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ADHERENCE TO ORAL ANTIHYPERTENSIVE THERAPY AND ADHERENCE-SUPPORTING CARE PATHWAYS AMONG POSTPARTUM OUTPATIENTS WITH HYPERTENSIVE DISORDERS OF PREGNANCY: A COMPREHENSIVE SYSTEMATIC REVIEW AND META- ANALYSIS OF RANDOMIZED CONTROLLED TRIALS AND PRIMARY STUDIES

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ABSTRACT

Introduction: Hypertensive disorders of pregnancy (HDP) frequently persist or worsen after hospital discharge, and more than half of hypertension-related maternal deaths occur postpartum. The effectiveness of outpatient antihypertensive therapy depends on initiation, implementation and persistence of medication-taking, and on adherence to blood pressure (BP) surveillance and follow-up, yet these behaviours have not been synthesised together for postpartum outpatients. This review aimed to quantify adherence to postpartum oral antihypertensive therapy and to adherence-

supporting care, to evaluate structured pathways (remote BP monitoring, self-management with titration, coaching, pharmacist counselling) and discharge agent choice, and to map determinants of non-adherence.^{1–3}

Methods: The study strictly adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. Randomized controlled trials (RCTs), cohort (prospective and retrospective), case–control, cross-sectional and other observational studies of postpartum outpatients with HDP were eligible; systematic reviews and meta-analyses were excluded from data synthesis but used in the Discussion. Risk of bias was assessed with RoB 2, ROBINS-I and the Newcastle–Ottawa Scale. DerSimonian–Laird random-effects models pooled logit-transformed proportions, risk ratios (RR), odds ratios (OR) and mean differences (MD); heterogeneity (I^2 , τ^2 , prediction intervals), subgroup, leave-one-out and small-study analyses (funnel plots, Egger test) were performed, and certainty was graded with GRADE.^{4,5}

Results: 25 studies (3 RCTs, 22 observational; ≈ 1.07 million participants; 2022–2026; USA, UK, Denmark, Switzerland, China, Tanzania and Nigeria) met inclusion criteria, spanning 12 outcome domains. Primary adherence (first fill within 7 days) was 73.4% (95% CI 70.5–76.0), whereas only 42.2% (41.8–42.6) of 63,312 women persisted without discontinuation. Pooled adherence to postpartum BP surveillance/follow-up was 77.5% (95% CI 67.1–85.3; $I^2 = 95.1\%$; 95% PI 32.8–96.0). Structured

pathways increased follow-up/BP ascertainment adherence (RR 1.57, 95% CI 1.49–1.66; $I^2 = 0\%$) and BP control (RR 1.44, 1.33–1.56), reduced hypertension-related readmission/emergency visits (RR 0.69, 0.49–0.99), and lowered systolic (MD -5.52 mmHg, -7.04 to -4.00) and diastolic BP (MD -4.51 mmHg, -6.37 to -2.66). Discharge on labetalol versus once-daily extended-release nifedipine was associated with higher readmission (adjusted OR 1.95, 1.22–3.14). Younger age, Black or Hispanic/Asian ethnicity, public insurance, lower education and multiparity predicted lower adherence or engagement. No small-study effect was detected (Egger $p = 0.30$).^{3,6–9}

Discussion: Postpartum antihypertensive care displays a steep adherence cascade: most women initiate therapy, but more than half discontinue early, and attendance at BP surveillance is variable. Structured, clinician-supported pathways consistently improve engagement and BP outcomes, and simpler once-daily regimens appear safer. Certainty of evidence ranged from moderate (BP reduction, follow-up adherence) to very low (medication-taking prevalence), with a critical scarcity of direct medication-adherence measurement and of data from Southeast Asia, including Indonesia.^{10–12}

Conclusion: Adherence to postpartum antihypertensive therapy among outpatients is suboptimal and decays over time. Discharge bundles combining once-daily regimens, education, home BP self-monitoring with clinician titration, and

navigated transition to primary care are recommended, together with validated adherence metrics and context-specific trials in low- and middle-income countries.^{2,13}

Keywords: hypertensive disorders of pregnancy; postpartum hypertension; preeclampsia; medication adherence; antihypertensive agents; remote blood pressure monitoring; nifedipine; labetalol; outpatients; meta-analysis

INTRODUCTION

Background

Hypertensive disorders of pregnancy (HDP), comprising chronic hypertension, gestational hypertension, preeclampsia–eclampsia, HELLP syndrome and preeclampsia superimposed on chronic hypertension, complicate approximately one in seven delivery hospitalisations in high-income settings and remain a leading, largely preventable, cause of maternal morbidity and mortality. Blood pressure (BP) typically follows a biphasic course after delivery: an initial fall is followed by a secondary rise between postpartum days 3 and 6, driven by mobilisation of extravascular fluid, sodium reabsorption and persistent endothelial dysfunction, so that BP frequently peaks after the patient has already been discharged to outpatient care.^{1,14}

Contemporary evidence confirms that postpartum hypertension is the rule rather than the exception after HDP. In a population-based cohort of 2,705 women with new-onset HDP, 81.8% had persistent hypertension after discharge, 14.1% developed severe-range hypertension and 22.6% required initiation of an antihypertensive agent after leaving hospital. In low- and middle-income countries (LMICs), persistent hypertension affects 6.9–62.2% of women in the months after an HDP-complicated pregnancy, and in Nigerian and Tanzanian cohorts it persisted in roughly two-fifths to three-fifths of women beyond the puerperium.^{15–18}

Because the majority of postpartum hypertension is managed in the outpatient setting, the clinical benefit of oral antihypertensive therapy depends on a chain of patient- and system-level behaviours. The Ascertaining Barriers to Compliance (ABC) taxonomy defines medication adherence as three sequential phases — initiation (taking or filling the first dose), implementation (the correspondence between prescribed and actual dosing) and persistence (the time until discontinuation). In postpartum care, these phases are inseparable from adherence to BP self-monitoring, timely BP ascertainment within 3–10 days of discharge and attendance at follow-up visits where therapy is titrated or safely withdrawn. Measurement of each phase — pharmacy-refill metrics such as the proportion of days covered (PDC), electronic monitoring, pill counts and self-report — carries distinct strengths and biases.^{4,5,19}

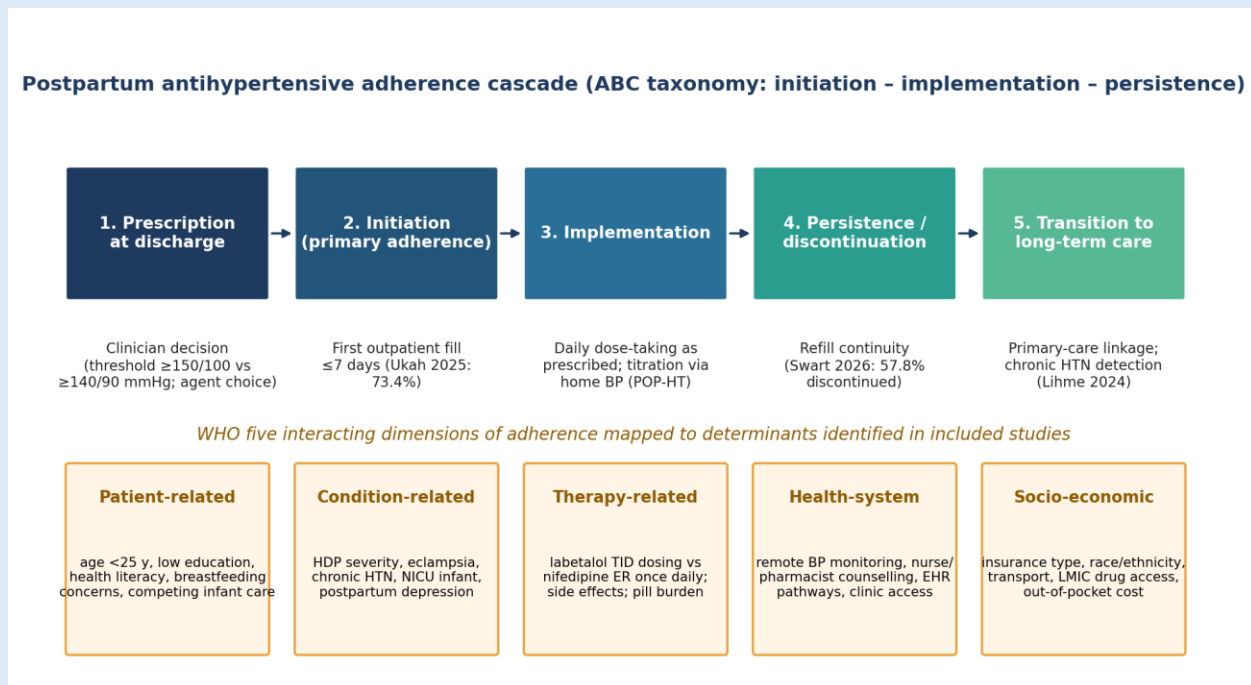


Figure 1. Conceptual framework of the postpartum antihypertensive adherence cascade (ABC taxonomy) and the WHO five interacting dimensions of adherence, populated with determinants and estimates identified in the included studies.^{3,6,7,20}

Several features make the puerperium a uniquely vulnerable period for adherence. Mothers face competing infant-care demands, sleep deprivation, possible neonatal intensive care admission, postpartum depression and concerns about drug transfer into breast milk, even though first-line agents such as extended-release nifedipine and labetalol are considered compatible with breastfeeding. Moreover, HDP itself is associated with earlier breastfeeding cessation, and women who discontinue maternal medications while lactating have shorter breastfeeding duration, highlighting the bidirectional interplay between medication decisions and infant feeding.^{21–24}

Guideline recommendations for postpartum follow-up after HDP remain heterogeneous: a 2026 appraisal of 15 clinical practice guidelines found that only nine of 37 recommendations reached more than 50% agreement, and an expert convening in 2026 recommended antihypertensive initiation at $\geq 140/90$ mmHg, provision of home BP devices to all HDP patients at discharge, at least daily home BP measurement for two weeks, and a coordinated transfer of care to primary care. Implementing

these recommendations presupposes that women will fill, take and continue their medication and engage with monitoring — assumptions that have rarely been quantified.^{2,13}

In Indonesia, hypertension in pregnancy remains an important contributor to maternal mortality, and local data show that medication adherence among hypertensive outpatients attending community health centres (Puskesmas) is closely associated with BP control, with non-adherent patients (pill count <80%) having approximately six-fold higher odds of uncontrolled BP. Among Indonesian pregnant women with hypertension, antenatal care frequency independently predicted medication adherence, yet no Indonesian study has specifically characterised adherence after delivery. These observations underline the need for a synthesis that can inform postpartum pathways in Indonesian and other LMIC primary-care systems.^{25–27}

Research gap

Previous systematic reviews have addressed discrete components of the postpartum care continuum — the effect of home BP monitoring on BP ascertainment and readmission, the comparative efficacy of oral antihypertensive agents and diuretics, the prevalence of persistent hypertension in LMICs and barriers to early BP follow-up — but none has integrated medication-taking adherence with monitoring and follow-up adherence among postpartum outpatients. Existing reviews included evidence published before 2023, largely omitted claims-based measures of initiation and persistence, and did not examine discharge agent choice as a therapy-related determinant of adherence and outcomes.^{10–12,16,28,29}

A second gap concerns measurement. Adherence has been operationalised variably as first-fill within 7 days, refill-based discontinuation, number of days with transmitted home BP readings, BP ascertainment within 10 days, or attendance at postpartum visits, and the proportion of days covered is often reported without standardised parameters. A rapid review in 2026 concluded that patient engagement measures are common but that provider adherence and composite measures are rarely reported. Finally, data from Southeast Asia are virtually absent, limiting transferability to Indonesian practice.^{4,27,30}

Novelty

To the authors' knowledge, this is the first systematic review to (i) apply the ABC adherence taxonomy to postpartum antihypertensive therapy in outpatients after HDP; (ii) jointly synthesise medication-taking adherence, dispensing continuity, BP self-monitoring engagement and follow-up attendance across 12 outcome domains; (iii) restrict eligibility to the most recent five-year evidence base (2022–2026), which reflects post-pandemic digital care models; (iv) quantitatively pool both single-arm adherence proportions and comparative effects of structured pathways, including discharge agent choice; and (v) map multilevel determinants onto the WHO five-dimension adherence framework with explicit implications for LMIC and Indonesian primary care.^{1,5}

Objectives

General objective: to comprehensively analyse adherence to oral antihypertensive therapy and adherence-supporting care among postpartum outpatients with HDP.

Specific objectives: (1) to estimate the prevalence of medication initiation, persistence and discontinuation after discharge; (2) to estimate pooled adherence to postpartum BP surveillance and follow-up; (3) to compare structured adherence-supporting pathways with usual care for follow-up adherence, BP control, BP levels, antihypertensive uptake and acute hypertension-related encounters; (4) to evaluate the association between discharge agent (labetalol versus nifedipine) and readmission; (5) to identify patient, condition, therapy, health-system and socioeconomic determinants of non-adherence; and (6) to grade the certainty of evidence and formulate practice and research recommendations.

Hypotheses

Table 1. Research hypotheses tested in this review.

Code	Null hypothesis (H0)	Alternative hypothesis (H1)	Analysis
H1	Adherence to postpartum antihypertensive therapy and follow-up reaches the conventional 80% threshold	Adherence is below 80%	Single-arm proportions; pooled logit proportion
H2	Structured pathways do not change follow-up/BP-ascertainment adherence (RR = 1)	Structured pathways increase adherence (RR > 1)	Random-effects RR
H3	Structured pathways do not change hypertension-related readmission/ED visits (RR = 1)	Structured pathways reduce acute encounters (RR < 1)	Random-effects RR

H4	Structured self-management/titration does not change SBP/DBP (MD = 0)	Structured self-management lowers SBP/DBP (MD < 0)	Random-effects MD
H5	Discharge agent is not associated with readmission (OR = 1)	Labetalol is associated with higher readmission than nifedipine (OR > 1)	Random-effects adjusted OR
H6	Structured pathways do not change antihypertensive uptake (RR = 1)	Structured pathways increase uptake (RR > 1)	Random-effects RR
H7	Sociodemographic and clinical factors are unrelated to adherence	Specific factors are associated with lower adherence	Structured narrative synthesis (SWiM)

Significance and expected benefits

Scientific benefit: the review provides an integrated, taxonomy-based estimate of the postpartum adherence cascade and quantifies the effect of structured pathways, clarifying where evidence is robust and where it is lacking. **Clinical benefit:** obstetricians, general practitioners, midwives and family physicians can use the findings to design discharge bundles — agent selection, counselling, home BP monitoring and titration protocols — that maximise adherence. **Health-system and policy benefit:** the results inform resource allocation for remote monitoring, pharmacist and nurse navigation, and integration with primary care, including Indonesian Puskesmas and referral networks. **Educational benefit:** the synthesis offers a structured framework for teaching residents and students about postpartum cardiovascular risk management.^{1,2}

METHODS

Protocol and reporting standards

This review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement, and non-pooled outcomes were synthesised following the Synthesis Without Meta-analysis (SWiM) guidance. The review protocol (eligibility criteria, outcomes, risk-of-bias tools and synthesis plan) was specified by the authors before data extraction. The review question was framed using the PICOS approach.

Table 2. Eligibility criteria according to the PICOS framework.

