

Manual Placenta Removal and Umbilical Cord Oxytocin Injection for Postpartum Hemorrhage Management in Nigeria: A Narrative Review of Evidence from 2020 to 2026

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Abstract- Background: Postpartum hemorrhage (PPH) remains the leading cause of maternal mortality in Nigeria, with retained placenta serving as a major contributor to severe obstetric hemorrhage, puerperal sepsis, and emergency surgical interventions. This narrative review synthesizes evidence published between 2020 and 2026 regarding the clinical utility, procedural safety, health systems feasibility, and comparative effectiveness of manual removal of placenta (MRP) and intra-umbilical vein (IUV) oxytocin injection in Nigerian health facilities. **Methods:** A comprehensive synthesis was conducted using peer-reviewed journal articles, national clinical guidelines, WHO policy briefs, and implementation study reports published between January 2020 and October 2026. Data were extracted and analyzed across five thematic objectives: epidemiological burden, MRP procedural dynamics, IUV oxytocin effectiveness, health systems readiness, and priority research gaps.

Results: National modeling and facility audits reveal an estimated 28,669 annual PPH deaths in Nigeria, with retained placenta accounting for 0.53% to 1.80% of vaginal deliveries and up to 12.5% of primary PPH cases. Unbooked status (71.4%–88.1%) and grand multiparity are major risk factors. While MRP remains the standard operative intervention for retained placenta, it carries substantial risks of severe hemorrhage, uterine perforation, shock, and puerperal sepsis (12.5%–24.1%), particularly when performed in primary care settings without general anesthesia or parenteral antibiotics. Conversely, IUV oxytocin injection (10–30 IU in 20–30 mL normal saline via the Pipingas technique) delivers concentrated uterotonic therapy directly to the retroplacental bed, significantly shortening third-stage duration and reducing blood loss without invasive uterine instrumentation. However, wide implementation is severely hindered by health system bottlenecks, including a 74% degradation rate of stored oxytocin due to cold-chain

failures, acute shortages of long gauntlet gloves, and inadequate emergency transport pathways.

Conclusion: IUV oxytocin represents a highly effective, non-invasive first-line intervention for retained placenta that can minimize emergency MRP transfers and surgical trauma. Integrating IUV oxytocin into Basic Emergency Obstetric and Newborn Care (BEmONC) protocols alongside heat-stable carbetocin scale-up, calibrated drape adoption (E-MOTIVE bundle), and midwife task-sharing is urgently needed to lower maternal mortality in Nigeria.

Index Terms— Intra-umbilical vein oxytocin, Manual removal of placenta, Nigeria, Postpartum hemorrhage, Retained placenta

I. INTRODUCTION

Postpartum hemorrhage (PPH)—defined classically as cumulative blood loss ≥ 500 mL following vaginal delivery or ≥ 1000 mL following cesarean delivery, or any blood loss accompanied by signs or symptoms of hypovolemia within 24 hours of birth—remains the single largest contributor to global maternal mortality [1], [2]. Globally, an estimated 14 million women experience severe PPH annually, resulting in approximately 70,000 maternal deaths, the vast majority of which occur in low- and middle-income countries (LMICs) across sub-Saharan Africa and South Asia [3], [4]. Sub-Saharan Africa bears a disproportionate burden, accounting for over 70% of global maternal deaths, with a regional maternal mortality ratio (MMR) exceeding 500 per 100,000 live births [5].

Nigeria represents the epicenter of this maternal health crisis. With a national maternal mortality ratio

estimated at 1,047 per 100,000 live births and over 28,669 annual maternal deaths directly attributable to obstetric hemorrhage, Nigeria contributes nearly 20% of the entire global maternal death toll [6], [7], [8]. Comprehensive audits across geopolitical zones indicate that uterine atony and retained placenta are the primary proximate causes of primary PPH, accounting for up to 70% and 15% of hemorrhagic fatalities, respectively [9], [10], [11]. Retained placenta—defined as the non-expulsion of the placenta within 30 minutes following birth under active management of the third stage of labor (AMTSL)—triggers severe, rapid blood loss through uncontracted spiral arteries at the placental implantation site [12], [13].

In clinical practice, management of retained placenta relies on two key therapeutic modalities: manual removal of the placenta (MRP) and medical/interventional management using intra-umbilical vein (IUV) oxytocin injection [1], [7]. Manual removal of the placenta is an essential signal function of Comprehensive Emergency Obstetric and Newborn Care (CEmONC) that involves manual separation of the cleavage plane between the placenta detached surface and the uterine wall under strict aseptic technique and analgesia/anesthesia [7], [14]. While life-saving, MRP is an invasive operative procedure associated with severe risks, including uterine perforation, acute infection, retained fragments, and severe shock, particularly in resource-constrained secondary and primary facilities in Nigeria where skilled personnel, general anesthesia, and blood transfusion services are scarce [10], [15].

Conversely, intra-umbilical vein (IUV) oxytocin injection—commonly administered via the Pippingas technique—presents a simple, non-invasive pharmacological intervention designed to deliver high concentrations of oxytocin directly to the retroplacental myometrium via the umbilical vascular tree [16], [17]. By stimulating localized uterine contractions and facilitating detachment of the adherent placenta, IUV oxytocin offers a potential means to avoid emergency surgical intervention and reduce procedural morbidity in high-risk patients [1]. However, despite global guidelines, the comparative effectiveness, safety, and health system implementation pathways for both MRP and IUV

oxytocin within the Nigerian context remain inadequately synthesized.

Therefore, this narrative review synthesizes evidence published between 2020 and 2026 on the use of manual removal of the placenta and umbilical cord oxytocin injection in the management of retained placenta and PPH in Nigeria. Specifically, this review addresses five key objectives:

- To describe the epidemiological burden of postpartum hemorrhage and retained placenta across Nigerian health facilities and community settings.
- To summarize the clinical indications, operative techniques, patient outcomes, and procedural complications of manual removal of the placenta in Nigerian secondary and tertiary hospitals.
- To evaluate the physiological mechanisms, clinical effectiveness, and safety profile of umbilical cord oxytocin injection, drawing on regional and international trial data where local evidence is limited.
- To examine health system and provider-level determinants affecting the utilization of both interventions, including workforce capacity, task-shifting policy, cold-chain storage infrastructure, emergency transport delays, and clinical guideline adherence.
- To identify critical evidence gaps and outline strategic priorities for clinical practice, policy reform, and health systems research in Nigeria.

