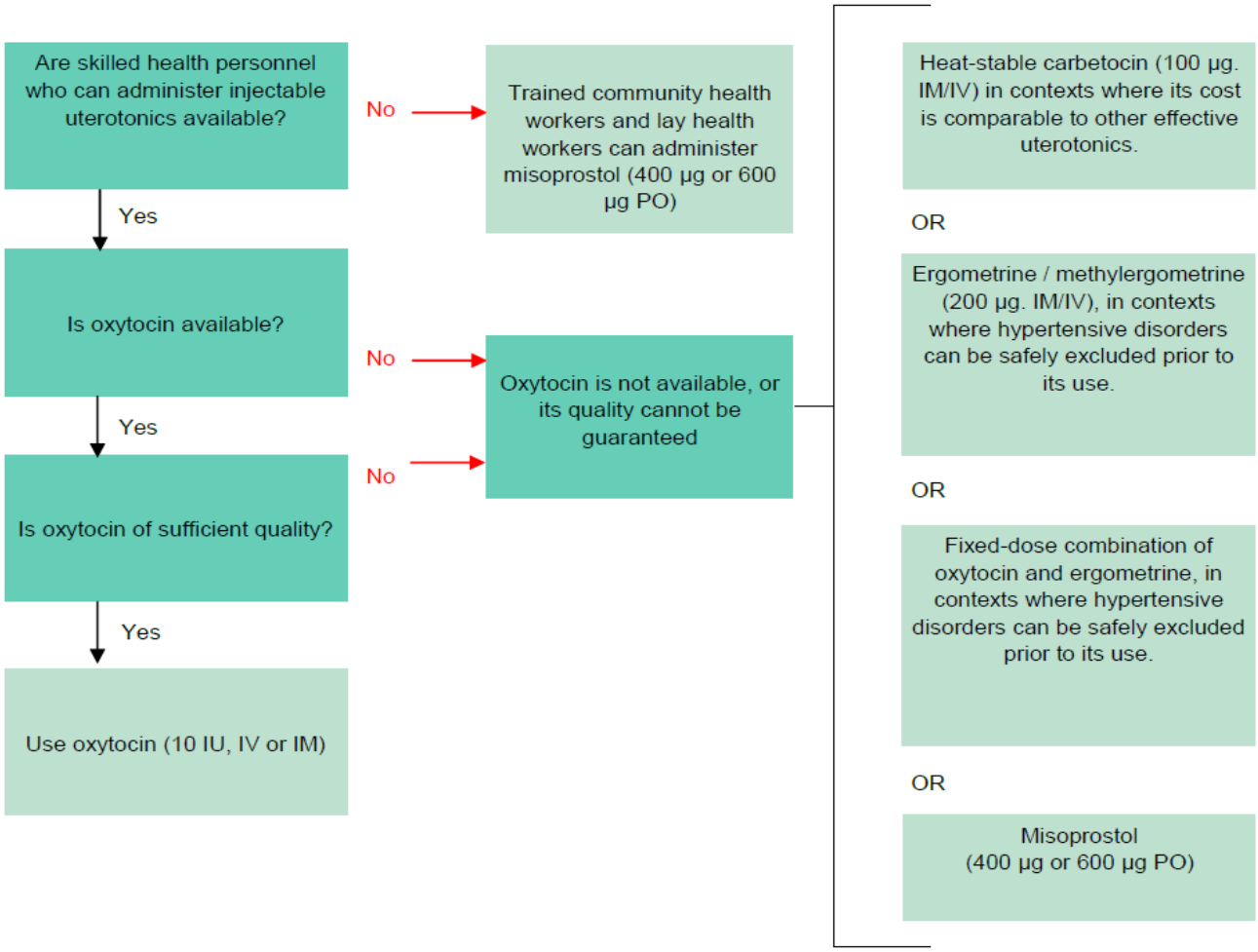

Figure 1: Algorithm on decision-making for choice of uterotonic agent in the third stage of labour (Adapted from the FIGO Generic Postpartum Haemorrhage Protocol and Care Pathways).

3.3.3 Delivery of the placenta

When appropriately trained skilled birth attendants are available, controlled cord traction is the recommended method for delivery of the placenta, as it is associated with reduction in blood loss and duration of third stage of labour(1,7)

3.3.4 Harmful practices

Application of fundal pressure to promote placental separation, cord traction without suprapubic counter-traction and application of cord traction before administration of uterotonic agent are discouraged, as they may result in adverse outcome such as uterine inversion.