Element	Inclusion criteria	Exclusion criteria
Population	Women in the postpartum period (from discharge to ≤24 months) with any HDP — chronic hypertension, gestational hypertension, preeclampsia/eclampsia,	Exclusively antepartum populations; non-obstetric hypertension; animal studies

	HELLP, superimposed preeclampsia or de novo postpartum hypertension — managed as outpatients	
Intervention / exposure	Prescribed oral antihypertensive therapy; structured adherence-supporting pathways (remote/home BP monitoring, self-management with titration, health coaching, pharmacist or nurse counselling, dedicated clinics, EHR pathways); discharge agent (labetalol, nifedipine, combination)	Interventions targeting only aspirin, diuretics in hospital, analgesics or breastfeeding without an antihypertensive component
Comparator	Usual postnatal care, historical or matched controls, alternative agent, no comparator (single-arm prevalence studies)	—
Outcomes	Primary: medication-taking adherence (initiation, implementation, persistence/discontinuation) and adherence to BP surveillance/follow-up. Secondary: dispensing continuity, BP level/control, antihypertensive uptake, readmission, ED visits, persistent hypertension, determinants, knowledge/satisfaction, system factors	Studies without any adherence-related or adherence-dependent outcome
Study design	RCTs, cohort studies (prospective, retrospective, registry, claims), case-control, cross-sectional, other observational and quality-improvement cohorts with quantitative data	Systematic reviews and meta-analyses (used only in Discussion), narrative reviews, guidelines, protocols, editorials, case reports, conference abstracts without a full peer-reviewed report
Time and language	Peer-reviewed publications from 1 January 2022 to the search date (September 2026), i.e., the most recent five-year window; English	Publications before 2022

Search Strategy

The keywords used for this research based PICO :

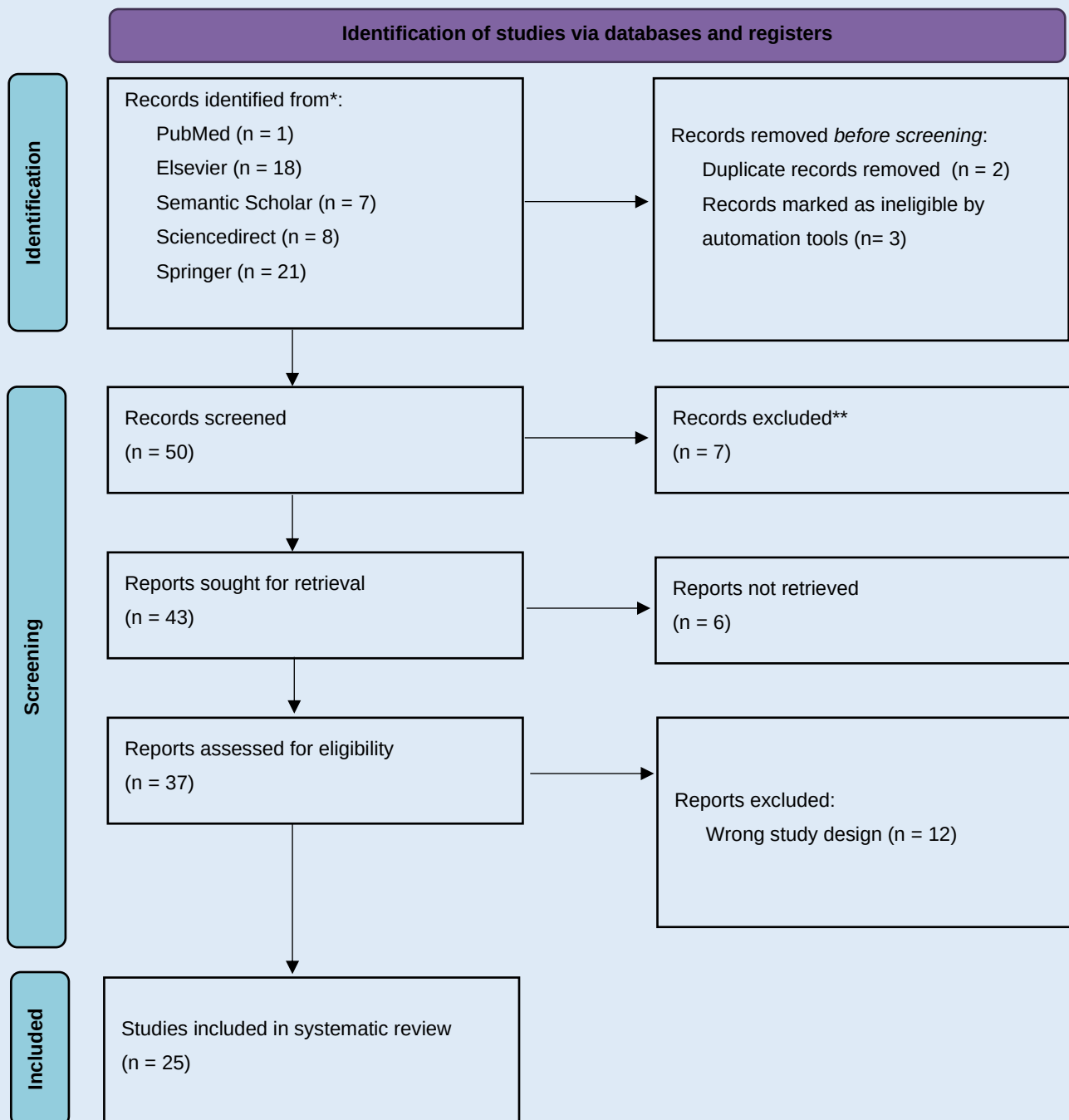
PICO Element	Keyword 1	Keyword 2	Keyword 3
P (Population)	Postpartum outpatients with hypertensive disorders of pregnancy	Women with postpartum hypertension	Postpartum women with preeclampsia
I (Intervention)	Oral antihypertensive therapy adherence	Structured adherence-supporting care pathways	Remote blood pressure monitoring and self-management
C (Comparison)	Usual postnatal care	Standard discharge without structured pathway	Labetalol versus nifedipine at discharge
O (Outcome)	Medication	Blood pressure	Hypertension-related

	adherence and persistence	control and follow-up adherence	readmission and emergency visits
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The Boolean MeSH keywords inputted on databases for this research are: (*"Postpartum outpatients with hypertensive disorders of pregnancy"* OR *"Women with postpartum hypertension"* OR *"Postpartum women with preeclampsia"*) AND (*"Oral antihypertensive therapy adherence"* OR *"Structured adherence-supporting care pathways"* OR *"Remote blood pressure monitoring and self-management"*) AND (*"Usual postnatal care"* OR *"Standard discharge without structured pathway"* OR *"Labetalol versus nifedipine at discharge"*) AND (*"Medication adherence and persistence"* OR *"Blood pressure control and follow-up adherence"* OR *"Hypertension-related readmission and emergency visits"*)

Article Search Strategy

Database	Keywords	Hits
Pubmed	<i>("Postpartum outpatients with hypertensive disorders of pregnancy" OR "Women with postpartum hypertension" OR "Postpartum women with preeclampsia") AND ("Oral antihypertensive therapy adherence" OR "Structured adherence-supporting care pathways" OR "Remote blood pressure monitoring and self-management") AND ("Usual postnatal care" OR "Standard discharge without structured pathway" OR "Labetalol versus nifedipine at discharge") AND ("Medication adherence and persistence" OR "Blood pressure control and follow-up adherence" OR "Hypertension-related readmission and emergency visits")</i>	1
Elsevier	<i>("Postpartum outpatients with hypertensive disorders of pregnancy" OR "Women with postpartum hypertension" OR "Postpartum women with preeclampsia") AND ("Oral antihypertensive therapy adherence" OR "Structured adherence-supporting care pathways" OR "Remote blood pressure monitoring and self-management") AND ("Usual postnatal care" OR "Standard discharge without structured pathway" OR "Labetalol versus nifedipine at discharge") AND ("Medication adherence and persistence" OR "Blood pressure control and follow-up adherence" OR "Hypertension-related readmission and emergency visits")</i>	18
Semantic Scholar	<i>("Postpartum outpatients with hypertensive disorders of pregnancy" OR "Women with postpartum hypertension" OR "Postpartum women with preeclampsia") AND ("Oral antihypertensive therapy adherence" OR "Structured adherence-supporting care pathways" OR "Remote blood pressure monitoring and self-management") AND ("Usual postnatal care" OR "Standard discharge without structured pathway" OR "Labetalol versus nifedipine at discharge") AND ("Medication adherence and persistence" OR "Blood pressure control and follow-up adherence" OR "Hypertension-related readmission and emergency visits")</i>	7
Science-direct	<i>"Postpartum outpatients with hypertensive disorders of pregnancy" AND "Oral antihypertensive therapy adherence" AND "Medication adherence and persistence"</i>	8
Springer	<i>("Postpartum outpatients with hypertensive disorders of pregnancy" OR "Women with postpartum hypertension" OR "Postpartum women with preeclampsia") AND ("Oral antihypertensive therapy adherence" OR "Structured adherence-supporting care pathways" OR "Remote blood pressure monitoring and self-management") AND ("Usual postnatal care" OR "Standard discharge without structured pathway" OR "Labetalol versus nifedipine at discharge") AND ("Medication adherence and persistence" OR "Blood pressure control and follow-up adherence" OR "Hypertension-related readmission and emergency visits")</i>	21



Article search flowchart

Study selection

Records were de-duplicated and screened by title and abstract, followed by full-text eligibility assessment against the PICOS criteria, by two reviewers (MA, HIH) working independently; disagreements were resolved by discussion or adjudication by the third author (YMS), an obstetrician–gynaecologist. Reasons for full-text exclusion were recorded and are presented in the PRISMA flow diagram. Systematic reviews and meta-analyses identified during screening were excluded from the characteristics tables and pooled analyses but retained for contextual comparison in the Discussion.

Data extraction

A standardised, piloted extraction form captured: first author, year, country, design, setting, sample size, HDP phenotype, intervention or exposure, comparator, adherence definition and measurement method, follow-up duration, outcome data (events and denominators, adjusted effect estimates with 95% confidence intervals [CI], means and mean differences), determinants and key conclusions. Where only percentages were reported, event counts were reconstructed from the published denominators; adjusted estimates were preferred over crude estimates when both were available. Data were extracted from the published peer-reviewed reports.

Operational definitions of adherence

Table 4. Operational definitions of adherence and adherence-related constructs applied in this review.

Construct (ABC phase)	Operational definition	Typical data source	Studies (examples)
Initiation / primary adherence	Filling the first outpatient antihypertensive prescription within a defined window (e.g., ≤ 7 days)	Pharmacy claims, EHR	Ukah 2025 ⁶
Implementation	Extent to which daily dosing matches prescription (PDC, pill count, self-report scales)	Claims (PDC), pill count, questionnaires	O'Grady 2025 ³¹
Persistence / discontinuation	Continued supply without a gap exceeding days' supply + 30 days	Claims	Swart 2026 ³
Dispensing continuity / initiation after discharge	Timing and continuation of fills across postpartum intervals	Registry, claims, EHR	Lihme 2024 ²⁰ ; Chen 2024 ³²

BP self-monitoring engagement	Transmission of ≥ 1 home BP reading within a window, days with readings, retention	Remote-monitoring platforms	Mujic 2024 ³³ ; Berhie 2026 ³⁴
Follow-up adherence	BP ascertainment ≤ 10 days, attendance at postpartum or primary-care visit	EHR, telephone follow-up	Arkerson 2023 ⁸ ; Li 2023 ³⁵
Adherence threshold	$\geq 80\%$ of prescribed doses/days covered (conventional) — used as reference benchmark	—	Dalli 2022 ⁴

Risk-of-bias assessment

Risk of bias was assessed independently by two reviewers. RCTs were evaluated with the revised Cochrane Risk-of-Bias tool (RoB 2) across five domains (randomisation process, deviations from intended interventions, missing outcome data, measurement of the outcome, selection of the reported result). Non-randomised comparative studies were evaluated with ROBINS-I across seven domains (confounding, selection of participants, classification of interventions, deviations, missing data, measurement of outcomes, selection of reported results). Single-cohort, registry and descriptive studies were appraised with the Newcastle–Ottawa Scale (NOS; selection 0–4, comparability 0–2, outcome 0–3 stars; ≥ 7 = good, 5–6 = fair, ≤ 4 = poor).

Table 5. Risk-of-bias assessment of randomized controlled trials (Cochrane RoB 2).

Study	D1 Randomisation	D2 Deviations	D3 Missing data	D4 Outcome measurement	D5 Reporting	Overall
Kitt 2023 (POP-HT) ⁷	Low – randomised 1:1	Some concerns – open-label self-management	Low – 91% analysed	Low – blinded 24-h ABPM end point	Low – registered NCT04273854	Some concerns
Arkerson 2023 ⁸	Low – multisite randomisation	Some concerns – open-label	Low – all randomised analysed	Some concerns – ascertainment mode differs by arm	Low – registered NCT04823949	Some concerns
Buchholz 2026 ⁹	Low – 1:1 randomisation, ITT	Some concerns – behavioural, unblinded	Low – 2/140 missing primary outcome	Some concerns – self-measured BP, incomplete BP data	Low – registered NCT05685251	Some concerns

Table 6. Risk-of-bias assessment of non-randomised comparative studies (ROBINS-I).

Study	Confounding	Selection	Classification	Deviations	Missing data	Outcome measurement	Reporting	Overall
Lemon 2024 ³⁶	Moderate (PS-matched)	Low	Low	Low	Low	Moderate	Low	Moderate
Forna 2023 ³⁷	Serious (historical controls)	Moderate	Low	Low	Moderate	Moderate	Low	Serious
Rosenfeld 2025 ³⁸	Moderate (doubly robust PS)	Moderate	Low	Low	Low	Moderate	Low	Moderate
Do 2022 ³⁹	Moderate (indication)	Low	Moderate (fills)	Low	Low	Low	Low	Moderate
Mitro 2024 ⁴⁰	Moderate (extensive adjustment)	Low	Low	Low	Low	Low	Low	Moderate
Bennett 2025 ⁴¹	Serious (BMI, chronic HTN imbalance)	Moderate	Low	Low	Low	Low	Low	Serious
Lovgren 2022 ⁴²	Serious (single centre)	Moderate	Low	Low	Low	Low	Low	Serious
Zhu 2024 ⁴³	Moderate	Moderate	Low	Low	Moderate	Moderate	Low	Moderate
O'Grady 2025 ³¹	Serious (pre-post)	Serious	Moderate	Moderate	Serious	Serious (self-report)	Moderate	Serious

Table 7. Methodological quality of single-cohort and descriptive studies (Newcastle–Ottawa Scale).

Study	Selection (0–4)	Comparability (0–2)	Outcome (0–3)	Total (0–9)	Quality	Main limitation
Ukah 2025 ⁶	★★★★	★	★★★	8	Good	Claims-based fills; no measure of ingestion
Swart 2026 ³	★★★★	★★	★★★	9	Good	National claims; adjusted Poisson models
Lihme 2024 ²⁰	★★★★	★★	★★★	9	Good	Complete Danish registries
Chen 2024 ³²	★★★	★	★★★	7	Good	Older data (2008–2014) in a 2024 report

Hauspurg 2024 ¹⁵	★★★★	★★	★★★	9	Good	Population-based remote-program cohort
Hotz 2025 ⁴⁴	★★★	★	★★	6	Fair	Attrition at 12 months
Patel 2024 ⁴⁵	★★★	★	★★	6	Fair	306/545 consented (selection)
Mujic 2024 ³³	★★★	★	★★	6	Fair	No comparator group
Li 2023 ³⁵	★★★★	★★	★★★★	8	Good	Multivariable model, ROC validation
Ahmed 2024 ¹⁸	★★★★★	★	★★★★	8	Good	94.5% follow-up
Mahmoud 2025 ⁴⁶	★★★	★	★★★★	7	Good	Small feasibility sample
Berhie 2026 ³⁴	★★★	★	★★	6	Fair	QI design, secular changes
Roman 2025 ⁴⁷	★★★	—	★★	5	Fair	Descriptive chart review

Risk of bias and methodological quality

All three RCTs were rated as having some concerns overall, principally because behavioural and self-management interventions cannot be blinded (domain 2) and because outcome ascertainment in two trials was intrinsically linked to the allocated care pathway (domain 4); randomisation, completeness of outcome data and prospective registration were low risk in every trial. Among nine non-randomised comparative studies, five were at moderate and four at serious overall risk of bias, confounding being the dominant concern — historical controls, confounding by indication in agent comparisons, and pre–post quality-improvement designs. Of 13 single-cohort and descriptive studies, seven were of good quality (NOS ≥ 7) and six of fair quality; none was poor.^{7–9,31,37,41,42}

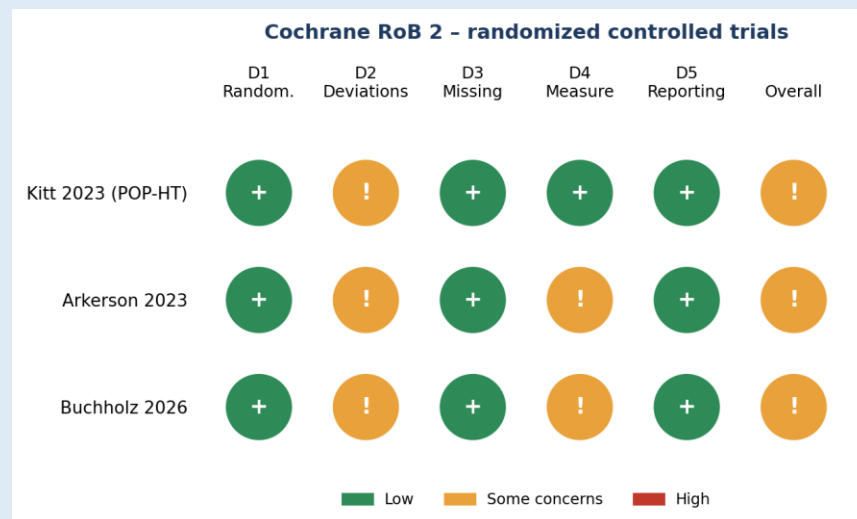


Figure 5. Traffic-light plot of domain-level risk-of-bias judgements for the three RCTs (RoB 2).