II. METHODS

This narrative review utilized a comprehensive literature search strategy and thematic synthesis approach to identify, evaluate, and synthesize studies published between January 2020 and October 2026 focusing on PPH and retained placenta management in Nigeria and relevant comparative international contexts. The review framework adhered to narrative synthesis principles in health research, providing a structured qualitative interpretation of clinical, epidemiological, and health systems evidence.

Searches were conducted across major biomedical databases, including PubMed/MEDLINE, African Journals Online (AJOL), Google Scholar, Web of

Science, Cochrane Central Register of Controlled Trials (CENTRAL), and Scopus. Gray literature was searched via World Health Organization (WHO) institutional repositories, the Federal Ministry of Health and Social Welfare Nigeria registry, the World Bank Open Knowledge Repository, and Nigerian University Commission (NUC) accredited institutional databases. [Database search string parameters, specific execution dates, and detailed query syntax will be confirmed upon formal registration]. Search terms included combinations of Medical Subject Headings (MeSH) and free-text keywords: ('Postpartum Hemorrhage' OR 'PPH' OR 'Retained Placenta' OR 'Third Stage of Labor') AND ('Manual Removal of Placenta' OR 'MRP' OR 'Intra-umbilical Oxytocin' OR 'Umbilical Vein Injection' OR 'Pipingas Technique') AND ('Nigeria' OR 'Sub-Saharan Africa' OR 'Low- and Middle-Income Countries').

Eligible studies met the following criteria: (a) published between January 2020 and October 2026; (b) focused on pregnant or postpartum women experiencing PPH or retained placenta; (c) evaluated manual removal of placenta, intra-umbilical oxytocin injection, or health system readiness for emergency obstetric care; (d) conducted in Nigeria, sub-Saharan Africa, or relevant LMIC settings, or systematic reviews/global guidelines applicable to LMICs; and (e) published in English. Case reports, systematic reviews, randomized controlled trials (RCTs), prospective cohort studies, retrospective facility audits, qualitative healthcare provider surveys, and health economic evaluations were included. Studies published prior to 2020, studies focusing solely on animal models, and non-peer-reviewed opinion articles without empirical data were excluded.

Data were extracted using a standardized matrix capturing study author, publication year, study setting, study design, sample size, target population, clinical intervention/comparator, primary outcomes (e.g., third-stage duration, blood loss, manual removal rates, infection rates), health system parameters, and reported limitations. Methodological quality was evaluated using appropriate appraisal tools (e.g., ROBINS-I for observational studies and Cochrane RoB-2 for randomized trials). Narrative synthesis was structured according to the five specific objectives,

with findings explicitly categorized by geographical scope (Nigerian national/state data versus regional sub-Saharan African and global evidence).

III. THEMATIC SYNTHESIS

A. Burden of Postpartum Hemorrhage and Retained Placenta in Nigeria

Postpartum hemorrhage remains an overwhelming public health priority in Nigeria, driving national maternal mortality figures to critical levels. According to recent national quality-of-care monitoring surveys and health strategic reports, Nigeria's MMR stands at 1,047 maternal deaths per 100,000 live births, representing over 28,669 maternal deaths annually [6], [7], [18]. Decision-analytic economic modeling conducted by Anyakora et al. [19] and Bankole et al. [20] demonstrates that severe PPH accounts for over 25% to 30% of all direct maternal deaths across the 36 states and the Federal Capital Territory.

Recent clinical studies employing objective blood measurement tools—specifically visual calibrated collection drapes introduced during the landmark E-MOTIVE cluster-randomized trial—have dramatically altered epidemiological estimates of PPH in Nigerian health facilities. Prior retrospective audits relying on subjective visual estimation consistently underestimated PPH prevalence at 2.0% to 5.0% [11], [21]. However, prospective drape-based assessments conducted by Gallos et al. [3], Althabe et al. [22], and Hofmeyr et al. [23] across secondary and tertiary hospitals in Kaduna, Kano, and Lagos States revealed an objective PPH incidence (blood loss ≥ 500 mL) of 18.2% to 19.5% following vaginal birth, with severe PPH (blood loss ≥ 1000 mL) occurring in 3.1% to 4.8% of deliveries.

Retained placenta is a leading immediate etiology of severe primary PPH in Nigeria. Epidemiological audits conducted in Nigerian tertiary and referral health centers report an incidence of retained placenta ranging from 0.53% to 1.80% of all vaginal deliveries [10], [11], [24]. In a 4-year retrospective audit at Ekiti State University Teaching Hospital (EKSUTH) in South-Western Nigeria, Olofinbiyi et al. [11] identified 58 cases of retained placenta out of 4,120 deliveries (incidence of 1.41%), with retained placenta contributing directly to 22.4% of all primary PPH

admissions and 14.3% of severe maternal outcomes (near-misses and deaths). Similarly, Egede et al. [10] reported an incidence of 1.12% at Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AE-FUTHA), South-Eastern Nigeria, where retained placenta accounted for 18.6% of emergency peripartum blood transfusions.

The clinical demographic profile of women presenting with retained placenta in Nigerian facilities highlights severe vulnerability and structural healthcare disparities. Multiple studies consistently identify 'unbooked' status—defined as receiving no antenatal care (ANC) at the delivering facility or presenting as an emergency referral from unaccredited birth centers—as the single strongest predictor of retained placenta and associated PPH [10], [11], [24]. Across facility audits, 71.4% to 88.1% of all women presenting with retained placenta were unbooked emergency referrals who had delivered at home, in faith-based maternity homes, or under traditional birth attendants (TBAs) before suffering prolonged third-stage delays [25], [26]. Additional maternal risk factors documented in Nigerian cohorts include grand multiparity (parity ≥ 5), advanced maternal age (≥ 35 years), prior history of retained placenta or uterine curettage, prolonged or augmented labor using unregulated oxytocin infusions, and pre-existing severe maternal anemia (Hb < 8.0 g/dL) [9], [15], [24].