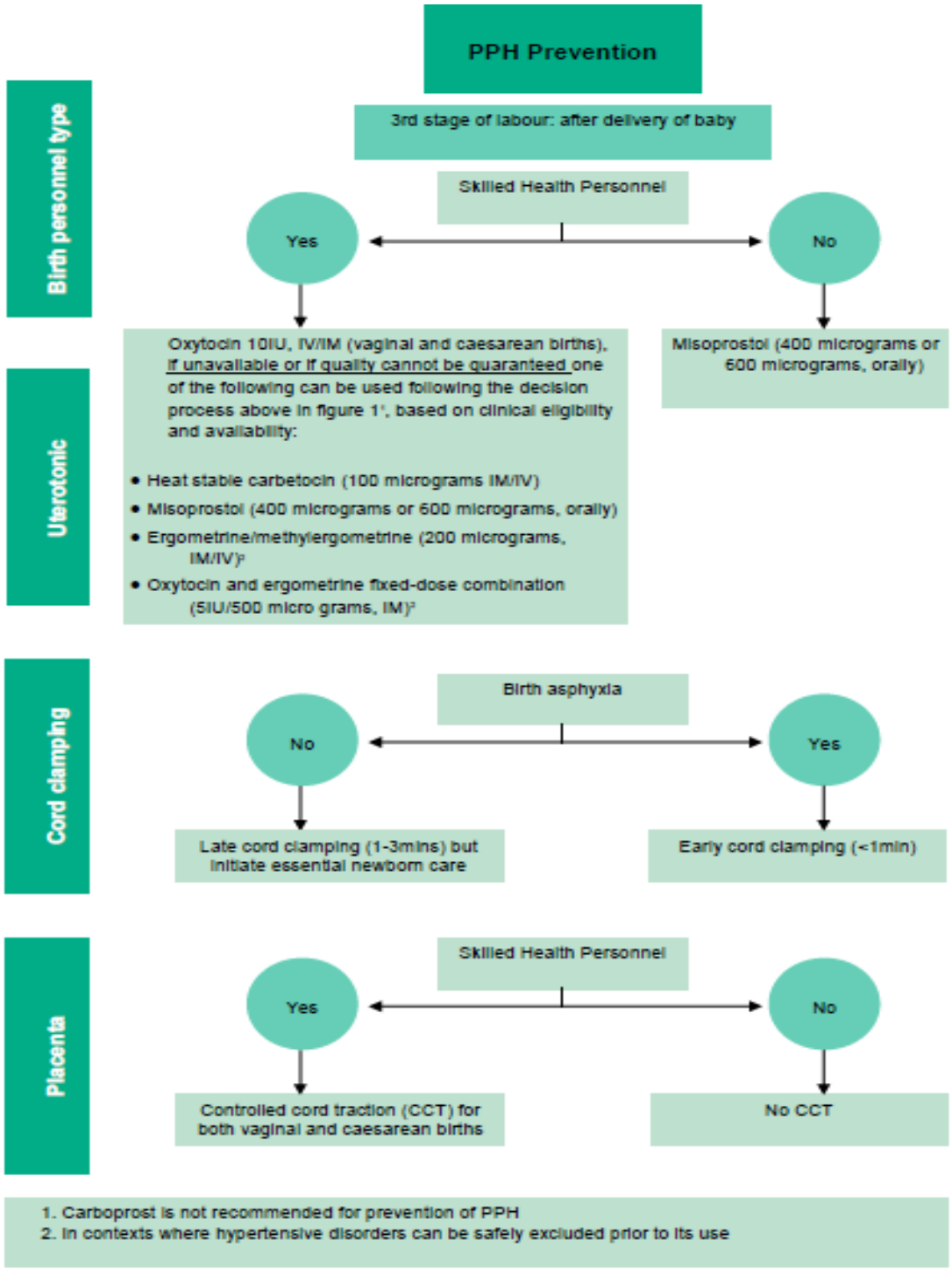

Figure 2: Algorithm for the Active Management of Third Stage of Labour.

(Adapted from the FIGO Generic Postpartum Haemorrhage Protocol and Care Pathways).

3.4 Early identification and diagnosis of postpartum haemorrhage

3.4.1 Estimating blood loss in a parturient

Calibrated blood collection drape is the recommended first line method of estimating blood loss among parturients after vaginal deliveries, based on the available evidence (14). It is critical to be as meticulous as possible in estimating blood loss after Caesarean section as well. Accoucheurs should be aware that visual inspection often underestimates peripartum blood loss (15). Consequently, life-saving treatments are either delayed, or not initiated at all, sometimes with dire consequences.

In the E-MOTIVE trial (16), the use of calibrated blood-collection drapes for early detection of postpartum hemorrhage, defined as blood loss ≥ 500mls, or bleeding ≥ 300mls with early warning signs of excessive blood loss, was associated with significant increase in early detection of PPH (93.1% of the patients in the intervention group, compared with 51.1% of women in whom the calibrated drape was not use (rate ratio, 1.58; 95% CI, 1.41 to 1.76). When the use of calibrated drapes is combined with a bundle of first-response treatments that include uterine massage, oxytocic drugs, tranexamic acid, intravenous fluids, examination, and escalation, there was a 60% reduction in the composite primary outcome, comprising blood loss ≥1000 ml, laparotomy for bleeding, or maternal death from bleeding (risk ratio, 0.40; P<0.001) (16).

Table 3: E-MOTIVE Bundle for the Early Diagnosis and Management of PPH

Acronym	Definition
E	Estimate the blood loss for all women after birth to recognize PPH early, preferably with calibrated blood collection drapes coupled with the clinical bundle of components listed below for all women with PPH.
M	Massage the uterus to rub up contractions.
O	Oxytocic agents, including Oxytocin, Carbetocin, Oxytocin-Ergometrine combination and Misoprostol.
T	Tranexamic acid, 1g intravenously over 10minutes
IV	Intravenous infusion for restoration of circulatory volume
E	Examine for genital tract lacerations and retained products of conception. Escalate to necessary Personnel and facility as necessary, if bleeding does not stop after the treatment bundle

Once there is an established diagnosis of PPH, the components of the MOTIVE treatment bundle should be initiated simultaneously, rather than serially, due to the proven benefits of this approach (16). For the treatment bundle to be effective, there must be standardized and timely implementation of all included interventions, preferably within 15 minutes of the recognition of PPH (17). It is also essential to consider the implementation strategy for the treatment bundle, to ensure that it is effective. The strategy

included ensuring availability of the required human resources, strengthened by dedicated research staff, regular health-care facility-level audit and feedback, designated facility champions to oversee change, restocking of PPH trolleys or carry cases so that all necessary medicines and equipment were readily available in one place, and training for health workers. As such, all the necessary equipment and medication should be in one place with ease of access, there should be training and retraining of maternity unit staff about the treatment bundle, appointment of Champions (comprising Doctors and Midwives) and the protocol will help to improve efficiency and eliminate phase 3 delays.

Other accurate methods of measurement of cumulative blood loss, such as weighing of pads, should be employed as additional tools when estimating peripartum blood loss (18,19). Routinely, postpartum care should include assessment for pulse rate, respiratory rate, blood pressure, vaginal bleeding and uterine contraction in the first 24 hours starting from the first hour after birth and next within 6 hours after birth (20).

Haematocrit check, though important for baseline assessment, could be falsely reassuring in patients with ongoing acute haemorrhage. It should therefore not be used in isolation for determining the magnitude of blood loss.

Clinical signs and symptoms should be included in the assessment for PPH(14), though it should be noted that clinical signs of hypovolaemic shock are less sensitive because of the physiologic increase in circulating blood volume in pregnancy.(21) Clinical signs of blood loss including tachycardia, tachypnea and a slight recordable fall in systolic blood pressure occurs with blood loss of 1000-1500ml (1) Systolic blood pressure below 80mmHg, associated with worsening tachycardia, tachypnea and altered mental state, often indicates PPH in excess of 1500mls(1).

Among obstetric patients with PPH however, the absence of a significant drop in blood pressure may mask the actual hypovolemic status due to physiological compensatory mechanisms. Shock index (SI), defined as heart rate divided by systolic blood pressure, should be considered as a marker of severity of PPH and can alert obstetrics teams of haemodynamic instability when its value is ≥ 0.9 (9). The normal range is 0.7-0.8, compared with 0.5-0.7 for the non-obstetric population. A high Shock Index is an early marker of haemodynamic compromise that may identify women at risk of morbidity due to PPH.

The “rule of 30” is also clinically relevant in the assessment of the severity of postpartum blood loss. The components include:

- 30% fall in hematocrit
- 30 mmHg fall in systolic blood pressure
- An increase in the baseline pulse rate by 30 beats/min
- 30% fall of hemoglobin (approximately 3 g/dl),
- Approximate blood loss of 30% of normal (70 ml/kg in adults; 100 ml/kg throughout pregnancy) (21).

The “Rule of 30”, when used along with SI aids clinicians to clinically estimate the severity of blood loss and the degree of haemodynamic instability (9). Combining these indices also aid communication between clinicians and facilitate decisions about the need for blood transfusion.

3.5 Tranexamic Acid as part of the MOTIVE Bundle for the Management of PPH

Tranexamic acid should be administered as 1g of 10 ml of a 100 mg/ml solution intravenously over 10 min, to all women with PPH as soon as the diagnosis is made, but not later than 3 hours for maximum benefits. This is irrespective of the mode of delivery, or the cause of the bleeding. A second dose of 1 g intravenously should be administered if bleeding continues after 30 min, or if bleeding restarts within 24 h of completing the first dose. Delayed administration of tranexamic acid appeared to reduce benefits by 10% for every 15-minute delay, with no benefit observed among parturients that had the medication administered after 3 hours of onset of bleeding. Adverse events, including thromboembolic events did not differ significantly in the tranexamic acid versus placebo group. There is also no evidence that the effect of tranexamic acid varies by cause of bleeding or type of birth.