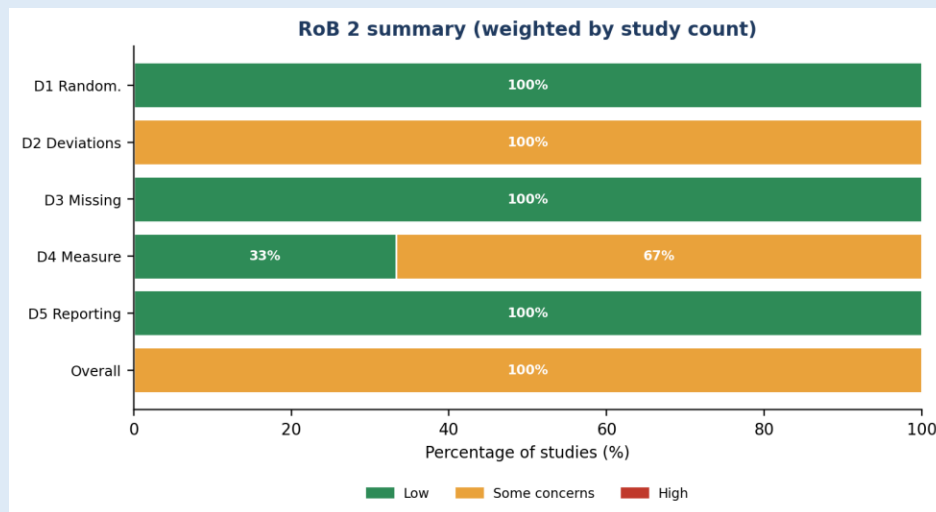


Figure 6. Summary plot of RoB 2 judgements across domains for RCTs (percentage of studies).

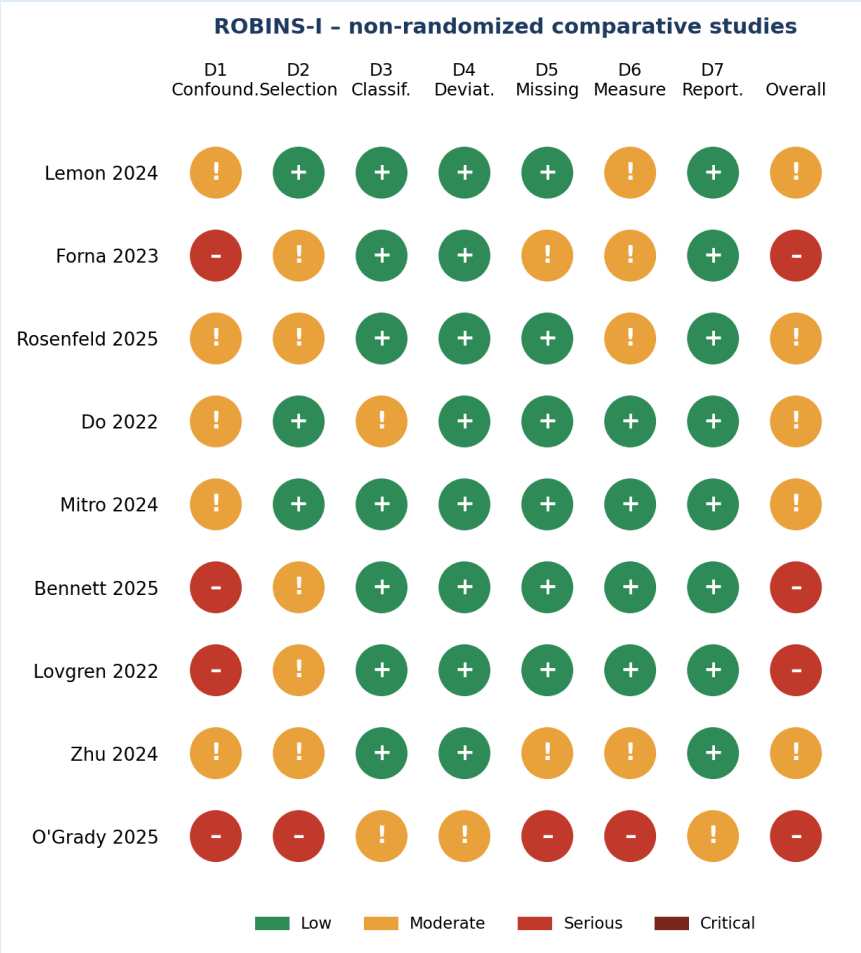


Figure 7. Traffic-light plot of ROBINS-I judgements for non-randomised comparative studies.

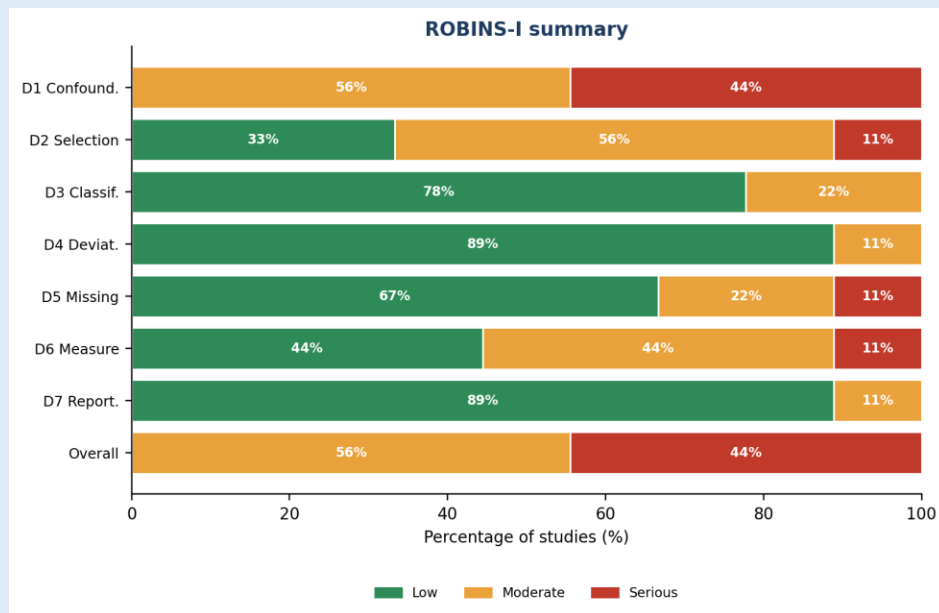


Figure 8. Summary plot of ROBINS-I judgements across the seven bias domains.

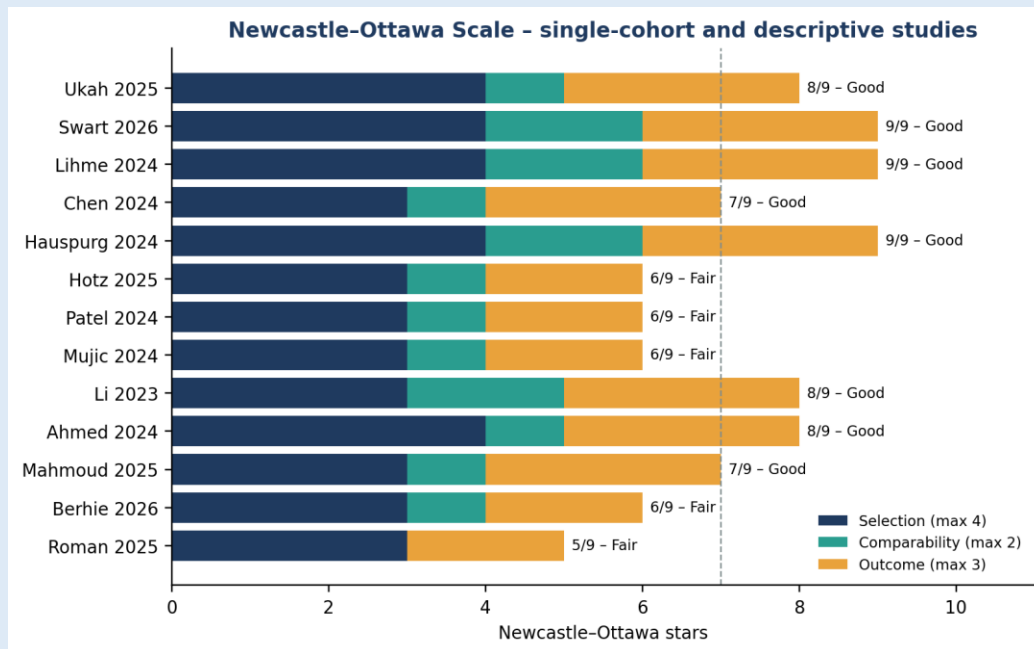


Figure 9. Newcastle–Ottawa Scale star allocation (selection, comparability, outcome) for single-cohort and descriptive studies; dashed line marks the threshold for good quality (≥ 7 stars).

Effect measures

Prevalence outcomes (adherence, engagement, attendance) were expressed as proportions with exact-binomial-consistent logit 95% CI. Dichotomous comparative outcomes were expressed as risk ratios (RR) or, where only adjusted odds ratios (aOR) were published, as aOR; adjusted estimates from propensity-score-matched or multivariable models were preferred over crude estimates. Continuous outcomes (systolic and diastolic BP) were expressed as mean differences (MD) in mmHg with 95% CI.

Data synthesis and statistical analysis

Meta-analysis was performed when at least two studies reported a commensurable outcome. Proportions were logit-transformed and pooled with the DerSimonian–Laird (DL) random-effects model; ratio measures were pooled on the natural-logarithm scale, and standard errors were derived from published 95% CI as $(\ln[\text{upper}] - \ln[\text{lower}])/3.92$. Heterogeneity was quantified with Cochran's Q , I^2 (thresholds 25%, 50% and 75% for low, moderate and high), between-study variance τ^2 and, for $k \geq 5$, 95% prediction intervals. Pre-specified subgroup analysis compared structured versus usual-care pathways, with a Q -test for subgroup differences. Robustness was evaluated with leave-one-out sensitivity analysis. Small-study effects were explored with funnel plots and Egger's regression test, acknowledging low power when $k < 10$; an exploratory centred funnel plot combined all comparative ratio estimates. Two estimates with non-commensurable definitions (primary adherence and persistence) were displayed in a forest plot without pooling. Analyses were conducted in Python (NumPy/SciPy) with custom scripts reproducing DL estimators; statistical significance was set at two-sided $p < 0.05$.⁴

Certainty of evidence

Certainty of evidence for each pooled outcome was graded using the GRADE approach (risk of bias, inconsistency, indirectness, imprecision, publication bias; upgrading for large effect or dose–response where applicable), with bodies of evidence led by RCTs starting at high certainty and those led by observational studies starting at low certainty.

Ethical considerations

This study synthesised published, de-identified data and did not require ethical approval or informed consent.

RESULTS

Characteristics of included studies

The 25 included studies were published between 2022 and 2026 and comprised three RCTs and 22 observational studies (prospective and retrospective cohorts, national registry and claims cohorts, and quality-improvement or implementation cohorts), together enrolling approximately 1.07 million women (range 90 to 784,782). Nineteen studies originated from the United States and one each from the United Kingdom, Denmark, Switzerland, China, Tanzania and Nigeria; thus only three studies represented low- or middle-income settings, and no study from Southeast Asia or Indonesia met the eligibility criteria. Follow-up ranged from 10 days to 2 years.^{7–9,18,20,35,44,46}

Table 8. Characteristics of included studies (Part A): author, year, country, design, sample and population.

No.	Author, year	Country	Study design	Analytic sample (n)	Population / HDP phenotype
1	Kitt 2023 (POP-HT) ⁷	UK	RCT (open-label, blinded end point)	220	Preeclampsia 60%, GH 40%; on antihypertensives at discharge
2	Arkerson 2023 ⁸	USA	Multisite RCT	197	HDP diagnosed before discharge
3	Buchholz 2026 ⁹	USA	RCT (pilot effectiveness)	140	HDP with chronic HTN, ongoing drugs or uncontrolled BP at 6 wk
4	Ukah 2025 ⁶	USA	Retrospective cohort (EHR + claims)	4,647 (987 with postpartum Rx)	HDP, continuous insurance to 6 wk postpartum
5	Swart 2026 ³	USA	Retrospective national claims cohort	63,312	Women initiating antihypertensive ≤ 30 d after live birth
6	Lihme 2024 ²⁰	Denmark	Nationwide registry cohort	784,782 (36,900 HDP)	All first pregnancies ≥ 20 wk, 1995–2018
7	Chen 2024 ³²	USA	Retrospective claims cohort (MarketScan)	108,614 exposed pregnancies	Pregnancies with ≥ 1 antihypertensive fill peripartum
8	Lemon 2024 ³⁶	USA	Retrospective PS-matched cohort	12,038	Postpartum HDP
9	Forna 2023 ³⁷	USA	Matched retrospective cohort	1,967 (1,030 vs 937)	HDP in integrated care system
10	Rosenfeld 2025 (MOPP) ³⁸	USA	Prospective vs PS-matched historical	705 matched (276 vs 429)	Postpartum hypertensive disorders

11	Hauspurg 2024 ¹⁵	USA	Cohort within remote BP program	2,705	New-onset HDP, no prior HTN
12	Do 2022 ³⁹	USA	Retrospective claims cohort	24,477 (on medication)	Delivery admissions 2006–2017, discharged on drug
13	Mitro 2024 ⁴⁰	USA	Retrospective cohort (KPNC)	57,254	Pregnancies with HDP
14	Bennett 2025 ⁴¹	USA	Retrospective cohort (remote program)	1,507	HDP enrolled in remote BP monitoring
15	Lovgren 2022 ⁴²	USA	Retrospective cohort	4,660	Peripartum hypertension
16	Zhu 2024 ⁴³	USA	Secondary analysis of QI cohort	357	HDP discharged with antihypertensives
17	O'Grady 2025 ³¹	USA	Quality-improvement pre-post	NR	Postpartum HDP
18	Patel 2024 ⁴⁵	USA	Prospective cohort	306	HDP in RPM as routine care
19	Mujic 2024 ³³	USA	Prospective implementation cohort	1,033	HDP at safety-net hospital
20	Li 2023 ³⁵	China	Prospective cohort	272	Discharged HDP patients
21	Ahmed 2024 ¹⁸	Tanzania	Multicentre prospective cohort	309	HDP in 3 public hospitals
22	Mahmoud 2025 ⁴⁶	Nigeria	Prospective feasibility cohort	90	HDP (plus normotensive comparators)
23	Berhie 2026 (HomeSafe) ³⁴	USA	QI implementation cohort	640	Postpartum HDP
24	Roman 2025 ⁴⁷	USA	Retrospective chart review	157	Severe HDP referred to PPHTN clinic
25	Hotz 2025 ⁴⁴	Switzerland	Prospective registry	370	Postpartum hypertension (all HDP phenotypes)

Table 9. Characteristics of included studies : intervention/exposure, comparator, adherence metric, follow-up and principal finding.