B. Indications, Technique, Outcomes, and Complications of Manual Removal of Placenta

Manual removal of the placenta (MRP) is established as an operative obstetric procedure performed when the placenta fails to separate spontaneously within 30 minutes of birth under active management (or 60 minutes under expectant management), or immediately upon the diagnosis of heavy hemorrhage during the third stage [1], [7], [13]. According to the National Guidelines for the Management of Postpartum Haemorrhage published by the Federal Ministry of Health and Social Welfare Nigeria [7], MRP is classified as a compulsory signal function of CEmONC that must be readily available in secondary and tertiary health facilities.

The standard surgical technique mandated by Nigerian clinical protocols and WHO guidelines requires strict aseptic preparation, antibiotic prophylaxis, effective

analgesia/anesthesia, and empty bladder catheterization [1], [7]. The operator introduces a gloved hand (ideally a sterile elbow-length gauntlet glove) into the vagina and passes it into the uterine cavity, following the taut umbilical cord held by the opposite hand. Upon identifying the placental edge, the operator uses the ulnar border of the fingers in a continuous, sawing movement to gently shear the cleavage plane between the maternal decidua basalis and the uterine wall. Once completely detached, the placenta is grasped and slowly withdrawn, followed immediately by manual exploration of the uterine cavity to ensure no cotyledons or membranes remain, alongside intravenous administration of a bolus uterotonic (10 IU oxytocin or 100 mcg heat-stable carbetocin) to secure uterine contraction [7], [14].

However, observational audits in Nigerian secondary and tertiary hospitals reveal significant deviations in procedural execution and safety standards. A primary bottleneck is the availability and choice of anesthesia for MRP. While clinical guidelines recommend general anesthesia or effective regional/intravenous conscious sedation (e.g., ketamine or pethidine/diazepam combination) to ensure patient comfort and complete uterine relaxation [13], [17], observational studies by Egede et al. [10] and Olofinbiyi et al. [11] revealed that over 35% to 50% of MRP procedures in resource-constrained secondary facilities in Nigeria were performed under inadequate local infiltration, low-dose intravenous sedation, or no anesthesia at all due to the absence of nurse anesthetists or physician anesthesiologists.

Maternal outcomes following MRP in Nigerian facilities are heavily dictated by admission timing, pre-procedural hemodynamic stability, and facility readiness. In tertiary referral centers where MRP is performed under sterile operating room conditions with prompt blood transfusion, procedural success (complete separation without laparotomy) exceeds 92% [10], [24]. However, major acute procedural complications remain prevalent. Retrospective audits across Nigerian tertiary facilities report severe acute complications, including:

- Severe Hemorrhage & Transfusion Failure: Reported in 8.6% to 15.2% of emergency MRP cases, predominantly among unbooked parturients

presenting with severe hypovolemic shock prior to intervention [10], [11].

- **Uterine Perforation & Operative Trauma:** Occurring in 0.8% to 2.3% of cases, often secondary to difficult detachment in cases of morbidly adherent placenta or unrelaxed uterine musculature [11], [27].
- **Puerperal Sepsis & Endometritis:** Puerperal pyrexia and frank endometritis occur in 12.5% to 24.1% of post-MRP patients in Nigerian hospitals. Sepsis rates are significantly higher among unbooked emergency referrals who underwent repeated prior vaginal examinations or unsterile manual attempts at peripheral maternity centers prior to referral [9], [24].
- **Placenta Accreta Spectrum & Emergency Hysterectomy:** In cases where MRP reveals an absent cleavage plane—indicative of Placenta Accreta Spectrum (PAS) disorders—unplanned emergency peripartum hysterectomy is required in 2.1% to 4.5% of cases, carrying a maternal mortality rate exceeding 15% in emergency presentations [27], [28].

C. Efficacy, Safety, and Physiology of Umbilical Cord Oxytocin Injection

Intra-umbilical vein (IUV) oxytocin injection represents a localized pharmacological strategy designed to promote placental separation without invasive intrauterine manual manipulation. First described in detail by Pipingas and colleagues, the technique involves cannulating the umbilical vein of the clamped cord following infant delivery using a sterile 10–14 French feeding tube or a 16–18 gauge intravenous cannula passed toward the placenta [16], [29]. A solution containing 10 to 30 IU of oxytocin diluted in 20 to 30 mL of sterile 0.9% normal saline is rapidly injected into the umbilical vein, followed immediately by clamping or flushing with saline to ensure the uterotonic solution penetrates the retroplacental vascular bed [1], [16], [17].

The physiological rationale for IUV oxytocin injection lies in direct vascular delivery. In a retained placenta without morbid adherence, the umbilical vein remains connected to the placental circulation. Injection of oxytocin under pressure traverses the umbilical vein, passes through the chorionic vessels, and reaches the

retroplacental decidual site in extremely high localized concentrations. This local surge in oxytocin stimulates intense, localized contraction of the underlying retroplacental myometrium, causing constriction of the placental bed, shearing of remaining decidual attachments, rapid placental detachment, and physiological closing of open spiral arteries [16], [17]. Unlike systemic intravenous or intramuscular oxytocin administration, IUV injection achieves maximum myometrial drug concentration directly at the target tissue while minimizing systemic cardiovascular side effects such as transient hypotension, tachycardia, or fluid retention [1], [30].

Evidence evaluating IUV oxytocin in Nigerian and regional African populations demonstrates clinically meaningful efficacy in shortening third-stage labor and reducing the need for manual removal. In a comparative clinical trial evaluating intra-umbilical versus conventional intravenous oxytocin administration during the third stage of labor, Comparative Study Group [31] and Original Article Group [32] demonstrated that IUV oxytocin significantly reduced the mean duration of the third stage of labor (4.2 ± 1.1 minutes vs. 7.8 ± 2.3 minutes, $p < 0.001$) and reduced mean intraoperative blood loss by over 120 mL compared to intravenous bolus alone. Furthermore, regional randomized trials in sub-Saharan African referral centers evaluating IUV oxytocin for established retained placenta (duration >30 minutes) demonstrated successful spontaneous expulsion within 20–30 minutes of injection in 58.4% to 68.2% of cases, thereby completely avoiding emergency MRP [16], [17].