3.6 Investigation and initial resuscitation of a patient with PPH

This should follow the principles of resuscitation as stated in the Expanded Life Saving Skills Manual of the Federal Ministry of Health.

- Assess the airway and ensure that the patient is breathing.
- Institute left lateral positioning and secure the airway, if necessary.
- Secure intravenous access with 2 wide bore cannulas of at least size 16G.
- Obtain about 5-10 ml of blood for:
    - Crossmatch (minimum of 4 units of blood)
    - Full blood count
    - Coagulation screen, renal and liver function for baseline
- If available, commence continuous vital signs monitoring. If a continuous monitor is not available, monitor pulse rate, blood pressure, respiratory rate, SPO2 and temperature every 15 minutes.
- Insert urethral catheter to monitor hourly urine output.
- Appoint a team lead to coordinate the interventions and assign tasks to the team members. It is also essential to appoint a scribe that will document all interventions, the time administered, the decisions that were taken and the patient’s response to each intervention.

For major PPH,

- Institute measures to prevent hypothermia.
- Commence high flow of intranasal oxygen (10–15 l/min) via a facemask, irrespective of maternal oxygen concentration.
- Initiate blood transfusion as soon as it is feasible.
- While awaiting blood, restore circulating blood volume with up to 3.5L of lukewarm clear fluids, starting with 2L of warmed isotonic crystalloid.

- Depending on the patient's haemodynamic status, transfuse with group-specific blood. Where this is not available however, group O-negative blood may be transfused.

3.7 Additional oxytocics for the treatment of PPH due to uterine atony

Administer oxytocin infusion (40 iu in 500 ml isotonic crystalloids at 125 ml/hour) unless fluid restriction is necessary. Other alternatives include;

Ergometrine 0.5 mg by slow intravenous or intramuscular injection (contraindicated in women with hypertension). Administration may be associated with significant nausea and vomiting.

Misoprostol 800 micrograms sublingually. There is no conclusive evidence to support repeating the administration of misoprostol for the treatment of PPH in patients that had already received 600ug of misoprostol as prophylaxis against PPH (9).

Carboprost, administered as 0.25 mg intramuscular injection, to be repeated at 15 minutes interval, up to a maximum cumulative dose of 2mg. (This is contra-indicated in Asthmatics).

3.8 The Non-pneumatic Antishock Garment (NASG)

WHO and FIGO recommend the NASG to reduce blood loss until appropriate care is available or while awaiting transfer to a higher-level facility. It's been demonstrated to be effective for postpartum women with severe hemorrhage showing signs of shock or hemodynamic instability, and during transportation to a higher level of care, irrespective of the tier of health care. The use of NASG is therefore recommended during initial resuscitation, and while organizing supervised referrals to higher tiers of health care facilities (23).

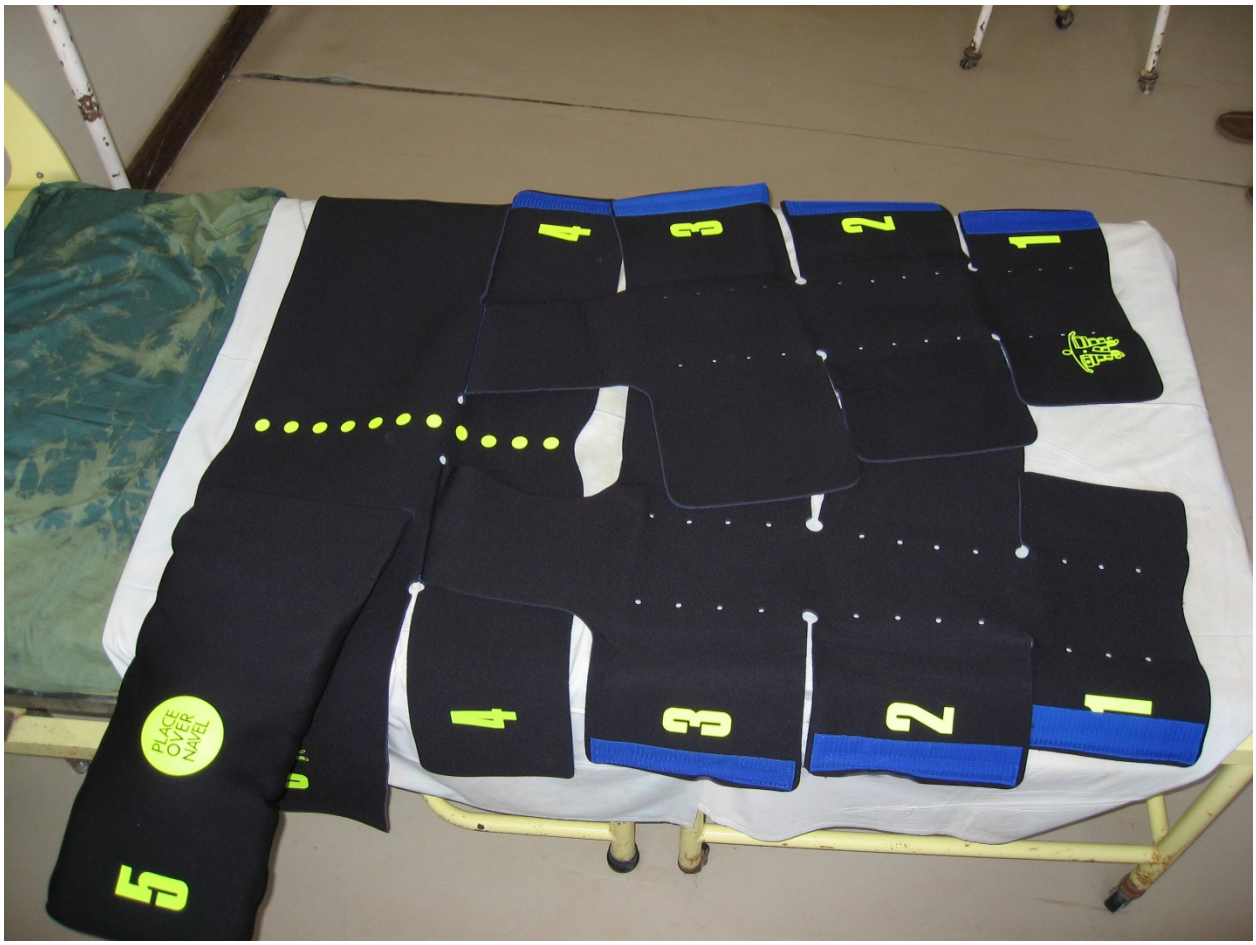

Figure 3: Non-pneumatic Anti-shock Garment

3.9 Mechanical methods of managing uterine atony

3.9.1 Bimanual uterine compression

This procedure can be done as a stop-gap measure after vaginal delivery in patients with ongoing significant bleeding that is not controlled by pharmacological management, or while transporting the patient to the operating theatre. External aortic compression serves the same purpose. The steps include;

- Counsel the patient about the procedure.
- Ensure that the bladder is empty.
- Evacuate blood clots from the vagina and uterine cavity.
- Insert a gloved hand gently into the vagina, with the fist in the anterior fornix, abutting on the anterior uterine wall.
- Apply counter-pressure on the posterior wall of the uterus through the anterior abdominal wall.
- Maintain compression until bleeding stops, or definitive management is about to start.