Author, year	Intervention / exposure	Comparator	Adherence engagement metric	Follow-up	Principal finding
Kitt 2023 (POP-HT) ⁷	Home BP self-monitoring + physician-optimised titration (app-based)	Usual postnatal primary care	Self-monitoring engagement; 24-h ABPM	~9 months	24-h DBP –5.80 mmHg; SBP –6.51 mmHg vs usual care

Arkeron 2023 ⁸	Smartphone remote BP monitoring	In-office BP check	BP ascertainment ≤ 10 d; remote uptake	10 days–6 weeks	Ascertainment 91.7% vs 58.4%; true remote uptake 80.2%
Buchholz 2026 ⁹	Care navigation + SMBP + health coaching	Usual care (all had RPM)	Primary-care visit attendance; BP control	12 months	PCP visit 71.0% vs 39.1% (RR 2.00); BP control RR 1.73
Ukah 2025 ⁶	Outpatient antihypertensive prescription	—	Primary adherence: first fill ≤ 7 days	6 weeks	Postpartum primary adherence 73.4%; severe BP $\rightarrow$ higher adherence (RR 1.26)
Swart 2026 ³	Postpartum antihypertensive use	—	Discontinuation (days' supply + 30-day gap)	Post-index	Discontinuation 57.8%; younger age, Hispanic/Asian $\rightarrow$ more discontinuation
Lihme 2024 ²⁰	HDP status and antenatal drug use	No HDP	Filled prescriptions (initiation, refills)	2 years	2-y initiation up to 44.1% (severe PE on antenatal drugs); $\leq 55.9\%$ needed refills > 3 mo
Chen 2024 ³²	Dispensation by trimester/postpartum	—	Dispensation continuity	12 months postpartum	8.4% with pre-conception chronic HTN not dispensed any drug in year 1 postpartum
Lemon 2024 ³⁶	Remote HTN program (home BP + nursing team)	Usual care	BP ≤ 10 d; 6-wk visit; drug initiation	6 weeks	Readmission aRR 0.78; drug initiation aRR 4.44; +85 BP checks/100
Forna 2023 ³⁷	Remote patient monitoring for HTN	Historical matched controls	BP measured ≤ 20 d; clinician visit	20 days postpartum	BP measured RR 1.56; normal BP RR 1.43; on antihypertensives RR 1.27
Rosenfeld 2025 (MOPP) ³⁸	Tighter target $< 130/80$ with remote titration	Target $< 150/100$	Remote BP reporting; ED visits	6 weeks	ED visits 3.6% vs 8.4%; SBP -4.4 , DBP -3.1 mmHg
Hauspurg 2024 ¹⁵	Inpatient BP categories	BP normalisation	Medication initiation after discharge (EHR)	6 weeks	81.8% persistent HTN; 14.1% severe HTN; 22.6% drug started after discharge
Do 2022 ³⁹	Filled labetalol	Filled nifedipine	Filled outpatient prescription	6 weeks	HTN readmission 4.5% vs 2.1%; aOR 1.63
Mitro 2024 ⁴⁰	Discharge Rx: labetalol / nifedipine / ≥ 2 drugs	No Rx	Discharge prescription (EHR)	6 weeks	Labetalol HR 1.63; nifedipine HR 0.74; ≥ 2 drugs HR 0.53 for readmission
Bennett 2025 ⁴¹	Discharge on labetalol	Discharge on nifedipine	Discharge prescription (EHR)	8 weeks	Readmission 9.2% vs 3.9%; aOR 2.70

Lovgren 2022 ⁴²	Labetalol / nifedipine / both	No treatment	Discharge prescription (EHR)	Postpartum	Nifedipine aOR 0.27; labetalol aOR 1.66 for readmission
Zhu 2024 ⁴³	Meds-to-Beds / on-campus pharmacy	Outside pharmacy	Visit attendance; BP	6 weeks	No difference in BP, attendance (OR 0.67) or readmission (12.2% vs 15.8%)
O'Grady 2025 ³¹	Pharmacy-resident discharge counselling	Baseline phase	Self-reported adherence (telephone 4–6 wk)	30 days	77% counselled; HTN readmission 0% vs 8.3%; refill knowledge gaps
Patel 2024 ⁴⁵	Remote patient monitoring	By race	First BP-check attendance; RPM response	6 weeks	Attendance 84.0%; engagement declined, more attrition among Black patients
Mujic 2024 ³³	Cell-enabled remote BP cuff (multilingual)	By patient characteristics	Days with BP measures; duration	6 weeks	Mean 15.2 measurement-days; age ≤25 y –4.3 days
Li 2023 ³⁵	Telephone follow-up	—	Return for BP visit at 6 and 12 wk	12 weeks	Non-return 24.26% (6 wk) and 50.37% (12 wk)
Ahmed 2024 ¹⁸	Scheduled 3-month review	—	Return at 3 months	3 months	94.5% returned; persistent HTN 41.1%
Mahmoud 2025 ⁴⁶	Home BP monitoring with daily transmission	Healthy postpartum women	Fidelity of daily BP recording; retention	12 weeks	Fidelity 96%; retention 94%; mean BP 137/89→125/84
Berhie 2026 (HomeSafe) ³⁴	EHR-tethered home BP + population-health coordinator	Year 1 vs Year 2	Timely BP return (≥1 BP in 7 d)	6 weeks	68.6% timely BP; engagement → 6-wk visit 89.9% vs 65.4%
Roman 2025 ⁴⁷	Dedicated postpartum HTN clinic	—	Seen ≤72 h; goal BP	Postpartum	53% seen ≤72 h; 85% discharged on drugs; 60% needed modification
Hotz 2025 ⁴⁴	Structured follow-up (AOBPM, 24-h ABPM)	—	Prescribed antihypertensives at V3/V12	12 months	Rx 85.4% → 19.2% (3 mo) → 20% (12 mo); undertreatment

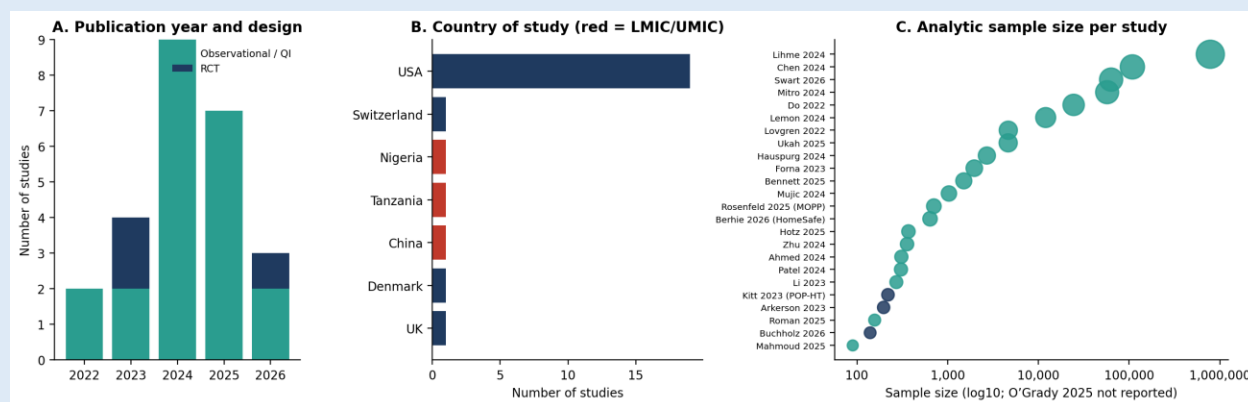


Figure 3. Evidence map of included studies: (A) publication year by design, (B) country of study with low- and middle-income settings highlighted, and (C) analytic sample size on a logarithmic scale (bubble area proportional to sample size; navy = RCT).

Table 10. Outcome-domain matrix of the 25 included studies. D1 medication-taking adherence; D2 prescription dispensing/continuity/initiation; D3 BP self-monitoring engagement; D4 follow-up visit attendance; D5 BP level/control; D6 readmission; D7 ED/unscheduled visits; D8 persistent hypertension; D9 choice of agent; D10 determinants; D11 knowledge/satisfaction/feasibility; D12 health-system and pharmacy factors.

Study	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	n
Kitt 2023 (POP-HT)			•		•								2
Arkerson 2023		•	•	•		•	•			•			6
Buchholz 2026				•	•								2
Ukah 2025	•									•			2
Swart 2026	•									•			2
Lihme 2024		•						•					2
Chen 2024		•											1
Lemon 2024		•		•		•						•	4
Forna 2023		•		•	•								3
Rosenfeld 2025 (MOPP)			•		•		•						3
Hauspurg 2024		•				•	•	•					4
Do 2022		•				•			•				3
Mitro 2024						•			•				2
Bennett 2025						•	•		•				3
Lovgren 2022						•			•				2
Zhu 2024				•	•	•						•	4

O'Grady 2025	•					•					•	•	4
Patel 2024			•	•	•					•			4
Mujic 2024			•							•			2
Li 2023				•						•			2
Ahmed 2024				•				•					2
Mahmoud 2025			•		•			•			•		4
Berhie (HomeSafe) 2026			•	•						•		•	4
Roman 2025		•		•	•	•					•	•	6
Hotz 2025		•			•			•					3
Total studies	3	9	7	10	9	10	4	5	4	7	3	5	

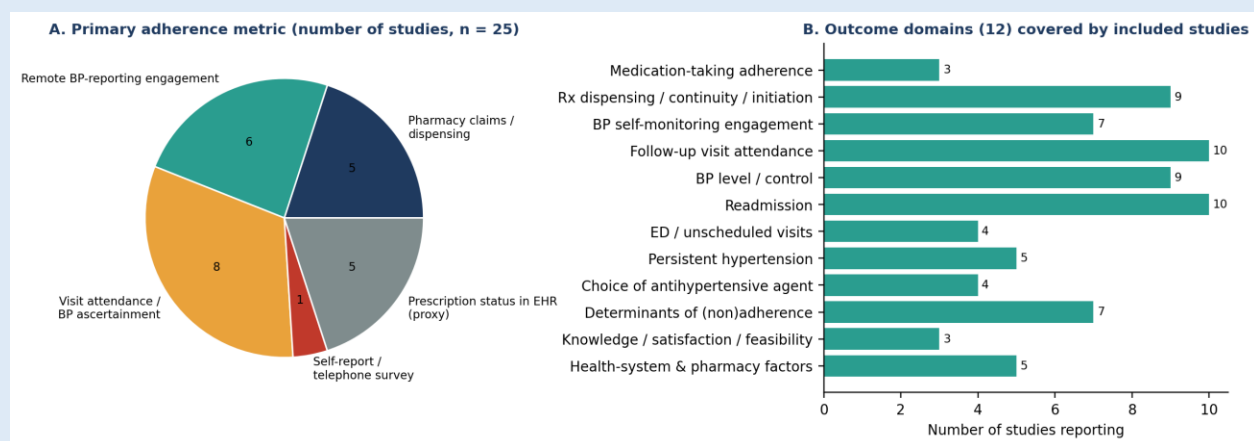


Figure 4. Adherence measurement methods and outcome-domain coverage: (A) primary adherence or engagement metric used by each study and (B) number of studies contributing to each of the 12 outcome domains.

Domain 1 — Medication-taking adherence (initiation, implementation, persistence)

Only three studies directly measured medication-taking behaviour after discharge. In a Minnesota health-system cohort of 4,647 insured patients with HDP, 987 (21.2%) received an outpatient antihypertensive prescription postpartum, and primary adherence — defined as filling the first prescription within 7 days — was 73.4%; severe-range BP during pregnancy was associated with a higher likelihood of postpartum primary adherence (RR 1.26, 95% CI 1.14–1.40), suggesting that perceived severity motivates initiation.⁶

Persistence was markedly lower. In a national claims cohort of 63,312 women who initiated an antihypertensive within 30 days of a live birth (2019–2022), 57.8% discontinued therapy (no

supply for the days' supply plus 30 days), i.e., only 42.2% persisted. Discontinuation risk was higher among women aged 18–24 years than in older age groups (RR 0.93, 0.89 and 0.85 for ages 25–34, 35–44 and ≥ 45 years, respectively) and among Hispanic (RR 1.03) and Asian (RR 1.02) versus White women, whereas eclampsia (RR 0.97), pre-existing hypertension (RR 0.95) and postpartum depression (RR 0.95) were associated with lower discontinuation.³

Implementation was assessed only by self-report in a quality-improvement initiative in which pharmacy residents counselled 77% of eligible postpartum patients at discharge; most reported adherence at 4–6 weeks, no hypertension-related readmission occurred within 30 days versus 8.3% at baseline, but knowledge gaps about prescription refill procedures were identified. Because the two quantitative estimates reflect different ABC phases, they were not pooled ; an illustrative combination of the initiation and persistence probabilities implies that of 100 women prescribed therapy, approximately 31 would both initiate promptly and persist.^{3,6,31}

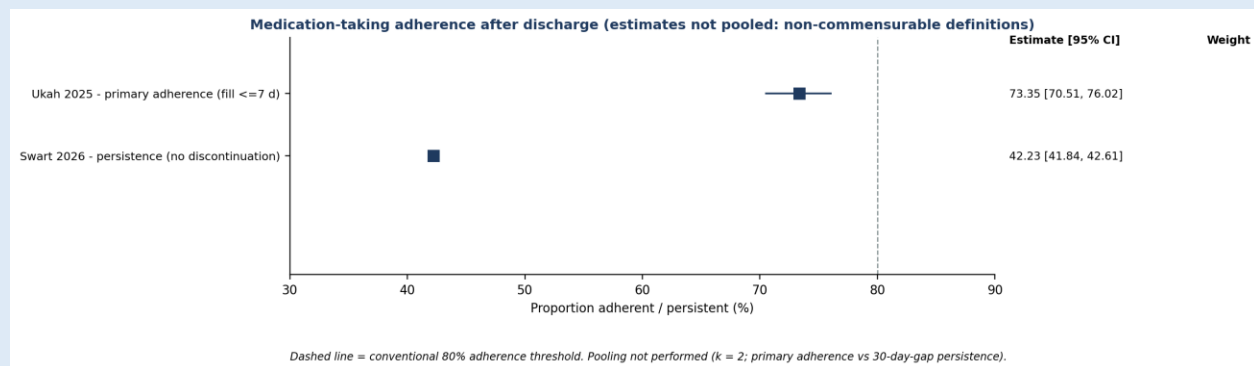


Figure 10. Forest plot of directly measured medication-taking adherence after discharge: primary adherence (first fill ≤ 7 days) and persistence (absence of discontinuation). Estimates are displayed without pooling because they represent different adherence phases; the dashed line marks the conventional 80% threshold.^{3,6}

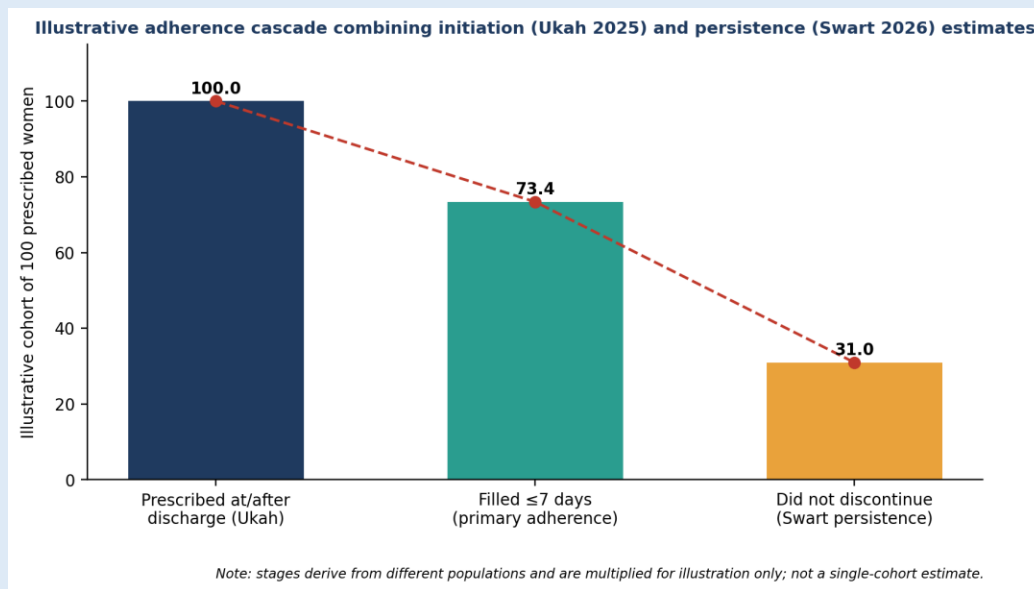


Figure 11. Illustrative postpartum antihypertensive adherence cascade obtained by multiplying the initiation probability with the persistence probability from two independent cohorts (for illustration only).^{3,6}

Domain 2 — Prescription dispensing, continuity and initiation over time

Registry and claims data describe how treatment evolves across the postpartum year. In the Danish nationwide cohort (36,900 HDP pregnancies), the 2-year cumulative incidence of initiating antihypertensive treatment reached 44.1% among women with severe preeclampsia who had required antenatal medication; most initiations occurred within 3 months (86.6% for severe preeclampsia, 75.3% for preeclampsia, 75.1% for gestational hypertension), yet 13.4–24.9% first filled a prescription more than 3 months after delivery and up to 55.9% of early users required further prescriptions beyond 3 months. In a United States claims analysis of 108,614 pregnancies exposed to antihypertensives, 8.4% of women with pre-conception chronic hypertension were not dispensed any antihypertensive during the first postpartum year.^{20,32}

Clinical cohorts corroborate early and substantial treatment needs followed by rapid de-escalation. In the Basel Postpartum Hypertension Registry (n = 370), antihypertensives were prescribed in 85.4% at baseline, 19.2% at 3 months and 20% at 12 months, while only 47.9% and 62.4% achieved non-hypertensive BP without medication at 3 and 12 months, respectively, indicating

undertreatment. In a dedicated postpartum hypertension clinic, 85% of women with severe HDP were discharged on antihypertensives and 60% required a postpartum dose modification, underscoring that adherence must be dynamic, following frequent titration.^{15,44,47}

Table 11. Medication-taking, dispensing and prescribing outcomes after discharge.