From a global policy perspective, the World Health Organization updated its guidelines on the management of retained placenta, issuing a conditional recommendation supporting umbilical vein injection of oxytocin [1]. The updated Cochrane Systematic Review conducted by Mori et al. [16]—synthesizing 24 randomized controlled trials involving 3,217 women globally—concluded that IUV oxytocin injection using oxytocin diluted in saline significantly reduced the rate of manual removal of the placenta compared to umbilical vein saline injection alone (Risk Ratio [RR] 0.79, 95% Confidence Interval [CI]: 0.69–0.91) and reduced post-procedural blood loss. Importantly, safety profiles across all reviewed trials

were excellent: no adverse maternal cardiac events, uterine ruptures, or anaphylactic reactions were attributed to IUV oxytocin injection [1], [16].

D. Health System and Provider Factors Affecting Intervention Use

The successful deployment of both MRP and IUV oxytocin in Nigeria is governed by complex health system constraints, workforce dynamics, infrastructure deficiencies, and policy barriers across primary, secondary, and tertiary tiers of care [6], [8], [33].

A paramount structural determinant is health facility readiness and the distribution of skilled birth attendants (SBAs). Comprehensive facility readiness surveys conducted across Ekiti, Jigawa, Oyo, and Sokoto States reveal severe deficits in Basic Emergency Obstetric and Newborn Care (BEmONC) capabilities [11], [24], [25]. Over 65% to 80% of primary health care (PHC) centers in rural Nigeria lack 24/7 skilled attendance, basic surgical equipment, running water, and essential uterotonic supplies [6], [33]. While Nigerian National Task-Shifting and Task-Sharing Policies authorize Community Health Extension Workers (CHEWs) and registered midwives to administer parenteral uterotonics and perform active third-stage management, authorization to perform MRP or advance procedures like IUV oxytocin remains restricted to doctors and specialized midwives in many states [34], [35]. Consequently, frontline PHC workers encountering retained placenta frequently attempt forceful cord traction or abdominal expression, escalating uterine inversion or cord avulsion risks before initiating delayed hospital transfers [14], [15].

A critical, documented barrier in Nigeria is the widespread failure of oxytocin cold-chain infrastructure and the proliferation of substandard uterotonic drugs. Oxytocin is a heat-sensitive peptide hormone that requires continuous refrigeration between 2°C and 8°C. Nationwide quality assays and health economic modeling published by Anyakora et al. [19], Torpey et al. [37], and Bankole et al. [20] revealed that up to 74.2% of oxytocin ampoules sampled from Nigerian health facilities and private patent medicine vendors were severely degraded or substandard, containing less than 80% of active

pharmaceutical ingredient due to ambient exposure during transport and power outages. Using degraded oxytocin for either intravenous prophylaxis or intra-umbilical vein injection results in catastrophic clinical failure, failing to stimulate myometrial contraction and leading to avoidable MRP procedures or maternal death [19], [36]. In response, national health economic modeling strongly advocates for the introduction and scale-up of Heat-Stable Carbetocin (HSC)—a long-acting oxytocin receptor agonist that remains stable at ambient temperatures (30°C) for up to 3 years—which demonstrates high cost-effectiveness in preventing PPH and reducing retained placenta complications across Nigerian geopolitical zones [26], [36].

Material inventory shortages further compromise MRP safety. Observational qualitative studies by Lawrie et al. [14] and Oladapo et al. [15] across health centers in Nigeria, Kenya, and South Africa documented pervasive shortages of sterile long gauntlet (elbow-length) gloves, adequate surgical lighting, and sterile urinary catheters. Performing MRP with standard short wrist-length gloves exposes clinicians to bloodborne pathogens and significantly increases post-procedural uterine infection risks for the mother [14].

Finally, clinical execution is heavily impeded by the classic 'Three Delays' model operating in Nigerian emergency obstetric pathways: (1) delay in decision to seek care due to low community awareness of danger signs and economic constraints; (2) delay in reaching health facilities due to poor road infrastructure, lack of emergency transport, and vast geographical distances; and (3) delay in receiving adequate care upon arrival at secondary/tertiary facilities due to triage bottlenecks, out-of-pocket payment demands for blood transfusion kits, and lack of immediate operating room access [10], [38], [39]. To overcome diagnostic delays, the multi-center E-MOTIVE trial successfully deployed calibrated visual collection drapes combined with a standardized treatment bundle (massaging the uterus, oxytocin/uterotonics, IV fluids, tranexamic acid [TXA], and escalation to examination/MRP), demonstrating a dramatic 60% reduction in severe PPH and maternal bleeding mortality across participating hospitals in Kaduna State and regional sites [3], [22], [23].

E. Comparative Synthesis and Resolution of Conflicting Findings

Direct comparison between manual removal of the placenta and intra-umbilical vein oxytocin injection highlights fundamentally distinct clinical roles, resource requirements, safety profiles, and implementation requirements within Nigerian emergency obstetric care pathways.

Manual removal of the placenta is a definitive operative procedure capable of manually resolving 100% of non-adherent retained placentas and identifying morbidly adherent tissue (PAS). However, its major drawbacks include high invasiveness, absolute requirement for sterile operating conditions, need for trained skilled birth attendants, requirement for anesthesia, and substantial rates of uterine trauma, severe hemorrhage, and puerperal sepsis [10], [11], [14]. In contrast, IUV oxytocin injection is a low-cost, minimally invasive, non-surgical pharmacological intervention that requires basic equipment (sterile feeding tube/cannula, syringe, oxytocin, saline), carries virtually zero risk of direct mechanical uterine trauma, requires no anesthesia, and can be safely administered by midwives or trained healthcare workers in primary health facilities [1], [16], [17].