3.9.2 Manual compression of the aorta

The aim is to compress the aorta before its bifurcation to the common iliac arteries. The uterus should be displaced to the right side, to facilitate access to the aorta, which is slightly to the left of the midline. Downward pressure should be applied with the fist, through the anterior abdominal wall, just to the left of the umbilicus, to compress the aorta against the vertebral spine. Sufficient pressure is confirmed by the obliteration of femoral pulsations. This should be observed on both limbs, to confirm that the pressure is applied centrally to the aorta, and not to just one of the two common iliac arteries. The pressure should be maintained until definitive management is instituted.

3.9.2 Balloon tamponade

Majority of patients with PPH will respond to the medical interventions listed earlier. However, about 10-20% of these women will develop Refractory PPH, which is unresponsive to medical management. Notably, about 50% of patients with refractory PPH have uterine atony. Balloon tamponade is recommended as a non-surgical management for PPH due to uterine atony(1,25). The options include the Sengstaken Blakemore esophageal tube, Urological Rusch catheter, Bakri balloon and the Condom catheter. This option is associated with significant reduction in hysterectomy from uterine atony, when appropriately deployed. Retained products of conception, uterine rupture and genital tract lacerations must be excluded before initiating this option of treatment (9). The tamponade should be left in place for a minimum of 4-6 hours. Removal should be done at a time when sufficient Personnel are available, and further interventions could be administered as necessary.

If ballo0n tamponade fails to control bleeding from uterine atony, it is prudent to consider laparotomy without further delay.

3.11 Surgical methods of managing refractory PPH from uterine atony

3.10.1 Haemostatic suturing

These are often applied at laparotomy and may obviate the need for hysterectomy among women with recalcitrant bleeding. The B-Lynch technique, described in 2007, is the most popular, but there are other methods such as the Modified B-Lynch, Cho, and the Hayman's sutures (26,27). They all have comparable efficacies, with studies reporting that up to 75% of patients that underwent compression suture technique may eventually avoid hysterectomy. The double vertical compression sutures (B-Lynch) are also effective in managing PPH due to bleeding from the placental bed in a patient with placental previa, in addition to uterine atony.

The complication rates for haemostatic suturing are low, but there may be increased risk of uterine ischaemia if this procedure is combined with devascularization procedures. There is no evidence to suggest that haemostatic suturing may impair future fertility in women that are desirous of conception.

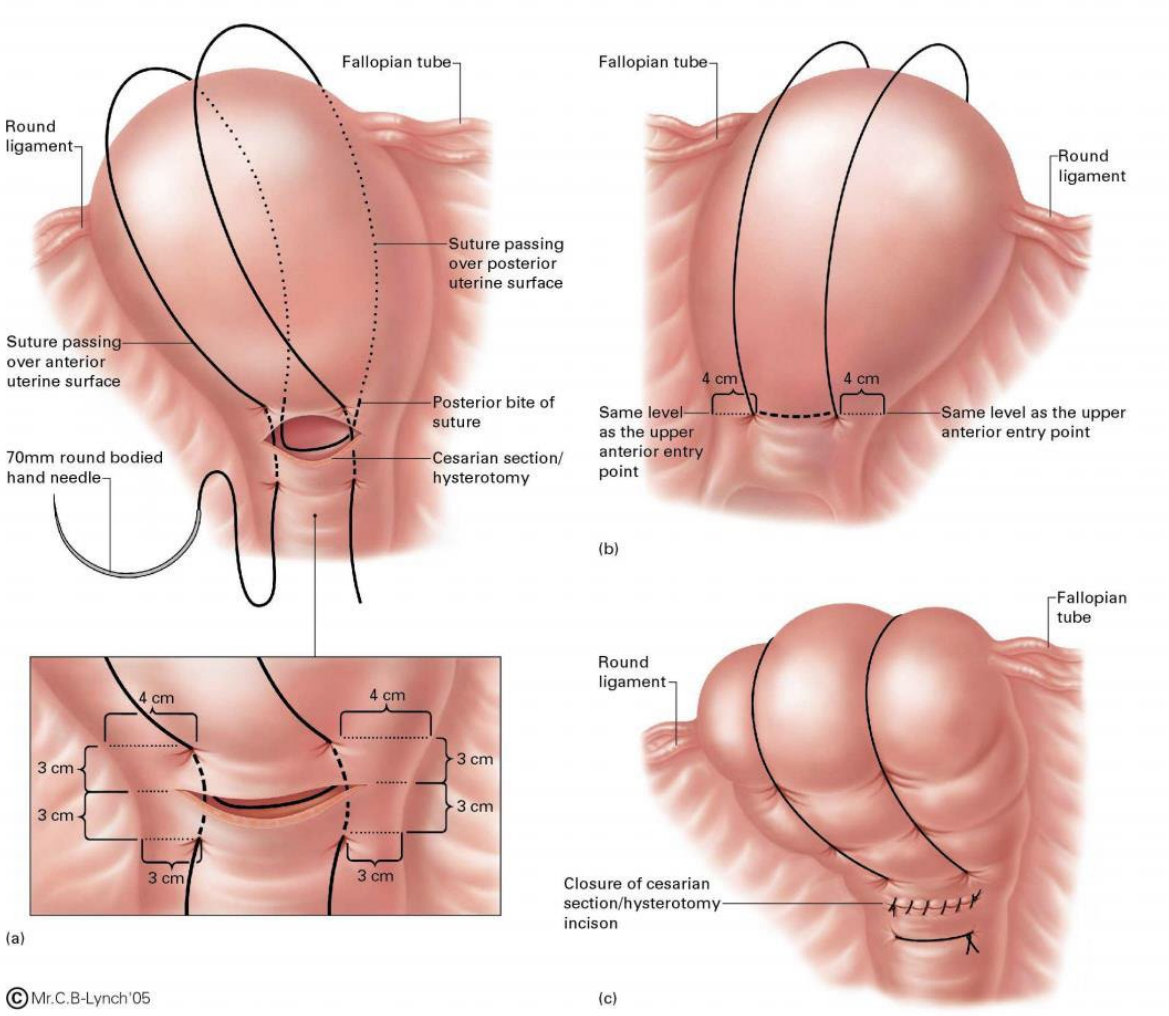

Figure 4: B-Lynch technique for control of recalcitrant PPH

(Adapted from the FIGO Generic Postpartum Haemorrhage Protocol and Care Pathways).

3.10.2 Systematic uterine devascularization

Stepwise uterine devascularization refers to the serial ligation of (i) uterine artery on one side, (ii) ligation of the uterine artery on the contralateral side, (iii) descending uterine arteries, (iv) the ovarian arteries (1). In recalcitrant situations, ligation of the internal iliac artery may be necessary. The procedure may reduce the need for hysterectomy in a high proportion of patients, but skill and speed are of essence. It is essential to note that the risk of ureteric injuries are high when performing these emergency procedures. A systematic review concluded that this procedure does not impair fertility and could therefore be used even among women with desire for future conception (27).