Study	Measure	Population / denominator	Result	Interpretation
Ukah 2025 ⁶	Primary adherence (fill ≤ 7 d)	987 with postpartum Rx	73.4% (95% CI 70.5–76.0)	≈ 1 in 4 do not initiate promptly
Swart 2026 ³	Discontinuation (gap > supply + 30 d)	63,312 initiators	57.8% discontinued; 42.2% persisted	Persistence well below 80%
O'Grady 2025 ³¹	Self-reported adherence 4–6 wk	Counselled patients (77% of eligible)	Most adherent; refill knowledge gaps	Counselling feasible; weak measure
Lihme 2024 ²⁰	Cumulative initiation, 2 y	36,900 HDP	Up to 44.1%; 13.4–24.9% first fill >3 mo	Delayed and late initiation common
Chen 2024 ³²	Dispensation continuity	Chronic HTN pre-conception	8.4% no fill in year 1 postpartum	Treatment gaps in chronic HTN
Hauspurg 2024 ¹⁵	Initiation after discharge	2,705 new-onset HDP	22.6% started after discharge	Out-of-hospital escalation frequent
Hotz 2025 ⁴⁴	Prescribed antihypertensive	370 PPHT	85.4% $\rightarrow$ 19.2% (3 mo) $\rightarrow$ 20% (12 mo)	Rapid de-escalation; undertreatment
Roman 2025 ⁴⁷	Discharged on drug; modification	157 severe HDP	85% discharged on drug; 60% modified	Adherence to changing regimens needed

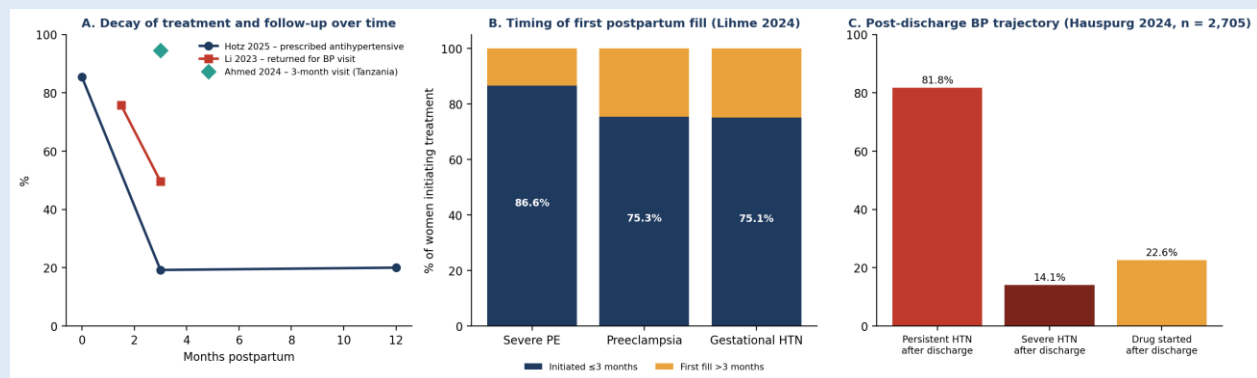


Figure 12. Temporal curves of postpartum treatment and follow-up: (A) decline in prescribed therapy and follow-up attendance over months; (B) timing of first postpartum fill by HDP phenotype; (C) post-discharge BP trajectory and out-of-hospital initiation.^{15,18,20,35,44}

Domains 3–4 — Adherence to BP self-monitoring and postpartum follow-up

Ten study arms from eight studies reported the proportion of women who adhered to postpartum BP surveillance or follow-up (Table 12). The pooled random-effects proportion was 77.5% (95% CI 67.1–85.3), with considerable heterogeneity ($I^2 = 95.1\%$, $\tau^2 = 0.64$, $Q = 184.3$, $p < 0.001$) and a wide 95% prediction interval (32.8–96.0%), implying that adherence in a new setting could plausibly fall anywhere between one-third and almost all women. Because the CI includes 80%, the null hypothesis that follow-up adherence reaches the 80% benchmark could not be rejected overall.^{8,9,18,34,35,45–47}

In subgroup analysis, adherence was 79.5% (95% CI 67.8–87.8; $k = 6$) in structured pathways and 74.0% (46.3–90.4; $k = 4$) under usual care; the between-subgroup difference was not significant ($Q = 0.21$, $p = 0.65$), reflecting between-study rather than within-study comparison and heterogeneous endpoints (72-hour visits to 12-month primary-care visits). Within-trial comparisons, which control for setting, were consistently favourable. Engagement with remote monitoring was dynamic: in a text-based cohort, engagement decreased over six weeks with greater attrition among Black patients; in a safety-net cohort, BP was transmitted on a mean of 15.2 days during six weeks, with women aged ≤ 25 years recording 4.3 fewer days; and in an EHR-tethered programme, 68.6% submitted a BP within 7 days, engagement predicting 6-week visit attendance (89.9% vs 65.4%).^{33,34,45}

Table 12. Adherence to postpartum BP surveillance and follow-up: study-level data used in the pooled-proportion meta-analysis.

Study (arm)	Pathway	Endpoint	Events / N	Proportion % (95% CI)	Weight %
Arkerson 2023 (remote arm) ⁸	Structured	BP ascertained ≤ 10 d	88/96	91.7 (84.2–95.8)	9.1
Patel 2024 ⁴⁵	Structured	First BP-check visit	257/306	84.0 (79.4–87.7)	10.6
Mahmoud 2025 ⁴⁶	Structured	Retention at 12 wk	85/90	94.4 (87.3–97.7)	8.3
Roman 2025 ⁴⁷	Structured	Seen ≤ 72 h	83/157	52.9 (45.1–60.5)	10.6
Berhie 2026 ³⁴	Structured	BP returned ≤ 7 d	439/640	68.6 (64.9–72.1)	10.9
Buchholz 2026 (coaching arm) ⁹	Structured	PCP visit by 12 mo	49/69	71.0 (59.3–80.5)	9.9
Arkerson 2023 (in-office arm) ⁸	Usual care	BP ascertained ≤ 10 d	59/101	58.4 (48.6–67.6)	10.3
Li 2023 ³⁵	Usual care	Returned at 6 wk	206/272	75.7 (70.3–80.5)	10.7

Ahmed 2024 ¹⁸	Usual care	Returned at 3 mo	292/304	96.1 (93.2–97.7)	9.7
Buchholz 2026 (control arm) ⁹	Usual care	PCP visit by 12 mo	27/69	39.1 (28.4–51.0)	10.0
Pooled (DL, logit)	All	—	1,585/2,104	77.5 (67.1–85.3)	100

$I^2 = 95.1\%$; $\tau^2 = 0.64$; 95% prediction interval 32.8–96.0%. Abbreviations: DL, DerSimonian–Laird; PCP, primary-care provider.

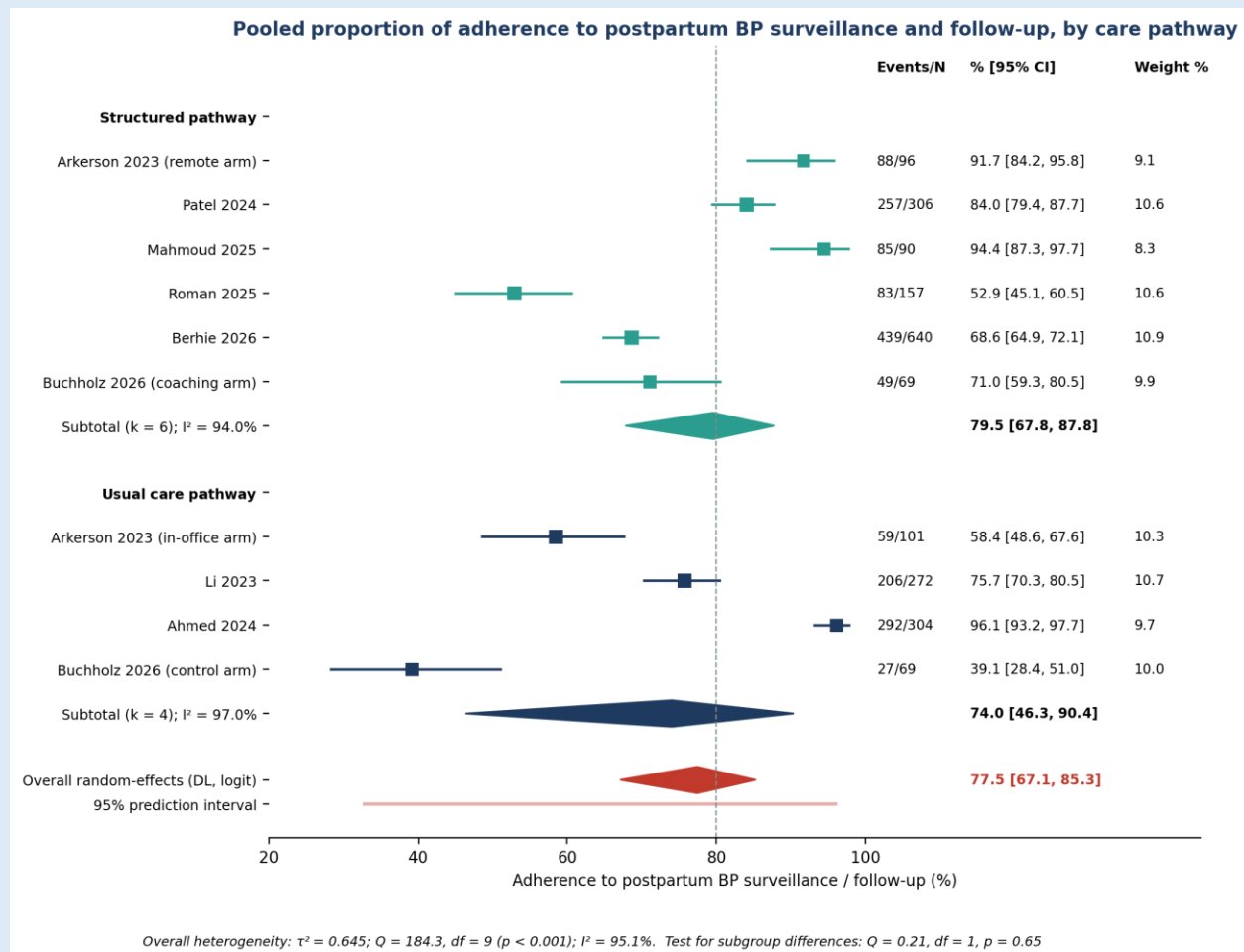


Figure 13. Forest plot of the pooled proportion of adherence to postpartum BP surveillance/follow-up, stratified by structured versus usual-care pathway (DerSimonian–Laird random effects on the logit scale, back-transformed), with the 95% prediction interval.^{8,9,18,34,35,45–47}

The funnel plot showed no visual asymmetry suggestive of small-study effects, and Egger's regression was not significant (intercept 3.44, SE 3.13, $p = 0.30$). In leave-one-out analysis the pooled

proportion remained stable between 73.2% and 80.5%, and heterogeneity remained above 93% after omission of any single arm, indicating that no single study drove the estimate.

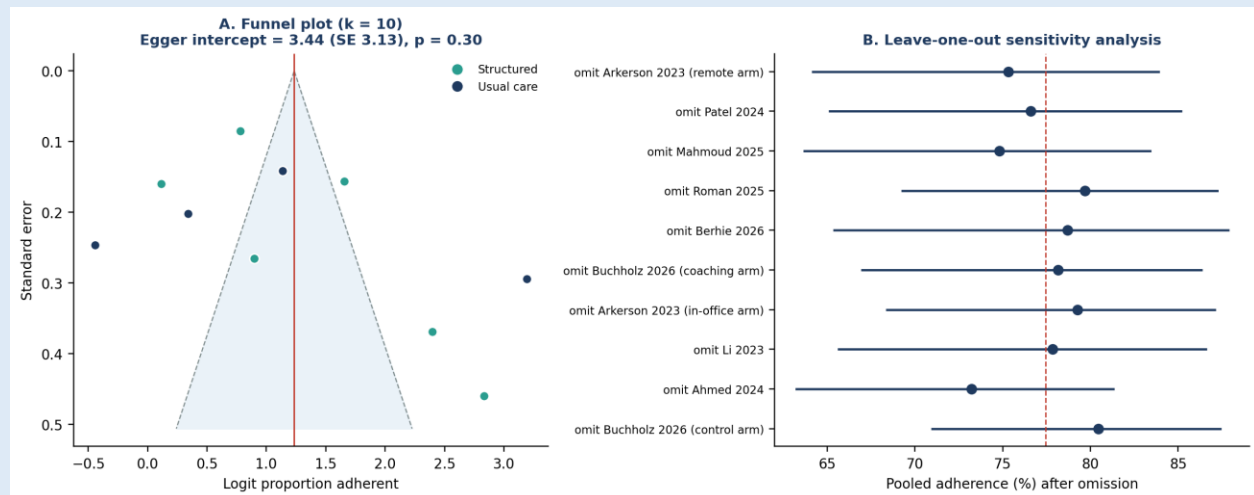


Figure 14. (A) Funnel plot of logit-transformed adherence proportions against their standard errors with Egger's test; (B) leave-one-out sensitivity analysis of the pooled proportion.