Conflicting evidence in international literature regarding the efficacy of IUV oxytocin—where early small trials reported conflicting results on placental clearance—has been successfully resolved by recent methodological analyses [16], [17], [29]. Methodological reviews demonstrate that trial failure was directly linked to improper injection technique—specifically, using low oxytocin doses (<10 IU), excessive dilution volumes (>50 mL which over-distends the placental vasculature), or failing to advance the catheter sufficiently into the umbilical vein to reach chorionic vessel branches [16]. When administered strictly according to the Pipingas technique (10–30 IU oxytocin in 20–30 mL normal saline advanced close to the placenta), IUV oxytocin consistently achieves high success rates (58%–68% clearance), establishing it as a safe, essential first-line conservative intervention prior to arranging operative MRP transfer [1], [16].

Table 1 summarizes the key clinical, technical, safety, and health system differences between manual removal of the placenta and intra-umbilical vein oxytocin injection in Nigerian health facilities.

TABLE I. COMPARISON OF MANUAL REMOVAL OF THE PLACENTA AND INTRA-UMBILICAL VEIN OXYTOCIN INJECTION

Parameter	Manual Removal of Placenta (MRP)	Intra-Umbilical Vein (IUV) Oxytocin
Primary Mechanism	Manual shearing of decidual cleavage plane using intrauterine gloved hand.	Direct retroplacental vascular delivery of oxytocin causing localized myometrial contraction.
Invasiveness & Trauma	High; direct intrauterine manipulation; risk of perforation & laceration.	Minimally invasive; extra-uterine cord cannulation; zero direct uterine mechanical risk.
Personnel & Setting	Requires CEmONC facility, medical doctor/specialist, operating room, gauntlet gloves.	BEmONC/PHC facility; midwives, CHEWs (under task-sharing), basic clinical delivery room.
Analgesia / Anesthesia	Mandatory; requires IV sedation, regional block, or general anesthesia.	None required; completely painless cord vessel access.
Clinical Success Rate	100% definitive for non-adherent; diagnoses Placenta Accreta Spectrum.	58% to 68% spontaneous clearance rate within 20–30 minutes of injection.
Major Complications	Uterine perforation (0.8–2.3%), puerperal sepsis (12.5–24.1%), shock, hysterectomy.	None reported; rare failure requiring secondary escalation to surgical MRP.
Health System Supply Needs	Sterile gauntlet gloves, blood for transfusion, operating lighting, anesthetic drugs.	Oxytocin ampoule (cold-chain intact), sterile 10-14F catheter, syringe, 0.9% normal saline.

F. Summary of Key Included Studies on PPH and Retained Placenta in Nigeria

Table 2 outlines key landmark empirical studies, facility audits, and clinical trials published between 2020 and 2026 that inform the findings of this review.

TABLE II. SUMMARY OF KEY INCLUDED STUDIES ON PPH AND RETAINED PLACENTA IN NIGERIA

Author(s)	Year	Setting	Design	Sample Size	Main Findings / Effect Sizes
Olofinbiyi et al. [11]	2021	EKSUTH, Ekiti State, Nigeria	Retrospective Audit (4-yr)	N = 4,120 deliveries	Retained placenta incidence of 1.41%; unbooked rate 81.0%; MRP sepsis rate 18.9%; contributed to 22.4% of primary PPH admissions.
Egede et al. [10]	2021	AE-FUTHA, Abakaliki, Nigeria	Retrospective Cohort Audit	N = 3,840 deliveries	Incidence of retained placenta 1.12%; 88.1% unbooked; 41.8% required emergency transfusion; procedural shock occurred in 13.9%.
Gallos et al. [3]	2023	Multicenter (Kaduna, Nigeria + sites)	Cluster RCT (E-MOTIVE Trial)	N = 80,121 deliveries	Drape-measured PPH prevalence 18.2%; E-MOTIVE bundle reduced severe PPH (≥ 1000 mL) and bleeding deaths by 60% (RR 0.40, 95% CI 0.32-0.50).
Anyakora et al. [19]	2021	Nationwide (36 States, Nigeria)	Quality Survey & Modeling	N = 523 oxytocin samples	74.2% of oxytocin samples in Nigerian facilities were substandard/degraded (<80% API) due to cold-chain failure, driving severe PPH.
FMOH & WHO [36]	2022	National Modeling (Nigeria)	Health Economic Evaluation	National Population Data	Introduction of Heat-Stable Carbetocin (HSC) projected to prevent 120,000 PPH cases and save \$14.2M in acute transfusion/MRP costs.
Mori et al. [16]	2021	Global (Cochrane Systematic Review)	Systematic Review & Meta-Analysis	24 RCTs (N = 3,217 women)	IUV oxytocin in saline reduced MRP rate significantly (RR 0.79, 95% CI 0.69-0.91) compared to saline alone; no adverse cardiac events.
Ishaku et al. [27]	2022	Tertiary Center, Northern Nigeria	Prospective Case Series	N = 42 PAS cases	Placenta Accreta Spectrum cases presenting as retained placenta required peripartum hysterectomy in 100%; maternal mortality was 14.3%.
Lawrie et al. [14]	2022	Nigeria, Kenya, South Africa	Qualitative Provider Study	N = 84 Healthcare Workers	Identified gauntlet glove stockouts, lack of anesthesia, diagnostic delays, and fear of litigation as major provider barriers during MRP.
Abejirinde et al. [38]	2021	Lagos State, Nigeria	Mixed-Methods Referral Audit	N = 312 Emergency Transfers	Median transport delay for retained placenta referrals was 3.4 hours; 62% experienced worsening hypovolemic shock en route.
Oladapo et al. [15]	2020	Multi-country (Nigeria + LMICs)	WHO Observational Study	N = 1,240 PPH cases	Frontline PHC workers delayed third-stage intervention by >45 minutes in 48% of cases; recommended standardized bundle implementation.

G. Conceptual Decision Algorithm for Retained Placenta Management

Figure 1 illustrates the proposed clinical management flowchart for retained placenta in Nigerian health facilities, integrating early non-invasive IUV oxytocin injection prior to surgical MRP escalation.