3.10.3 Hysterectomy

Sub-total or total hysterectomy could be life-saving for patients with PPH. To be effective however, the decision must be taken early, before haematological complications ensue, which may easily tilt the patient into extremis.

Subtotal hysterectomy may be easier and faster, if haemostasis could be secured on the cervical stump. A total hysterectomy may however be necessary, if there was placenta praevia and haemostasis of the placental bed on the lower segment could not be secured, or if there was extensive uterine rupture that extended into the vaginal or pelvic floor.

3.10.4 Uterine packing

The use of uterine packing with gauze, either soaked with haemostatic agent, or with gauze alone for the management of PPH due to uterine atony is not recommended (7).

3.11 Disseminated intravascular coagulopathy

Clinical manifestations include:

- Ongoing bleeding from the genital tract.
- Non-clotting blood
- Non-genital bleeding from areas such as venepunture sites, the natural orifices and haematuria.

DIC may set in early in conditions such as abruptio placentae, amniotic fluid embolism, prolonged intrauterine fetal death and uterine rupture with significant haemoperitoneum. A high index of suspicion is therefore advised.

The most objective method to diagnose DIC is by test of coagulation using standardized parameters such as PT, PTTK, and INR. The Haematologists must therefore be invited into the managing team early enough for meaningful intervention to happen. Where these investigations are not feasible, or the results are delayed, bedside clotting time may be helpful. As the results of these investigations may not be readily available in most clinical settings however, prophylactic transfusion of fresh frozen plasma at a rate of 12-15mls/kg is advised after every four units of blood transfusion in anticipation of imminent

DIC. This may translate to 4 units of FFP for every 6 units of packed red cells transfused (1). Where this is not available, blood that is donated within 4 hours can be given to the patient, with appropriate caution to prevent fluid overload.

3.12 Transfusion of platelets

Platelet transfusion should be initiated at a platelet concentration of 75 x 105/mm3 (1).

3.13 Genital tract laceration

Examination of the genital tract should occur concurrently with measures to control uterine atony. The possible sources of bleeding from the genital tract are listed in Table 1. Examination should be systematic, starting from the vulva upward. The hand-over-hand technique should be used to examine the cervix.

Abdominal examination may reveal a para-uterine mass with deviation of the uterus to the contralateral side in patients with broad ligament haematoma.

It is essential that adequate analgesia is administered to the patient, and the illumination should be optimal. There should be early recourse to theatre for prompt examination and repair under anaesthesia as necessary. When patients are diagnosed with extensive genital tract trauma at lower-tier facilities, without capacity for adequate examination and repair, they should be transferred to high-tier facilities without delay.

Table 4: Summary of the Recommendations for the Prevention of PPH

Intervention	Strength of evidence	Recommendation	Level of care
Uterotonics for the prevention of PPH for all births.	Moderate	Strong Recommendation	All
Good quality Oxytocin (10 IU, IV/IM) is the recommended uterotonic drug for the prevention of PPH.	Moderate	Strong Recommendation	All
If oxytocin is not available, alternatives include ergometrine*, oxytocin-ergometrine combination*, Carbetocin, or oral misoprostol, 600ug	Moderate	Strong recommendation	All
If SBA or good quality oxytocin is not available, misoprostol, 600ug orally should be administered for the prevention of PPH	Moderate	Strong recommendation	Primary care, Community.
When appropriate skill is available, CCT is recommended after vaginal births	High-quality	Weak recommendation	All
If SBA is not available, CCT is not recommended.	Moderate quality	Strong recommendation	Primary care, community
Delayed cord clamping (1 to 3 minutes after birth) is recommended for all births while initiating	Moderate quality	Strong recommendation	All

simultaneous essential newborn care.			
Early cord clamping (<1 minute after birth) is not recommended unless immediate neonatal resuscitation is necessary.	Moderate quality	Strong recommendation	All
Sustained uterine massage is not recommended in women who have received prophylactic oxytocin.	Low quality	Weak recommendation	All
Postpartum uterine tonus assessment for early identification of uterine atony is recommended for all women.	Very low	Strong recommendation,	All
Oxytocin (IV or IM) is recommended for the prevention of PPH during caesarean section.	Moderate quality	Strong recommendation	Secondary and tertiary