Structured adherence-supporting pathways versus usual care: follow-up adherence

Three studies compared a structured pathway with usual care for adherence to BP ascertainment or follow-up. Smartphone-based remote monitoring increased BP ascertainment within 10 days of discharge (91.7% vs 58.4%; RR 1.57, 95% CI 1.32–1.87); remote monitoring abolished the racial gap observed with in-office surveillance (Black vs White patients 41.2% vs 69.5% in-office; 92.9% vs 92.9% remote). A remote patient-monitoring programme in an integrated care system increased BP measurement within 20 days (RR 1.56, 1.47–1.65), and care navigation with health coaching doubled primary-care attendance by 12 months (71.0% vs 39.1%; RR 2.00, 1.34–2.97). The pooled RR was 1.57 (95% CI 1.49–1.66; $p < 0.001$) with no heterogeneity ($I^2 = 0.0\%$), supporting H2 (Figure 15). In the largest propensity-matched cohort ($n = 12,038$), programme enrolment yielded 85 more women per 100 with BP recorded within 10 days (aRD 85.4, 95% CI 84.3–86.6) and six more per 100 attending the 6-week visit (aRD 5.7, 3.9–7.6); these risk differences could not be converted to RR and were synthesised narratively.^{8,9,36,37}

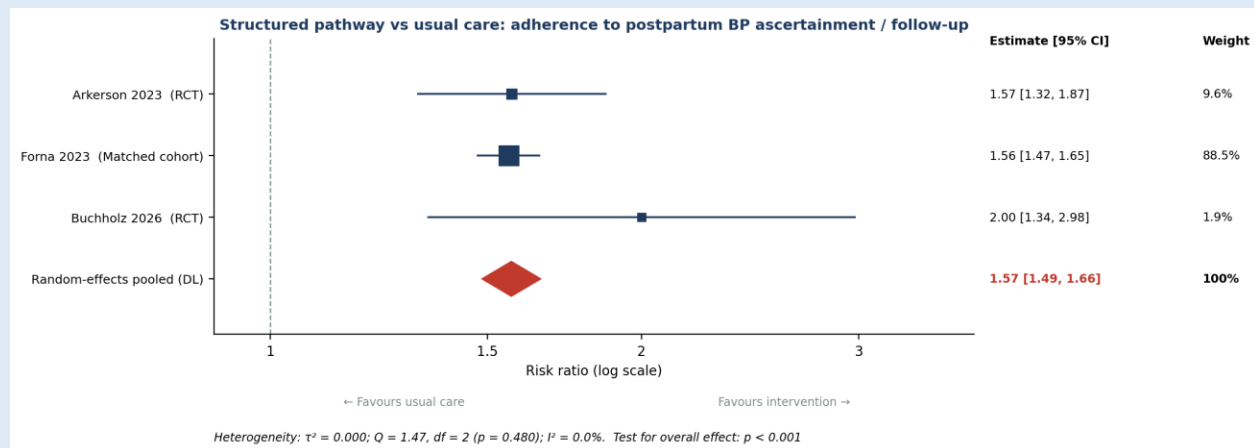


Figure 15. Forest plot of structured pathways versus usual care for adherence to postpartum BP ascertainment/follow-up (risk ratio, random effects).^{8,9,37}

Table 13. Study-level comparative effects of structured adherence-supporting pathways versus usual care across outcome domains.

Study (design)	Pathway components	Follow-up / ascertainment	BP control / level	Acute encounters	Antihypertensive uptake
Kitt 2023 (RCT) ⁷	App-based self-monitoring + physician titration	—	24-h SBP -6.51; DBP -5.80 mmHg	—	Titrated by protocol
Arkerson 2023 (RCT) ⁸	Smartphone remote BP monitoring	91.7% vs 58.4%; RR 1.57	—	Readmission 4.2% vs 5.0%; unscheduled visits 12.5% vs 5.0%	9.4% vs 6.9%
Buchholz 2026 (RCT) ⁹	Navigation + SMBP + health coaching	PCP visit 71.0% vs 39.1%; RR 2.00	Control 55.3% vs 31.1%; SBP -5.6, DBP -4.5 mmHg	—	—
Lemon 2024 (PS cohort) ³⁶	Home BP + central nursing team	+85.4/100 BP ≤10 d; +5.7/100 6-wk visit	—	Readmission aRR 0.78 (0.65–0.93)	aRR 4.44 (3.88–5.07)
Forna 2023 (matched cohort) ³⁷	Remote patient monitoring	BP ≤20 d RR 1.56; clinician visit RR 1.50	Normal BP RR 1.43	—	RR 1.27 (1.15–1.40)
Rosenfeld 2025 (PS cohort) ³⁸	Remote titration to <130/80 mmHg	—	SBP -4.4; DBP -3.1 mmHg at 6 wk	ED 3.6% vs 8.4%; doubly robust OR 0.32 (0.10–1.01)	—

Blood pressure control and blood pressure levels

Structured pathways increased the probability of achieving BP control (health coaching: 55.3% vs 31.1% below 130/80 mmHg at 12 months; remote monitoring: normal post-discharge BP RR 1.43), with a pooled RR of 1.44 (95% CI 1.33–1.56; $I^2 = 0.0\%$).^{9,37}

Three studies reported BP differences. In the POP-HT RCT, home self-monitoring with physician-optimised titration lowered 24-hour mean diastolic BP by 5.80 mmHg and systolic BP by 6.51 mmHg at a mean of 249 days postpartum, with subsequent secondary analyses showing lower aortic BP and pulse-wave velocity; health coaching reduced systolic and diastolic BP by 5.6 and 4.5 mmHg at 12 months; and a lower treatment target (<130/80 mmHg) with remote titration reduced systolic and diastolic BP by 4.4 and 3.1 mmHg at 6 weeks. Pooled MDs were -5.52 mmHg (95% CI -7.04 to -4.00; $I^2 = 0.0\%$; $p < 0.001$) for systolic and -4.51 mmHg (-6.37 to -2.66; $I^2 = 57.3\%$; $p < 0.001$) for diastolic BP, supporting H4. In contrast, delivering discharge medication at the bedside (Meds-to-Beds) or on campus did not further improve BP within an existing multicomponent programme (median SBP 135 vs 137 mmHg, $p = 0.22$).^{7,9,38,43,48}

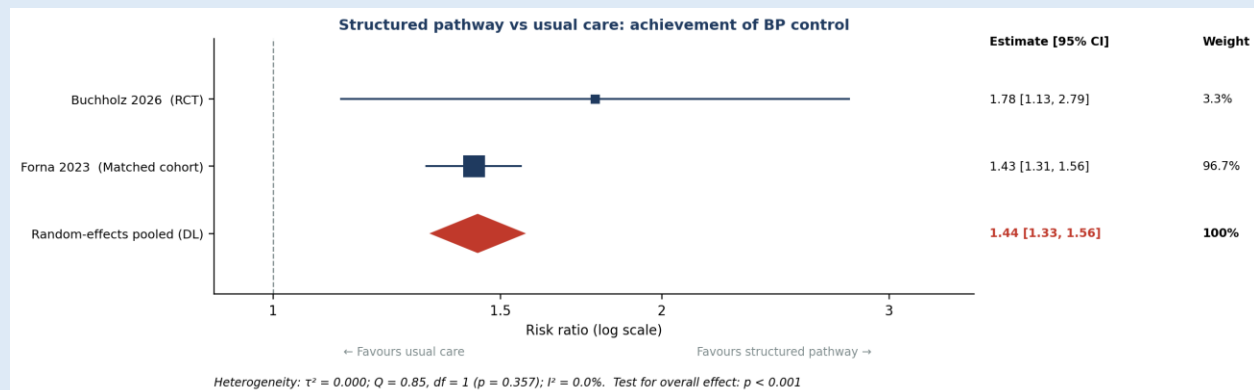


Figure 16. Forest plot of structured pathways versus usual care for achievement of BP control (risk ratio).^{9,37}

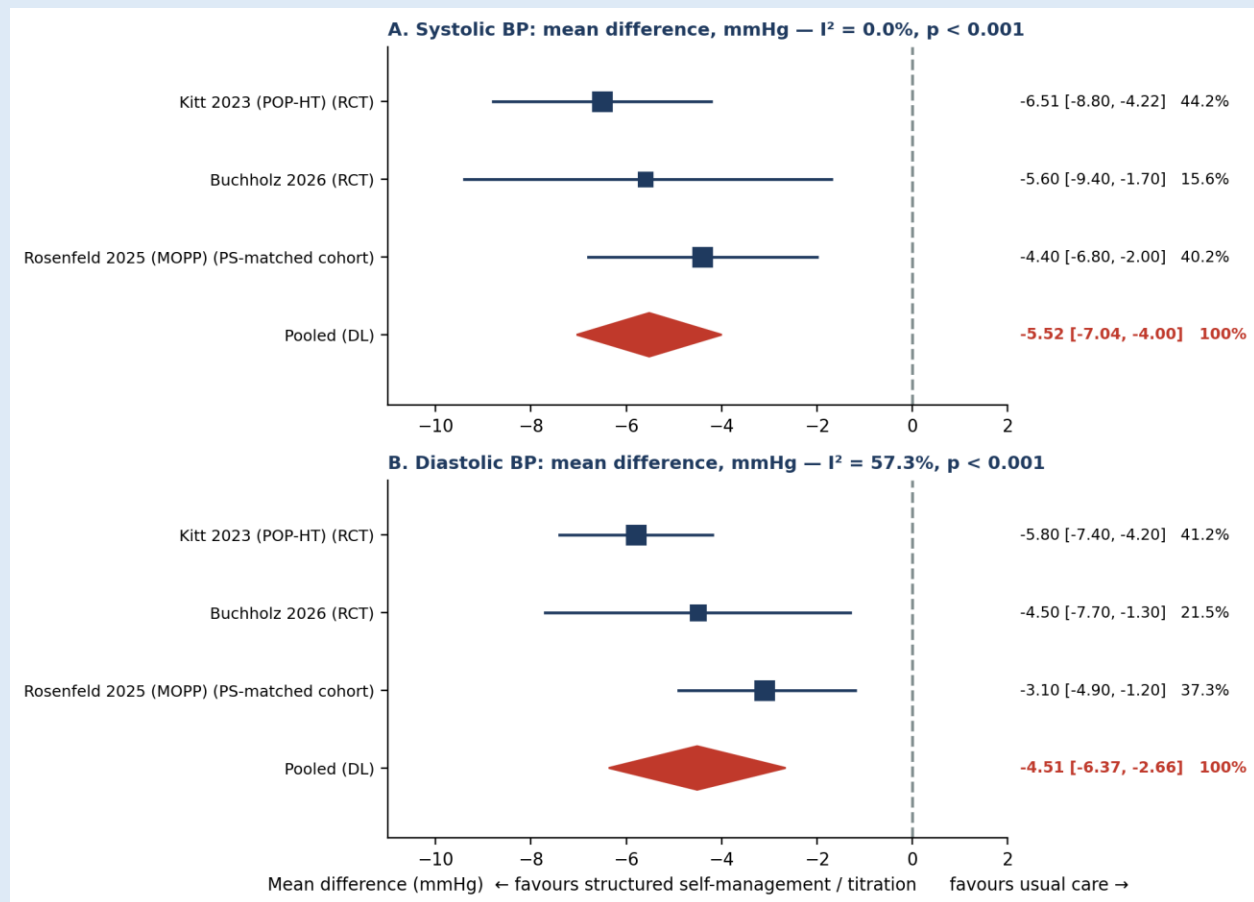


Figure 17. Forest plots of mean differences in (A) systolic and (B) diastolic BP between structured self-management/titration pathways and usual care.^{7,9,38}

Hypertension-related readmission and emergency department visits

Structured pathways were associated with fewer acute hypertension-related encounters: remote monitoring in an RCT (readmission 4.2% vs 5.0%; RR 0.84, 0.23–3.04), a propensity-matched remote programme (readmission aRR 0.78, 0.65–0.93) and tighter remote titration (ED visits 3.6% vs 8.4%; RR 0.43, 0.22–0.86). The pooled RR was 0.69 (95% CI 0.49–0.99; $p = 0.04$; $I^2 = 26.4\%$), supporting H3 at low certainty. Unscheduled visits were numerically more frequent with remote monitoring in the RCT (12.5% vs 5.0%, $p = 0.059$), consistent with earlier triage. Uncontrolled evidence was concordant: no hypertension-related readmission after pharmacist counselling versus 8.3% at baseline, 5% readmission in a dedicated clinic, and, conversely, a 2.22-fold higher odds of

ED visits and 5.73-fold higher odds of readmission among women whose medication was started after discharge compared with those never requiring medication.^{8,15,31,36,38,47}

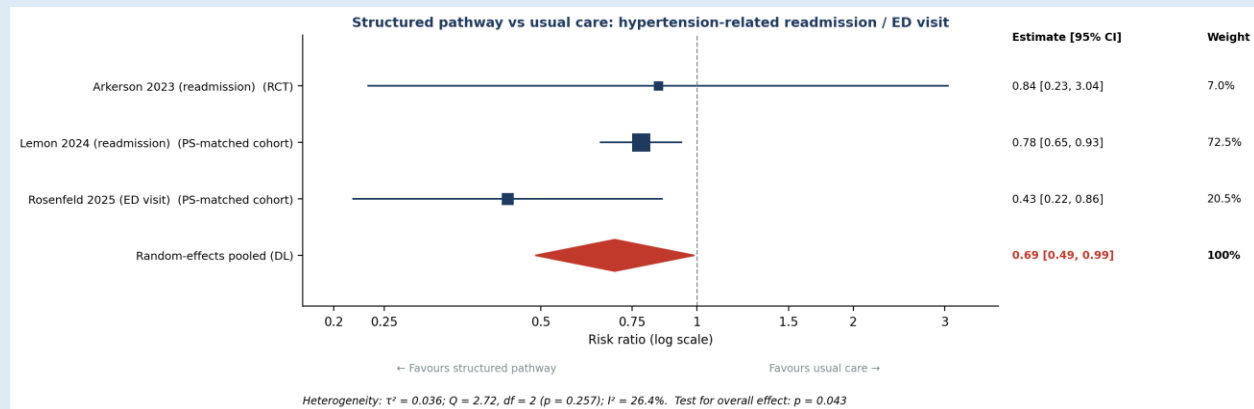


Figure 18. Forest plot of structured pathways versus usual care for hypertension-related readmission or ED visits (risk ratio).^{8,36,38}

Antihypertensive uptake after discharge

Structured pathways tended to increase initiation or use of antihypertensive medication after discharge (RCT: 9.4% vs 6.9%; matched cohort RR 1.27, 1.15–1.40; propensity-matched cohort aRR 4.44, 3.88–5.07), but the pooled RR of 2.03 (95% CI 0.72–5.68; $p = 0.18$) was not statistically significant owing to extreme heterogeneity ($I^2 = 99.1\%$), so H6 was not supported. The heterogeneity is clinically interpretable: programme intensity, treatment thresholds ($\geq 150/100$ vs $\geq 140/90$ mmHg) and baseline prescribing differed substantially.^{8,36,37}

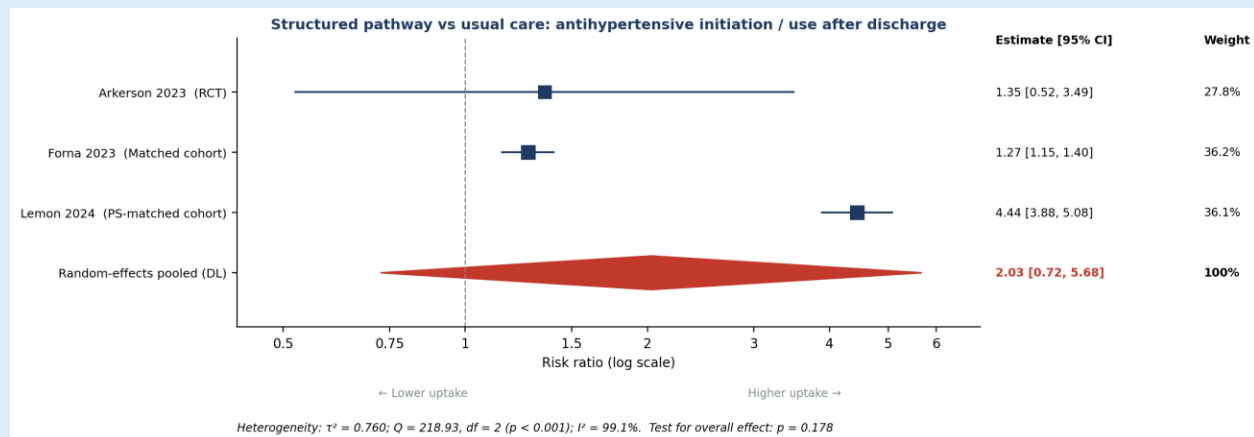


Figure 19. Forest plot of structured pathways versus usual care for antihypertensive initiation or use after discharge (risk ratio).^{8,36,37}

Choice of antihypertensive agent at discharge

Four cohorts examined discharge agent. In a national claims database, readmission for hypertension occurred in 4.5% of women filling labetalol versus 2.1% filling nifedipine (aOR 1.63, 1.43–1.85), consistently for mild and severe HDP. In a remote-monitoring cohort (n = 1,507), readmission was 9.2% versus 3.9% (aOR 2.70, 1.57–4.65), and severe-range home BP readings were more frequent with labetalol during the first ten postpartum days. Pooling these direct comparisons gave an aOR of 1.95 (95% CI 1.22–3.14; p = 0.01; I² = 68.2%), supporting H5. Two further cohorts, using no medication as reference, found that labetalol monotherapy increased (HR 1.63; aOR 1.66) whereas nifedipine monotherapy decreased (HR 0.74; aOR 0.27) readmission, and two or more agents were protective (HR 0.53).^{39–42}

Table 14. Discharge antihypertensive agent and postpartum readmission.