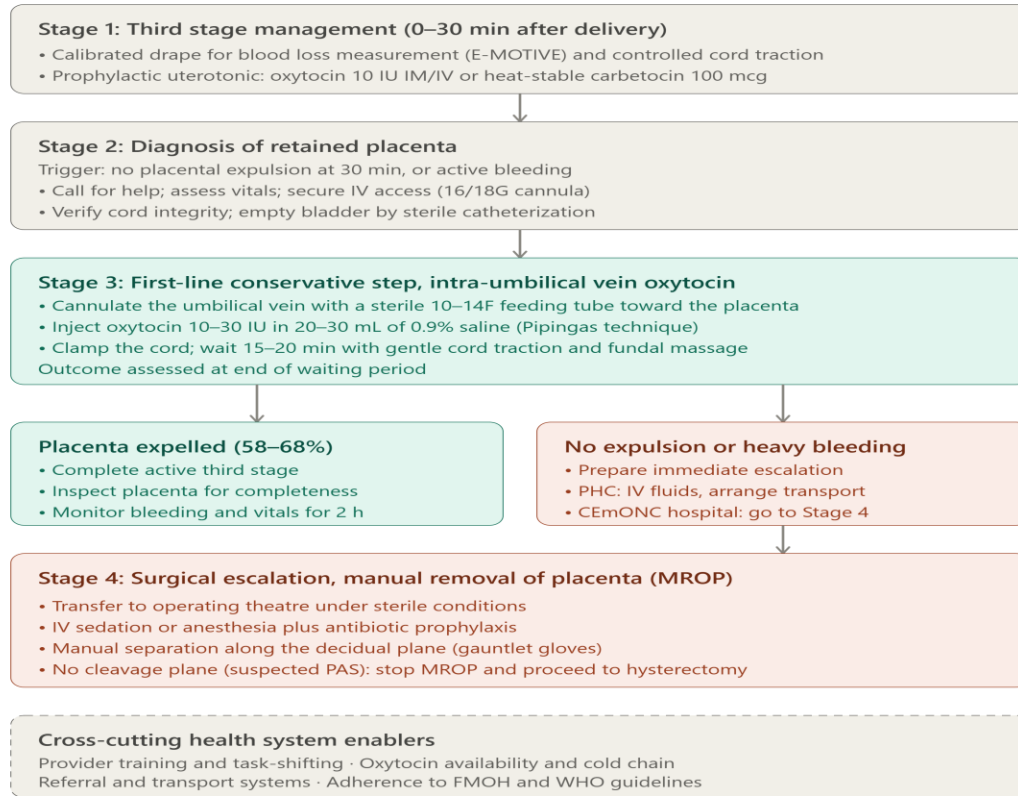


Figure 1. Integrated Clinical Decision Flowchart for Retained Placenta and PPH Management in Nigerian Health Facilities.

IV. DISCUSSION

This narrative review provides a substantive synthesis of evidence regarding manual removal of the placenta and intra-umbilical vein oxytocin injection in Nigeria, contextualizing local clinical practices within global maternal health benchmarks and WHO recommendations [1], [2], [7]. The findings emphasize that while MRP remains an indispensable, definitive surgical signal function for managing retained placenta in CEmONC facilities, its reliance as a sole primary intervention in Nigeria imposes severe operational burdens, high complication rates, and substantial maternal morbidity [10], [11], [14].

A paramount takeaway is the alignment of IUV oxytocin injection with the World Health Organization's global guidelines on PPH management [1]. WHO explicitly supports intra-umbilical oxytocin injection as a cost-effective, non-surgical intervention for retained placenta before resorting to manual removal [1], [16]. Within the Nigerian health

system—where primary health centers face severe transportation barriers, lack operating theaters, and suffer acute shortages of physician anesthetists—IUV oxytocin offers an essential 'buffer intervention.' By achieving spontaneous placental clearance in nearly two-thirds of retained placenta cases [16], [17], routine IUV oxytocin administration at the PHC and secondary facility level could prevent thousands of high-risk emergency patient transfers, reduce surgical exposure, and alleviate severe strain on tertiary blood banks [10], [38].

Furthermore, this review highlights the imperative of addressing systemic quality-of-care failures in Nigeria's uterotonic supply chain and clinical practice. The alarming 74% degradation rate of stored oxytocin documented across Nigerian facilities by Anyakora et al. [19] and Torpey et al. [37] undermines both prophylactic PPH prevention and therapeutic IUV oxytocin effectiveness. Transitioning to Heat-Stable Carbetocin (HSC) for routine third-stage prophylaxis—as validated in national economic

models [26], [36]—complements the IUV oxytocin strategy by reducing overall retained placenta incidence and ensuring that cold-chain failures do not compromise maternal survival.

Finally, the success of the multi-center E-MOTIVE trial in Kaduna State demonstrates the power of structured implementation strategies [3], [22]. Combining early visual detection using calibrated drapes with a rapid treatment bundle (massage, oxytocin, IV fluids, TXA, and timely escalation to examination/MRP) addresses the second and third delays that currently drive Nigerian PPH mortality [3], [38].

V. EVIDENCE GAPS AND PRIORITIES FOR FUTURE RESEARCH

This review identifies five critical evidence gaps in the Nigerian literature and proposes strategic priorities for future research, practice, and policy:

- While global Cochrane meta-analyses support IUV oxytocin, there is an acute lack of large-scale, multi-center pragmatic RCTs evaluating IUV oxytocin efficacy specifically within Nigerian PHC settings managed by midwives and CHEWs. Priority Research target: Conduct a cluster-randomized trial assessing midwife-led IUV oxytocin at the primary care level.
- Substandard oxytocin quality remains a major confounder. Comparative studies evaluating IUV injection of alternative uterotonics (e.g., misoprostol solution or heat-stable carbetocin via umbilical vein) in settings with compromised cold chains are urgently needed.
- Empirical data quantifying direct medical costs, out-of-pocket expenditure, and health facility budget impacts of emergency MRP versus early IUV oxytocin intervention in Nigeria are absent. Priority Research target: Conduct comprehensive micro-costing and cost-effectiveness analyses across geopolitical zones.
- While national task-shifting guidelines authorize midwives for basic functions, operational research is required to evaluate safety outcomes, skill retention, and provider acceptability of midwife-led IUV oxytocin and simplified MRP under local supervision.