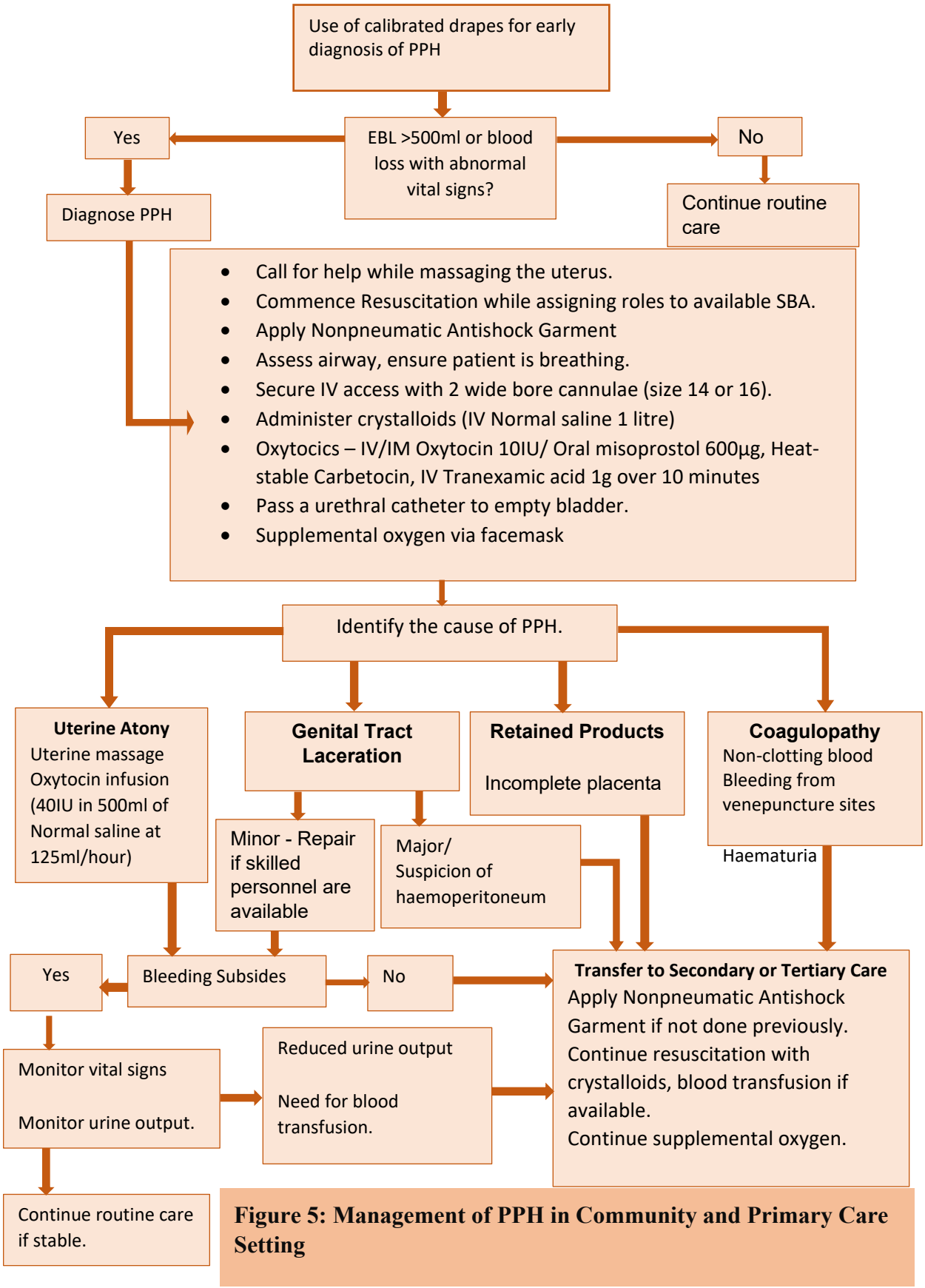

Figure 5: Management of PPH in Community and Primary Care Setting

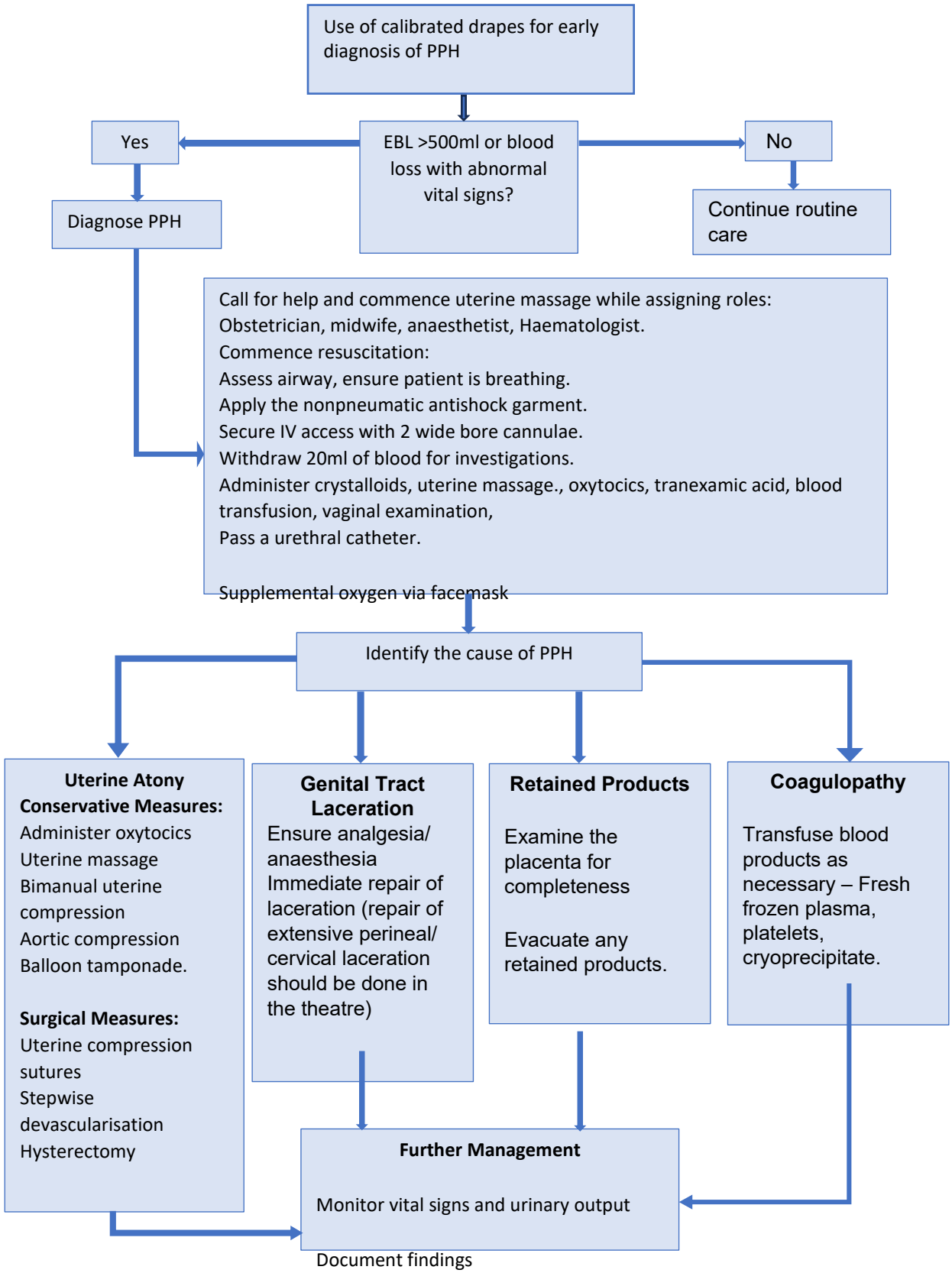

Figure 6: Management of PPH in the Secondary and Tertiary Settings

3.15 Secondary PPH

The most common causes are retained products of conception, subinvolution of the uterus and endometritis. Other less common causes include arterio-venous malformations and pseudo-aneurysms of the uterine vasculature. The initial resuscitation of patients with secondary PPH should follow the outline for the resuscitation of women with Primary PPH.

Pelvic ultrasonography should be performed without delay to assess for retained products of conception. Suggestive findings of retained products include thickened endometrium, echogenic intrauterine mass and endometrial hypervascularity on colour Doppler assessment. Arterio-venous malformations may also be diagnosed on Doppler investigation. The common risk factors for retained products of conception include partial morbidly adherent placenta, previous uterine surgeries, previous multiple uterine curettage, and placenta abnormalities such as placenta succenturiata. Postpartum events such as primary PPH and need for additional manoeuvres beyond CCT to deliver the placenta may also be illustrative. This information should be combined with findings from clinical assessment of the patient, such as the uterine size, pelvic examination findings and the magnitude of bleeding, to plan the management. Evacuation of retained products should be arranged for patients with retained products of conception without delay, after initiating parenteral antibiotics. It is noteworthy that the postpartum uterus is prone to easy perforation, and damage to the stratum basalis of the endometrium, leading to uterine synechiae. The procedure must therefore be performed by Personnel with requisite experience.

Endometritis is a common cause of secondary PPH, so, evaluation for microbial aetiology of endometritis should be initiated at admission in all patients with secondary PPH. Endocervical and high vaginal swabs should be obtained for microbial culture and antibiotic sensitivity testing. Empirical antibiotic therapy should be started based on local experience of microbial sensitivity without delay if endometritis is suspected.