Study	Design / n	Comparison	Crude readmission	Adjusted estimate (95% CI)	Comment
Do 2022 ³⁹	Claims cohort; 24,477 treated	Labetalol vs nifedipine	4.5% vs 2.1%	aOR 1.63 (1.43–1.85)	Consistent in mild and severe HDP
Bennett 2025 ⁴¹	Remote-program cohort; 1,507	Labetalol vs nifedipine	9.2% vs 3.9%	aOR 2.70 (1.57–4.65)	More severe home BP days 1–10
Mitro 2024 ⁴⁰	KPNC cohort; 57,254	Each regimen vs no Rx	7.6% / 3.6% / 3.2% / 2.5%	Labetalol HR 1.63 (1.41–1.88); nifedipine	No race interaction

				HR 0.74 (0.59–0.93); ≥2 drugs HR 0.53 (0.38–0.74)	
Lovgren 2022 ⁴²	Single centre; 4,660	Each regimen vs no Rx	4.7% overall	Nifedipine aOR 0.27 (0.15–0.48); labetalol aOR 1.66 (1.06–2.61); both 0.35 (0.16–0.77)	Labetalol ≈6× vs nifedipine
Pooled (direct comparisons)	k = 2	Labetalol vs nifedipine	—	aOR 1.95 (1.22–3.14)	I ² = 68.2%

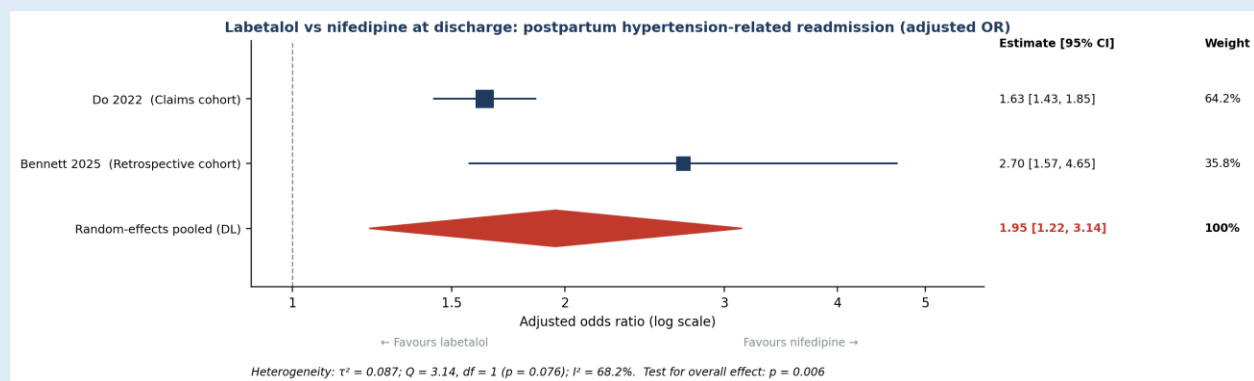


Figure 20. Forest plot of discharge on labetalol versus nifedipine and postpartum hypertension-related readmission (adjusted odds ratios).^{39,41}

Persistent hypertension

Persistent hypertension — the clinical condition that makes sustained adherence necessary — was highly prevalent: 81.8% after discharge in a United States cohort; 41.1% (95% CI 35.6–46.9) at 3 months in Tanzania, with reduced eGFR at delivery as the strongest predictor (aOR 2.1); and, in Nigeria, 81.1% of participants had elevated BP during the first two weeks of home monitoring. In Switzerland, non-hypertensive BP without medication was achieved by only 47.9% at 3 months, and albuminuria persisted in 16.9% at 12 months.^{15,18,44,46}

Determinants of non-adherence

Determinants were mapped to the WHO five dimensions. **Patient-related:** younger maternal age predicted discontinuation and fewer monitoring days; lower education (high school or below) tripled the odds of not returning for BP follow-up at 6 weeks (OR 3.71) and 12 weeks (OR 3.20);

multiparity predicted non-return and reduced engagement. **Condition-related:** greater HDP severity, eclampsia and pre-existing hypertension were associated with better initiation and persistence, whereas NICU admission of the infant did not reduce engagement. **Therapy-related:** labetalol, which requires multiple daily doses, was consistently associated with worse outcomes than once-daily extended-release nifedipine. **Health-system-related:** remote monitoring, nurse navigation, population-health coordinators and pharmacist counselling improved engagement and follow-up. **Socioeconomic:** public insurance and Black race predicted lower BP return in an EHR-tethered programme, and Black patients had greater attrition from text-based monitoring.^{3,6,8,31,33–36,39,41,45}

Table 15. Determinants of postpartum adherence (medication, monitoring, follow-up) mapped to WHO dimensions.

WHO dimension	Determinant	Direction	Effect estimate	Source
Patient	Younger age (18–24 y)	↓ persistence	Discontinuation RR 0.85–0.93 for older groups vs 18–24 y	Swart 2026 ³
Patient	Age ≤25 y	↓ monitoring	–4.3 measurement-days (95% CI –6.1 to –2.4)	Mujic 2024 ³³
Patient	Education ≤ high school	↓ follow-up	OR 3.71 (6 wk), 3.20 (12 wk) for non-return	Li 2023 ³⁵
Patient	Multiparity / grand multiparity	↓ follow-up / monitoring	OR 1.63 non-return (12 wk); –3.5 days engagement	Li 2023 ³⁵ ; Mujic 2024 ³³
Condition	Severe BP / eclampsia / chronic HTN	↑ initiation, persistence	RR 1.26 (primary adherence); discontinuation RR 0.95–0.97	Ukah 2025 ⁶ ; Swart 2026 ³
Condition	NICU admission of infant	↔ monitoring	aRR not significant (predictor not retained)	Berhie 2026 ³⁴
Therapy	Labetalol vs nifedipine	↓ favourable outcome	Pooled aOR 1.95 for readmission	Do 2022 ³⁹ ; Bennett 2025 ⁴¹
Health system	Remote BP programme	↑ follow-up, uptake	aRR 4.44 uptake; +85/100 BP checks	Lemon 2024 ³⁶
Health system	Pharmacist / coordinator support	↑ adherence, engagement	Readmission 0% vs 8.3%; Epic-routed capture 44.9%→56.5%	O'Grady 2025 ³¹ ; Berhie 2026 ³⁴
Socioeconomic	Black race; public insurance	↓ engagement (usual care)	In-office ascertainment 41.2% vs 69.5%; negative predictors of BP return	Arkerson 2023 ⁸ ; Berhie 2026 ³⁴
Socioeconomic	Hispanic / Asian ethnicity	↓ persistence	Discontinuation RR 1.03 and 1.02	Swart 2026 ³

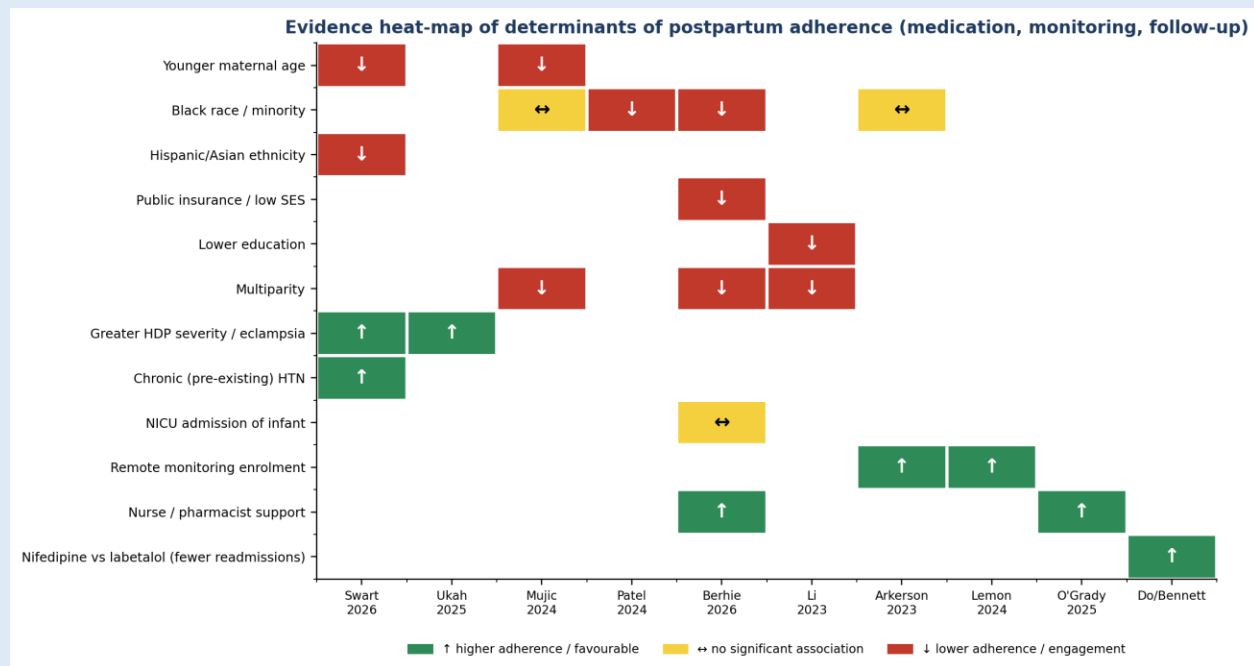


Figure 21. Evidence heat-map of determinants of postpartum adherence across included studies (green: higher adherence or favourable outcome; yellow: no significant association; red: lower adherence or engagement).

Knowledge, satisfaction, feasibility and health-system factors

Where measured, feasibility and acceptability were high. A Nigerian home-monitoring programme achieved 96% fidelity to daily BP recording and 94% retention at 12 weeks, demonstrating that postpartum self-monitoring is feasible in a low-resource setting. In a dedicated hospital postpartum hypertension clinic, 86% of women received HDP education and 89% had or were prescribed a BP cuff at discharge, although only 53% were seen within 72 hours and 28% reached goal BP at the first visit. Adding a population-health coordinator doubled programme enrolment (245 to 485) and shifted BP submission toward EHR-integrated routes. By contrast, the location of medication dispensing did not improve BP, follow-up or readmission within an existing quality-improvement programme, suggesting that access to the drug alone is insufficient when counselling and monitoring are already in place.^{34,43,46,47}

Small-study effects and exploratory publication-bias assessment

An exploratory centred funnel plot combining all 13 comparative ratio estimates across five outcome domains showed a broadly symmetrical distribution about the domain-specific pooled estimates, with the outlying points explained by the heterogeneous antihypertensive-uptake domain rather than by small-study effect. Given the small number of studies per outcome, formal tests for comparative outcomes were not undertaken, and publication bias cannot be excluded.

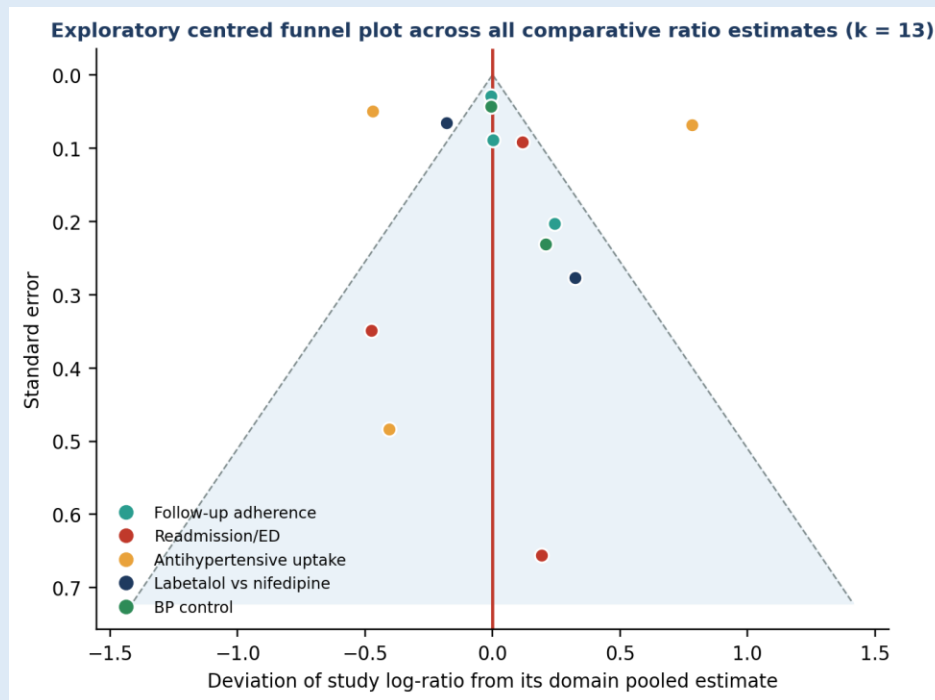


Figure 22. Exploratory centred funnel plot of all comparative ratio estimates (log scale), expressed as deviation from each domain's pooled estimate, coloured by outcome domain.

Summary of quantitative syntheses and certainty of evidence

Table 16. Summary of all meta-analyses (DerSimonian–Laird random-effects model).

Outcome	k	Participants	Measure	Pooled estimate (95% CI)	p	I ² (%)	τ ²
Adherence to BP surveillance / follow-up	10 arms	2,104	Proportion (%)	77.5 (67.1 to 85.3)	—	95.1	0.64
– Structured pathways	6	1,358	Proportion (%)	79.5 (67.8 to 87.8)	—	94.0	0.52
– Usual care	4	746	Proportion (%)	74.0 (46.3 to 90.4)	—	97.0	1.43

Follow-up adherence, structured vs usual care	3	2,304	RR	1.57 (1.49 to 1.66)	<0.001	0.0	0.00
BP control, structured vs usual care	2	2,075	RR	1.44 (1.33 to 1.56)	<0.001	0.0	0.00
Systolic BP	3	1,043	MD (mmHg)	-5.52 (-7.04 to -4.00)	<0.001	0.0	0.00
Diastolic BP	3	1,043	MD (mmHg)	-4.51 (-6.37 to -2.66)	<0.001	57.3	1.51
Readmission / ED visit	3	12,940	RR	0.69 (0.49 to 0.99)	0.043	26.4	0.04
Antihypertensive uptake	3	14,202	RR	2.03 (0.72 to 5.68)	0.178	99.1	0.76
Labetalol vs nifedipine, readmission	2	25,984	aOR	1.95 (1.22 to 3.14)	0.006	68.2	0.09

Participant totals are approximate analytic sample sizes of contributing studies (Forna 2023: 1,967; Lemon 2024: 12,038; Rosenfeld 2025: 705 matched; Do 2022: 24,477 treated). Abbreviations: aOR, adjusted odds ratio; MD, mean difference; RR, risk ratio.

Table 17. Subgroup and sensitivity analyses.

Analysis	Estimate (95% CI)	Heterogeneity	Interpretation
Subgroup: structured pathway (k = 6)	79.5% (67.8–87.8)	I ² = 94.0%	Numerically higher adherence
Subgroup: usual care (k = 4)	74.0% (46.3–90.4)	I ² = 97.0%	Wide CI; endpoints heterogeneous
Test for subgroup difference	Q = 0.21, df = 1	p = 0.65	Between-study contrast not significant
Leave-one-out (range of pooled %)	73.2% to 80.5%	I ² 93.5–95.7%	Robust to omission of any arm
Egger regression (proportion MA)	Intercept 3.44 (SE 3.13)	p = 0.30	No small-study effect detected
RCT-only follow-up adherence (Arkerson, Buchholz)	RR 1.57 and 2.00 (both p < 0.01)	Directionally consistent	Effect not driven by observational data
Exclusion of serious-RoB study (Forna) from BP-control MA	RR 1.78 (1.13–2.79), Buchholz alone	—	Direction and significance preserved
Exclusion of serious-RoB study (Bennett) from agent MA	aOR 1.63 (1.43–1.85), Do alone	—	Association preserved

Table 18. GRADE summary of findings for principal outcomes.