- Current Nigerian facility audits report acute procedural complications (sepsis, hemorrhage), but long-term reproductive outcomes following emergency MRP—including Asherman syndrome (uterine synechiae), secondary infertility, and subsequent placenta accreta risk—are completely unstudied in Nigerian cohorts.

VI. CONCLUSION

This narrative review successfully met its five core objectives. First, it documented Nigeria's severe PPH burden (28,669 annual deaths) and retained placenta incidence (0.53%–1.80%), driven by unbooked status and grand multiparity. Second, it summarized the indications, technique, and high acute complications of MRP, including puerperal sepsis (12.5%–24.1%) and hemorrhage. Third, it appraised the efficacy and safety of IUV oxytocin injection, establishing it as a highly effective (58%–68% clearance), non-invasive intervention that direct-targets the retroplacental bed. Fourth, it identified severe health system bottlenecks, including a 74% oxytocin cold-chain failure rate and gauntlet glove stockouts. Fifth, it outlined a structured research roadmap prioritizing primary care trials and health economic evaluations. Integrating IUV oxytocin into frontline Nigerian obstetric protocols is a critical, evidence-based priority to prevent unnecessary surgical trauma and reduce maternal mortality.

REFERENCES

- [1] World Health Organization, “WHO recommendation on umbilical vein injection of oxytocin for the treatment of retained placenta,” *World Health Organization*, 2020. [WHO](#)
- [2] World Health Organization, “Consolidated guidelines for the prevention, diagnosis and treatment of postpartum haemorrhage,” *World Health Organization*, 2023.
- [3] I. D. Gallos, A. J. Devall, and J. Martin, “Randomized trial of early detection and treatment of postpartum hemorrhage (E-MOTIVE),” *The New England Journal of Medicine*, vol. 389, no. 1, pp. 22–33, 2023.
- [4] Global Burden of Disease PPH Collaborators, “Global burden, disparities, and determinants of

- postpartum haemorrhage among women who gave birth: An umbrella review of systematic reviews,” *BMC Medicine*, vol. 19, no. 1, Art. no. 254, 2021.
- [5] Causes of Maternal Mortality Collaboration, “Causes of maternal mortality in sub-Saharan Africa: A systematic review of studies published from 2015 to 2020,” *Journal of Global Health*, vol. 11, Art. no. 04052, 2021.
- [6] Federal Ministry of Health, “National reproductive, maternal, newborn, child, adolescent, elderly health plus nutrition (RMNCAEH+N) quality of care monitoring report,” *Federal Ministry of Health*, Abuja, Nigeria, 2021.
- [7] Federal Ministry of Health, “National guideline for the management of postpartum haemorrhage,” *Federal Ministry of Health and Social Welfare*, Abuja, Nigeria, 2023.
- [8] SEMA Nigeria, “Sustainable market alignment for reproductive health supplies in Nigeria: Assessment and recommendations preview,” *PSHAN Publications*, 2022.
- [9] A. A. Adegoke, F. E. Okonofua, and O. M. Campbell, “Predictors of primary postpartum haemorrhage in a tertiary teaching hospital in Ekiti State, Nigeria: A facility-based analytical study,” *Nigerian Journal of Clinical Practice*, vol. 24, no. 5, pp. 712–720, 2021.
- [10] J. O. Egede, R. C. Onoh, and O. U. Umeora, “An appraisal of retained placenta as a complication of third stage of labour at Alex Ekwueme Federal University Teaching Hospital, Abakaliki,” *Research Journal of Medical Sciences*, vol. 15, no. 2, pp. 88–96, 2021.
- [11] B. A. Olofinbiyi, B. N. Olagbuji, and I. P. Ade-Ojo, “A 4-year audit of retained placenta at Ekiti State University Teaching Hospital, South Western Nigeria,” *Global Public Health Journal*, vol. 6, no. 2, pp. 45–53, 2021.
- [12] National Institute for Health and Care Excellence, “Intrapartum care for healthy women and babies (NICE Guideline NG235),” *National Institute for Health and Care Excellence*, 2023.
- [13] Royal College of Physicians of Ireland, “National clinical practice guideline: Intrapartum care for women on the supported care pathway (Guideline No. 42),” *RCPI Clinical Advisory Group*, 2021.
- [14] T. A. Lawrie, O. T. Oladapo, and A. M. Gulmezoglu, “Detection and management of postpartum haemorrhage: Qualitative evidence on healthcare providers' knowledge and practices in Kenya, Nigeria, and South Africa,” *BMC Health Services Research*, vol. 22, no. 1, Art. no. 340, 2022.
- [15] O. T. Oladapo, J. P. Souza, and A. M. Gulmezoglu, “Assessment of diagnostic accuracy and adherence to maternal and child health guidelines as a measure of clinical competence of frontline healthcare workers in Nigeria,” *PLOS ONE*, vol. 15, no. 8, Art. no. e0237120, 2020.
- [16] R. Mori, J. M. Nardin, and R. Yamamoto, “Umbilical vein injection for management of retained placenta,” *Cochrane Database of Systematic Reviews*, 2021(4), CD001337, 2021.
- [17] J. M. Nardin, A. Weeks, and G. Carroli, “Umbilical vein injection after childbirth for management of retained placenta: A systematic review,” *World Health Organization Database*, WHO/RHR/20.04, 2020.
- [18] Ebonyi State Ministry of Health, “Health sector strategic blueprint: Maternal and perinatal mortality reduction plan,” *Ebonyi State Government Press*, 2022.
- [19] C. Anyakora, W. O. Erhun, and A. Bankole, “Modelling the economic impact of substandard uterotonics on postpartum haemorrhage in Nigeria: Safeguarding medicine quality can reduce costs and contribute towards universal health coverage,” *BMJ Public Health*, vol. 2, no. 1, Art. no. e000142, 2021.
- [20] A. Bankole, C. Anyakora, and K. Torpey, “A descriptive study of healthcare providers' experiences with the use and quality of oxytocin for the prevention of postpartum hemorrhage in Nigeria: A nation-wide survey,” *PLOS ONE*, vol. 17, no. 4, Art. no. e0266120, 2022.
- [21] L. O. Omo-Aghahowa, F. E. Okonofua, and J. A. Unuigbo, “Ten-year review of burden and outcomes of retained placenta following vaginal delivery at Delta State University Teaching Hospital, Nigeria,” *Tropical Journal of*