3.16 Complication readiness.

All staff involved in maternity care should receive in-service hands-on teamwork training and simulation exercises (drills) in the management of PPH. Such drills should be multi-professional and multi-disciplinary, with standardized language of communication between obstetric units and the blood bank (1,7)**.** This approach promotes cohesion among the team members, with improved response time.

All maternity units should develop multidisciplinary protocols for management of PPH. This should include algorithms, which will take into considerations, contextual factors such as manpower and available facilities for the care of the patient.

3.17 Documentation

As part of good clinical practice and clinical governance measures, it is important to ensure that accurate documentation is done for all patients that have been managed for PPH.

Essential components of documentation for PPH;

Time of recognition of PPH

Identified cause of bleeding

Personnel that were involved in the management and time of arrival

Interventions that were administered to the patient.

Exact time of the interventions.

Response to each intervention

Serial documentation of the vital signs

Evidence of cessation or ongoing bleeding after each documentation.

Time at which haemostasis was considered as achieved.

Estimated blood loss.

Volume of blood, blood products and IVF

Additional treatment that will be required to maintain haemostasis

Monitoring plan for the patient.

3.18 Debriefing

Debriefing should be done by the most senior Personnel that was involved in the management of the patient. If a Consultant Obstetrician was not involved in the management of the patient, it is good clinical practice for the Consultant Obstetrician to be familiar with the events and be present during the debriefing process. This should be scheduled for a time when the patient has significantly recovered enough to fully comprehend the discussion.

References

1. Mavrides E, Allard S, Chandraharan E, Collins P, Green L, Hunt BJ, Riris S, Thompson AJ. On behalf of the Royal College of Obstetricians and Gynaecologists. Prevention and Management of Postpartum Haemorrhage. BJOG 2016;124:e106-e149.
2. Royal Australian and New Zealand College of obstetrician and Gynaecologist. RANZCOG statement: Management of Postpartum Haemorrhage (C-obs-43). Nov 2021.
3. WOMAN-2 Trial Collaborators. Maternal anaemia and the risk of postpartum haemorrhage: a cohort analysis of data from the WOMAN-2 trial. Lancet Glob Health. 2023. Aug;11(8):e1249-e1259. doi: 10.1016/S2214-109X(23)00245-0. Epub 2023 Jun 27
4. Jauniaux ERM, Alfirevic Z, Bhide AG, Belfort MA, Burton GJ, Collins SL, Dornan S, Jurkovic D, Kayem G, Kingdom J, Silver R, Sentilhes L On behalf of the Royal College of Obstetricians and Gynaecologists. Placenta Praevia and Placenta Accreta: Diagnosis and Management. Green-top Guideline No. 27a. BJOG 2018.
5. World Health Organization. A roadmap to combat postpartum haemorrhage between 2023 and 2030. Geneva; WHO: 2023
6. Begley CM, Gyte GM, Devane M, McGuire W, Weeks A. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst Rev 2019; ;2(2):CD007412. doi: 10.1002/14651858.CD007412.pub5. (11):CD007412.
7. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: WHO;2012.
8. World Health Organization. WHO recommendations: Uterotonics for the prevention of Postpartum haemorrhage. Geneva: WHO; 2018.
9. Escobar MF, Nassar AH, Theron G, et al. FIGO recommendations on the management of postpartum haemorrhage 2022. Int J Gynecol Obstet. 2022;157(Suppl. 1):3-50.
10. World Health Organization. WHO recommendation on routes of oxytocin administration for the prevention of postpartum haemorrhage after vaginal birth. Geneva: WHO;2020.
11. Cannon JW. Hemorrhagic shock. N Engl J Med. 2018; 378: 370–379.
12. Pérez-Nieto OR, Castañón-González JA, Lima-Lucero IM, Delsol LAG. Near fatal bronchospasm and bradycardia after carbetocin administration. Med Intensiva. 2018;42:319–321.
13. Mousa HA, Blum J, Abou El Senoun, Shakur H, Alfirevic Z. Treatment for primary postpartum haemorrhage. Cochrane Database of Syst Rev 2014; 2014(2):CD003249.
14. Glover P. Blood loss at delivery: How accurate is your estimation? Aust J Midwifery 2003;16:21-24.
15. Gallos I, Devall A, Martin J, Middleton L, Beeson L, Galadanci H, et al. Randomized Trial of Early Detection and Treatment of Postpartum Hemorrhage. N Engl J Med. 2023 Jul 6;389(1):11-21. doi: 10.1056/NEJMoa2303966. Epub 2023 May 9. PMID: 37158447
16. World Health Organization. WHO recommendations on the assessment of postpartum blood loss and treatment bundles for postpartum haemorrhage. Geneva: WHO; 2023
17. Patel A, Gouder SS, Geller SE, Kodkany BS, Edalvitch SA, Wagh K, et al. Drape estimation vs. visual assessment for estimating postpartum haemorrhage. Int J Gynaecol Obstet 2006;93:220-224.
18. Schorn MN. Measurement of blood loss: Review of the literature. J Midwifery Women's Health. 2010;55:20-27.

19. Toledo P, McCarthy RJ, Hewlett BJ, Fitzgerald PC, Wong CA. The accuracy of blood loss estimation after vaginal delivery. Anesth Analg 2007;105:1736-1740.
20. World Health organization. WHO Recommendations on Postnatal Care of the Mother and Newborn. Geneva: WHO;2013.
21. Rath WH. Postpartum haemorrhage- update on problems of definitions and diagnosis. Acta Obstet Gynecol Scand 2011; 90(5): 421-428.
22. Mehdi M, Chandraharan E. Diagnosis and Management of Shock in Postpartum Haemorrhage., Glob. Libr. Women's Med. ISSN: 1756-2228; DOI 10.3843/GLOWM.409603.
23. Woman Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. Lancet 2017; 389: 2105–2116.
24. Ojengbede OA, Morhason-Bello IO, Galadanci H, Meyer C, Nsima D, Camlin C, Butrick E, Miller S. Assessing the role of the non-pneumatic anti-shock garment in reducing mortality from postpartum hemorrhage in Nigeria. Gynecologic and Obstetric Investigation. 2011.;71(1):66-72.
25. World Health Organization. WHO recommendation on uterine balloon tamponade for the treatment of postpartum haemorrhage. Geneva; WHO: 2021.
26. B-Lynch C, Coker A, Lawal AH, Abu J, Cowen MJ. The B-Lynch surgical technique for the control of massive postpartum haemorrhage: an alternative to hysterectomy? Five cases reported. Br J Obstet Gynaecol. 1997;104:372–375.
27. Hayman RG, Arulkumaran S, Steer PJ. Uterine compression sutures: surgical management of postpartum hemorrhage. Obstet Gynecol 2002; 99: 502–506.
28. Doumouchtsis SK, Nikolopoulos K, Talaulikar VS, Krishna A, Arulkumaran S. Menstrual and fertility outcomes following the surgical management of postpartum haemorrhage: a systematic review. BJOG 2014; 121: 382–388.