Outcome	Studies (design)	Effect (95% CI)	Downgrading / upgrading	Certainty
Medication initiation and persistence	2 (cohorts)	Initiation 73.4%; persistence 42.2%	Inconsistency (different definitions) –1;	⊕○○○ Very low

			indirectness (fills ≠ ingestion) -1	
Adherence to BP surveillance / follow-up	8 (2 RCT arms, cohorts)	77.5% (67.1–85.3)	Inconsistency (I^2 95%) -1	⊕○○○ Very low
Follow-up adherence, structured vs usual care	3 (2 RCTs, 1 cohort)	RR 1.57 (1.49–1.66)	Risk of bias -1; large effect (RR >1.5) considered	⊕⊕⊕○ Moderate
Systolic BP	3 (2 RCTs, 1 cohort)	MD -5.52 mmHg (-7.04 to -4.00)	Risk of bias -1; consistent (I^2 0%)	⊕⊕⊕○ Moderate
Diastolic BP	3 (2 RCTs, 1 cohort)	MD -4.51 mmHg (-6.37 to -2.66)	Risk of bias -1	⊕⊕⊕○ Moderate
BP control	2 (1 RCT, 1 cohort)	RR 1.44 (1.33–1.56)	Risk of bias -1; imprecision -1	⊕⊕○○ Low
Readmission / ED visit	3 (1 RCT, 2 cohorts)	RR 0.69 (0.49–0.99)	Risk of bias -1; imprecision -1	⊕⊕○○ Low
Antihypertensive uptake	3 (1 RCT, 2 cohorts)	RR 2.03 (0.72–5.68)	Inconsistency -2; imprecision -1	⊕○○○ Very low
Labetalol vs nifedipine, readmission	2 (cohorts)	aOR 1.95 (1.22–3.14)	Observational start; consistent direction across 4 cohorts	⊕⊕○○ Low

Table 19. Results of hypothesis testing.

Hypothesis	Key result	Decision
H1 – adherence below 80%	Persistence 42.2% (well below 80%); follow-up 77.5% (CI crosses 80%)	Supported for medication persistence; not rejected for follow-up
H2 – structured pathways ↑ follow-up adherence	RR 1.57 (1.49–1.66), $p < 0.001$	H0 rejected; H1 accepted
H3 – structured pathways ↓ acute encounters	RR 0.69 (0.49–0.99), $p = 0.04$	H0 rejected; H1 accepted (low certainty)
H4 – structured self-management ↓ BP	SBP -5.52, DBP -4.51 mmHg, both $p < 0.001$	H0 rejected; H1 accepted
H5 – labetalol ↑ readmission vs nifedipine	aOR 1.95 (1.22–3.14), $p = 0.01$	H0 rejected; H1 accepted
H6 – structured pathways ↑ uptake	RR 2.03 (0.72–5.68), $p = 0.18$	H0 not rejected
H7 – determinants associated with adherence	Age, education, parity, ethnicity, insurance, severity, agent	Supported (narrative synthesis)

DISCUSSION

Principal findings

This systematic review of 25 studies published between 2022 and 2026, encompassing approximately 1.07 million women, provides the first integrated appraisal of adherence to postpartum antihypertensive therapy and adherence-supporting care in outpatients after HDP. Four principal findings emerge. First, the postpartum adherence cascade is steep: roughly three-quarters of women fill their first prescription promptly, but more than half discontinue therapy, so that an illustrative 31 of every 100 prescribed women both initiate and persist. Second, adherence to BP surveillance and follow-up averages about three-quarters but varies enormously between settings. Third, structured, clinician-supported pathways — remote monitoring with titration, coaching and navigation — consistently improve follow-up adherence by approximately 57%, increase BP control, lower systolic and diastolic BP by about 5.5 and 4.5 mmHg and reduce acute hypertension-related encounters by about 30%. Fourth, discharge on once-daily extended-release nifedipine is associated with roughly half the odds of readmission compared with labetalol.^{3,6–9,39,41}

Medication-taking adherence: a cascade that collapses after initiation

The contrast between high initiation (73.4%) and low persistence (42.2%) is clinically important but must be interpreted carefully. Postpartum hypertension resolves in a substantial proportion of women within weeks, and clinicians frequently and appropriately de-escalate therapy; in the Basel registry, prescription prevalence fell from 85.4% to 19.2% within three months. Some discontinuation therefore represents guideline-concordant withdrawal rather than non-adherence. However, the same registry documented undertreatment, with fewer than half of women normotensive without medication at three months, and the Danish registry showed that up to one-quarter of women first filled a prescription more than three months after delivery and up to 55.9% of early users needed prescriptions beyond three months. Discontinuation that is not accompanied by BP ascertainment is therefore potentially hazardous, and the pattern of discontinuation — higher among the youngest women and among Hispanic and Asian women, lower after eclampsia or with pre-existing hypertension — suggests that perceived risk and social context, rather than BP normalisation alone, shape persistence.^{3,6,20,44}

These findings mirror adherence in non-obstetric young adults with hypertension, among whom only 43.3% achieved PDC $\geq 80\%$ in the first year, with renin–angiotensin blockers, calcium-channel blockers and single-pill combinations associated with better adherence than diuretics. Social risk profiles in Medicaid populations reduce the odds of full antihypertensive coverage by up to 36%, and pill burden and dosing frequency are consistent predictors of non-adherence across cardiometabolic drug classes. In sub-Saharan Africa, 43.9% of treated hypertensive adults are non-adherent, with cost, side effects, pill burden and poor knowledge as leading determinants. Postpartum women share these vulnerabilities and add unique ones — infant care, sleep deprivation, lactation concerns and fragmented obstetric-to-primary-care transitions.^{49–53}

Adherence to monitoring and follow-up: the enabling behaviour

Because postpartum regimens change frequently — 60% of women with severe HDP needed dose modification in one clinic — adherence to monitoring is the behaviour that makes safe titration, escalation and withdrawal possible. The pooled follow-up adherence of 77.5% conceals a range from 39% (primary-care attendance under usual care at 12 months) to 96% (a research-supported 3-month review in Tanzania). An integrative review of 13 studies found that fewer than half of individuals with HDP receive the recommended BP evaluation within 7–10 days, with the lowest rates among Black and Hispanic individuals, consistent with the in-office arm of the RCT included here, in which only 41.2% of Black patients had BP ascertained. The Chinese cohort further showed that non-return rises from 24% at 6 weeks to 50% at 12 weeks, with education as the dominant predictor, demonstrating that attrition accelerates precisely when transition to long-term cardiovascular prevention should begin.^{8,9,18,29,35,47}

Engagement with remote monitoring is itself a form of adherence that decays over time. Engagement fell over six weeks with greater attrition among Black patients in a text-based programme, and a 2026 cohort of 2,556 participants reported engagement lower than earlier studies, although NICU admission did not further reduce it. Nevertheless, in the Boston safety-net programme, cell-enabled cuffs that did not depend on smartphones or data plans achieved uniform engagement across racial and ethnic groups, suggesting that device design and language concordance can mitigate the digital divide.^{24,33,45}

Why structured pathways work: mechanisms and comparison with previous reviews

The effects of structured pathways on follow-up adherence (RR 1.57), BP control (RR 1.44) and BP levels are coherent with a mechanistic model in which frequent BP feedback closes the loop between measurement and action. Self-monitoring provides the patient with salient, personalised evidence of disease activity — a recognised facilitator of adherence — while clinician review permits timely titration, preventing both uncontrolled hypertension and overtreatment-related adverse effects that drive discontinuation. The POP-HT trial illustrates that the benefits extend beyond the puerperium, with lower BP and lower aortic stiffness at nine months, suggesting that early adherence-supported control may favourably modify long-term cardiovascular remodelling.^{7,48,54}

Our results extend earlier syntheses. A 2023 systematic review for the Agency for Healthcare Research and Quality found that home BP monitoring likely improves BP ascertainment (RR 2.11 in a single RCT) and may reduce racial disparities, but evidence on clinical outcomes was insufficient. A 2024 meta-analysis of 18 studies reported greater compliance with 10-day follow-up without an increase in readmissions, whereas a 2025 meta-analysis of four RCTs found no significant reduction in readmission and an increase in ED visits. Our pooled estimate for acute encounters (RR 0.69) differs because it incorporates large propensity-matched cohorts and a lower treatment-target cohort; the RCT-only estimate remains imprecise. A 2026 rapid review emphasised that most evaluations measure patient engagement but not provider adherence to triage protocols — a gap that also limits interpretation of our findings.^{10–12,30}

Beyond obstetrics, a 2025 meta-analysis of 29 studies showed that pharmacist-led interventions increase mean PDC by 0.06 for antihypertensive medications and adherence rates by 9%, with the largest effects for telephone-based delivery. However, a large pragmatic RCT of text-message refill reminders for cardiovascular medications showed only a 2-percentage-point PDC improvement that did not survive multiplicity correction, and TEXT4BP in Nepal improved adherence and BP control only when messages were co-designed and contextualised. These data imply that simple reminders are insufficient; effective postpartum pathways combine monitoring, clinician responsiveness and human support, as in the included coaching, navigation and pharmacist models.^{9,31,55–57}

Discharge agent choice as a therapy-related determinant

Four independent cohorts consistently associated labetalol with higher readmission than nifedipine. Several mechanisms are plausible and not mutually exclusive. Pharmacokinetically, labetalol has a short elimination half-life and typically requires two to three daily doses postpartum, whereas extended-release nifedipine is given once daily; dosing frequency is among the most robust predictors of non-adherence in chronic cardiovascular therapy. Pharmacodynamically, the postpartum secondary BP rise is volume- and vasoconstriction-driven, and dihydropyridine calcium-channel blockade may be more effective in this phase; the higher proportion of severe home readings with labetalol in the first ten days supports a combined efficacy–adherence explanation. Confounding by indication (labetalol preferred in women with higher BMI or chronic hypertension) cannot be excluded, and a 2024 meta-analysis of RCTs found no clear efficacy difference between the agents, with a single trial even suggesting faster control with labetalol. A pragmatic comparative-effectiveness trial measuring adherence directly is therefore warranted.^{28,39–42,51}

Postpartum diuretics, sometimes added for volume-driven hypertension, had no significant effect on persistent hypertension or subsequent antihypertensive use in a 2025 meta-analysis, although systolic BP was modestly lower. Both nifedipine and labetalol are considered compatible with breastfeeding by current guidelines, and counselling that addresses lactation safety explicitly should be a core adherence intervention, given that HDP is associated with a higher hazard of breastfeeding cessation and that maternal medication discontinuation is associated with shorter breastfeeding duration.^{21–23,58}

Equity, social determinants and low- and middle-income settings

Racial, ethnic, insurance-related and educational gradients in adherence recurred across studies. Remote monitoring attenuated or abolished some disparities in BP ascertainment, but engagement and persistence gaps remained in several programmes, indicating that technology must be embedded within equity-focused, human-supported care. Only three of the 25 studies came from LMICs, and none from Southeast Asia. LMIC health systems face limited access to crucial medications, shortages of trained personnel, community perceptions of preeclampsia and outdated local guidelines, while persistent hypertension after HDP affects up to three-fifths of women. The

Nigerian feasibility cohort and the Tanzanian follow-up study nonetheless show that high retention is achievable when programmes are structured.^{8,16–18,27,34,45,46}

For Indonesia, evidence from community health centres in Surabaya shows that 77.65% of hypertensive outpatients were adherent by pill count and that non-adherence was associated with six-fold higher odds of uncontrolled BP, while a study of pregnant women with hypertension reported high adherence linked to antenatal care frequency. These data, although not postpartum-specific, suggest that the Puskesmas network, midwives and community health workers could deliver a postpartum adherence bundle — early home or clinic BP checks, once-daily regimens, lactation-sensitive counselling and structured referral to family physicians — if supported by clear protocols and reliable drug supply.^{25,26}

Measurement of adherence: methodological considerations

Adherence definitions were highly heterogeneous. Claims-based measures capture dispensing but not ingestion; PDC calculations are sensitive to parameters such as early refills, in-hospital supply and switching, which are rarely reported and which the TEN-SPIDERS tool seeks to standardise. In the postpartum context, a fixed 80% PDC threshold is conceptually problematic because intended duration is short and frequently modified; future studies should anchor adherence to the prescribed regimen at each time point and combine pharmacy data with home-BP-linked titration records, validated self-report instruments and, where feasible, electronic monitoring.^{4,5,19}

Strengths

Strengths include a contemporary five-year evidence base, inclusion of both randomised and large real-world studies, application of an explicit adherence taxonomy, 12 outcome domains, multiple complementary meta-analyses with prediction intervals, subgroup and sensitivity analyses, formal risk-of-bias assessment with three validated tools, GRADE certainty ratings, and full traceability of every source through DOI and Consensus links.

Implications for practice and research

For practice, the evidence supports a postpartum discharge bundle that (i) prefers once-daily agents such as extended-release nifedipine where clinically appropriate; (ii) provides explicit counselling on purpose, duration, side effects, refill procedures and breastfeeding compatibility; (iii)

equips women with a validated BP device and a clear action plan; (iv) ensures BP ascertainment within 3–10 days, preferably through remote monitoring with clinician-led titration; and (v) arranges a navigated transfer to primary care within 12 months. For research, priorities are pragmatic RCTs in LMICs including Indonesia, direct and standardised adherence measurement, head-to-head comparative-effectiveness trials of discharge agents with adherence outcomes, implementation studies evaluating provider adherence to triage protocols, and long-term cardiovascular outcomes.^{1,2,13}

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Adherence to oral antihypertensive therapy among postpartum outpatients with HDP is suboptimal: most women initiate treatment, but fewer than half persist, and adherence to BP surveillance and follow-up is variable and declines over time. Structured, clinician-supported pathways — remote BP monitoring with titration, health coaching, navigation and pharmacist counselling — significantly improve follow-up adherence, BP control and BP levels and reduce hypertension-related acute encounters, and once-daily nifedipine at discharge is associated with fewer readmissions than labetalol. The certainty of evidence is moderate for follow-up adherence and BP reduction but low to very low for medication-taking prevalence, acute encounters and antihypertensive uptake, and evidence from Southeast Asia, including Indonesia, is absent.^{3,6–8,39}

Recommendations

Table 20. Recommendations derived from the review, by target group.

Target	Recommendation	Supporting evidence
Obstetricians / GPs at discharge	Prefer once-daily extended-release nifedipine when appropriate; provide written regimen, refill plan and breastfeeding-compatibility counselling	Readmission aOR 1.95 for labetalol ^{39,41}
Midwives / nurses / pharmacists	Deliver structured discharge counselling and teach-back; confirm first fill within 7 days	Initiation 73.4%; counselling feasible ^{63,1}
Health-care facilities	Implement home BP monitoring with protocol-based clinician titration and BP ascertainment within 3–10 days	Follow-up RR 1.57; SBP –5.5 mmHg ⁸⁷
Primary care / Puskesmas (Indonesia)	Establish navigated transfer from obstetric to primary care with 6-week, 3-month and 12-month	PCP attendance RR 2.00; decay after 6 wk ⁹³⁵

	reviews; monitor persistence and titrate or withdraw safely	
Policy-makers / insurers	Fund BP devices, remote-monitoring platforms and coordinators; ensure affordable supply of first-line agents	Coordinator enrolment ³⁴²⁷ doubled
Researchers	Conduct Indonesian and other LMIC RCTs with standardised adherence metrics (ABC taxonomy, TEN-SPIDERS PDC) and long-term cardiovascular outcomes	Evidence gap ⁴³⁰

DECLARATIONS

Author contributions: MA conceived the review, performed the search, screening, data extraction and analyses, and drafted the manuscript; HHH performed independent screening, extraction and risk-of-bias assessment and revised the manuscript; YMS provided obstetric expertise, adjudicated disagreements and critically revised the manuscript. All authors approved the final version.

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Registration: not prospectively registered.

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