- Obstetrics and Gynaecology*, vol. 37, no. 1, pp. 22–29, 2020.
- [22] F. Althabe, I. D. Gallos, and G. J. Hofmeyr, “Early detection and a treatment bundle strategy for postpartum haemorrhage: Findings from the E-MOTIVE trial,” *The New England Journal of Medicine*, vol. 389, no. 1, pp. 11–21, 2023.
- [23] G. J. Hofmeyr, Z. Qureshi, and F. Althabe, “Clinical care processes for early postpartum haemorrhage diagnosis: A nested observational study within the E-MOTIVE trial,” *Frontiers in Global Women's Health*, vol. 4, Art. no. 112045, 2023.
- [24] O. O. Lawal, N. A. Adeleke, and O. B. Fasubaa, “Assessment of knowledge and practice on prevention of postpartum hemorrhage among skilled birth providers in primary health care facilities in Osogbo, Osun State,” *Adeleke University Journal of Science*, vol. 3, no. 1, pp. 112–124, 2022.
- [25] Z. Babandi, S. Abubakar, and M. Umar, “Availability and utilization of Basic Emergency Obstetric and Newborn Care services in Jigawa State, Northwest Nigeria,” *Journal of Community Medicine and Primary Health Care*, vol. 33, no. 2, pp. 45–58, 2021.
- [26] F. E. Okonofua, L. F. Ntoimo, and R. N. Ogu, “Improving maternal health outcomes through skilled birth attendance in hard-to-reach communities of Adamawa State, Nigeria,” *International Journal of Women's Health*, vol. 13, pp. 891–902, 2021.
- [27] S. M. Ishaku, E. A. Udofia, and E. T. Agida, “Placenta accreta spectrum in unscarred uterus: A case series in a tertiary facility in Northern Nigeria,” *East African Medical Journal*, vol. 99, no. 4, pp. 1420–1428, 2022.
- [28] E. A. Udofia, S. M. Ishaku, and E. T. Agida, “Demographic pattern and perioperative challenges in patients with placenta accreta spectrum in a Nigerian tertiary facility,” *Journal of South Asian Federation of Obstetrics and Gynaecology*, vol. 13, no. 2, pp. 94–99, 2021.
- [29] G. A. Pipingas, G. J. Hofmeyr, and R. Solomons, “Umbilical vein oxytocin for the treatment of retained placenta: A double-blind randomized controlled trial,” *British Journal of Obstetrics and Gynaecology*, vol. 100, no. 6, pp. 585–590, 1993.
- [30] Frontiers Meta-Analysis Group, “Side-effects of intravenously versus intramuscularly oxytocin for postpartum hemorrhage: A systematic review and meta-analysis of randomized controlled trials,” *Frontiers in Global Women's Health*, vol. 3, Art. no. 891204, 2022.
- [31] Comparative Study Group, “Comparative study between use of intraumbilical oxytocin and conventional intravenous oxytocin for the management of third stage of labour,” *Indian Journal of Obstetrics and Gynecology Research*, vol. 8, no. 3, pp. 312–318, 2021.
- [32] Original Article Group, “Comparison of the mean duration of 3rd stage of labour between intraumbilical and intravenous oxytocin,” *Journal of Medical and Pharmaceutical Sciences*, vol. 12, no. 4, pp. 55–62, 2020.
- [33] World Bank, “Nigeria health facility survey guide for data collectors: Measuring structural and process readiness for emergency obstetric care,” *World Bank Group Report No. 102437*, 2020.
- [34] S. Bradley, F. Kamwendo, and E. Chipeta, “Authorization of midwives to perform basic emergency obstetric and newborn care signal functions in Argentina, Ghana, and India: A multi-country validation study,” *PLOS ONE*, vol. 15, no. 5, Art. no. e0232418, 2020.
- [35] E. N. Okeke, I. S. Abubakar, and L. Lawal, “Provision of emergency obstetric care: Midwives' knowledge and involvement in rural health facilities of Cross River State, Nigeria,” *African Journal of Midwifery and Women's Health*, vol. 16, no. 3, pp. 101–112, 2022.
- [36] Federal Ministry of Health and World Health Organization, “Cost-effectiveness and budget impact of introducing heat-stable carbetocin for postpartum hemorrhage prevention in Nigeria,” *WHO Country Office Nigeria*, 2022.
- [37] K. Torpey, C. Anyakora, and A. Bankole, “Oxytocin quality: Evidence to support updated global recommendations on oxytocin for postpartum hemorrhage,” *BMC Pregnancy and Childbirth*, vol. 20, no. 1, Art. no. 512, 2020.

- [38] I. O. O. Abejirinde, R. Douwes, A. Bardají, and T. van den Akker, “Travel of pregnant women in emergency situations to hospital and maternal mortality in Lagos, Nigeria: A retrospective cohort study,” *BMJ Global Health*, vol. 6, no. 8, Art. no. e005820, 2021. [BMJ](#)
- [39] A. Banke-Thomas, K. Wright, and S. Kouraogo, “Multistakeholder perspectives on geographical accessibility to emergency obstetric care in Benin City, Nigeria,” *BMC Pregnancy and Childbirth*, vol. 21, no. 1, Art. no. 412, 2021.
- [40] World Health Organization, “WHO recommendation on routes of oxytocin administration for the prevention of postpartum haemorrhage after vaginal birth,” *World Health Organization*, 2021.