CHAPTER 4

Commodity Supply Chain And Logistic Management

4.1. Introduction and Rationale

The National Health Supply Chain Strategic and Implementation Plan development was motivated by the desire to create a patient-oriented supply chain masterplan to achieve high levels of efficiency and effectiveness in the delivery of medicines and other health products to the people of Nigeria. The implementation of the guidelines for the management of PPH, and the required commodities should align with the National Health Products Supply Chain Strategy and Implementation plan.[1]

It is imperative that critical consideration is given to how commodities are determined, quantified, distributed, and warehoused for smooth implementation of the guideline for the management of PPH.

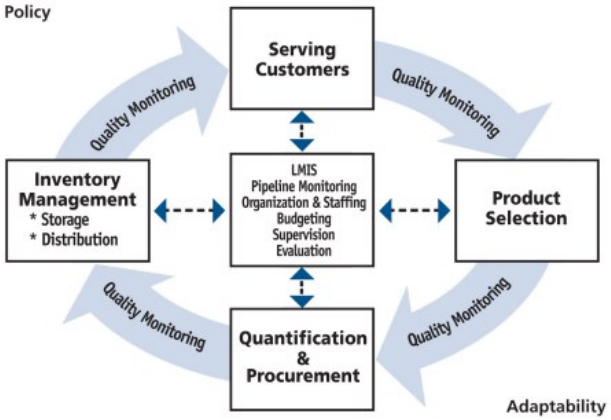

Figure 7: Logistic Cycle

This goal is geared towards achieving Universal Health Coverage. Implementation of the National guideline for the management of PPH requires an efficient and effective supply chain management of all commodities that would be needed in the country.

4.2. Product selection

Critical selection of products for the management of PPH is essential for effective and efficient reduction of deaths and complications due to PPH. This is a key element of the logistic cycle that is directly linked to customer satisfaction, by ensuring that the necessary products for service delivery are available and ready for use within the health system.

Table 5: Essential Commodities for the Management of PPH

S/N	ITEM	COMMENTS
A	**DRUGS**	
1	Oxytocin 10IU	
2	Misoprostol 200mcg	
3	Heat Stable Carbetocin (HSC) 100mcg	
4	Ergometrine 0.5mg	
5	Tranexamic Acid 1g	
6	IV Fluids	
7	Calibrated drapes	
8	Consumables (cannulae, urethral catheter, blood and fluid giving set)	
B	**Laboratory Reagents**	**For: PCV, blood grouping and cross matching, clotting profile, renal function test.**
	Equipped Blood Bank	**Blood and blood products, blood bag, blood giving sets, blood screening reagents, machines, microscopes, etc.**
C	**Equipment**	
1	Sphygmomanometer	
2	Stethoscope	
3	Sample bottles	
4	Syringes and needles	
5	Weighing scale	
6	Non-Pneumatic Anti-shock Garment	
7	Hand – held ultrasound scan	

Table 6: Contents of PPH Emergency Bundle for Health Care Workers

1. Oxytocin, ergometrine, oxytocin-ergometrine fixed combination
2. Tranexamic Acid
3. Sterile water or normal saline for dilution
4. One tourniquet
5. Three 20-mL syringes and needles
6. Methylated spirit
7. Gloves—at least 2 pairs
8. IV needle and tubing
9. 1L of Normal saline
10. Heat Stable Carbetocin
11. Ambu Bag
12. Laryngeal mask
13. IV Cannula size 14/16
14. Oxygen
16. Urethral catheter and urine bag
17. Infusion sets
18. Surgical gloves
19. Calibrated drape

4.4. Warehousing and Distribution

Good warehousing practice entails receiving, putting away, ordering, picking and timely last mile delivery (LMD). The LMD will be dependent on an effective distribution network which is largely influenced by the number of storage facilities, location, ownership, warehouse operations and transportation management.

4.5. Logistics Management Information System (LMIS)

The purpose of LMIS is to collect, organized and report information to other levels in the system in order to make decisions that will guaranty fulfilment of the six rights of logistics.

The three essential data items are:

- **Stock-on-hand:** quantity of usable stock available at a particular time.
- **Consumption data:** Quantity of drugs or consumables dispensed to users during the reporting period.
- **Losses/adjustment:** Quantity of products removed from the system for anything other than dispensing to patients or issuing to another facility. It can be positive or negative.

4.6. Pharmacovigilance

Good pharmacovigilance practice will identify risks and risk factors in the shortest possible time to avoid or minimize harm. It is important that all healthcare providers involved in the management of PPH in Nigeria, at various service delivery points, assess their patients for adverse drug reactions at every encounter and report all suspected adverse events to the National Agency for Food and Drug Administration and Control (NAFDAC), using the required approved protocols.

CHAPTER 5:

Monitoring And Evaluation.

Monitoring and evaluation systems in PPH must include indicators that improve the clinical outcomes of patients and guide programme management. Below are some indicators that are used in the monitoring and evaluation processes for a successful implementation of PPH interventions.

Table 7: Monitoring and Evaluation Indicators

	Indicator	Numerator	Denominator	Reporting frequency	Data source/MOV
1	Proportion of women who had calibrated drape used for blood loss estimation	Number of women who had calibrated drapes used for blood loss estimation	Number of women who delivered at the facility	Monthly	
2	Proportion of women that had uterotonic administered within 1minute of delivery	Number of women who gave birth in a health facility who had uterotonic administered within 1 minute to prevent PPH	Number of women who delivered in the facility	Monthly	
3	Proportion of women who had AMSTL	Number of women who had AMSTL	Number of women who delivered in the facility	Monthly	
4	Proportion of women who developed PPH due to retained products of conception	Number of women who developed PPH due to retained products	Number of women who developed PPH	Monthly	
5	Proportion of women with retained placenta that were referred	Number of women who had retained placenta that were referred.	Number of women who had retained placenta	Monthly	
6	Proportion of women that developed PPH at the facility	Number of women who developed PPH	Number of women who delivered in the facility	Monthly	
8	Proportion of PPH cases referred	Number of women who developed PPH that were referred	Number of women who developed PPH	Monthly	
9	Proportion of PPH referral cases that were managed	Number of referred PPH cases that were managed	Number of PPH cases managed	Monthly	
10	Proportion of women who had PPH due to uterine atony	Number of women who developed PPH due to uterine atony	Number of women who developed PPH	Monthly	

11	Percentage of women who had PPH due to cervical/vaginal laceration	Number of women who developed PPH due to Cervical/vaginal laceration	Number of women who developed PPH	Monthly	
12	Percentage of women who had PPH due to uterine rupture	Number of women who developed PPH due to uterine rupture	Number of women who developed PPH	Monthly	
13	Percentage of women who had PPH due to coagulopathy	Number of women who developed PPH due to coagulopathy	Number of women who developed PPH	Monthly	
14	Percentage of women who had PPH and managed with Non-pneumatic Anti-shock Garment (NASG)	Number of women who developed PPH and managed with NASG	Number of women who developed PPH	Monthly	
15	Percentage of women who developed PPH and were managed using E-MOTIVE bundle	Number of women who were managed using E-MOTIVE bundle	Number of women who delivered in the facility	Monthly	
16	Percentage of maternal death due to PPH	Number of women who died from PPH	Number of maternal deaths	Monthly	
17	PPH case fatality Rate	Number of women who died from PPH	Number of women who developed PPH	Monthly	