Institute for Healthcare Improvement

AIM
ALLIANCE FOR INNOVATION ON MATERNAL HEALTH

Severe Hypertension in Pregnancy Change Package

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Introduction

The Alliance for Innovation on Maternal Health (AIM) is a national data-driven maternal safety and quality improvement (QI) initiative. AIM works through state and community-based teams to align national, state, and hospital-level QI efforts to reduce preventable maternal mortality and severe morbidity across the United States.

The AIM Patient Safety Bundles are a core part of this work. To promote the successful implementation of these bundles, AIM partnered with the Institute for Healthcare Improvement (IHI) to create a series of associated change packages. This specific change package is designed to support Perinatal Quality Collaboratives (PQCs) and other state-based initiatives to leverage the AIM Severe Hypertension in Pregnancy Safety Bundle more effectively.

Why is this important?

The US remains in a maternal mortality crisis. According to the latest data released by the Centers for Disease Control and Prevention (CDC), the 2018 pregnancy-related mortality ratio was 17.3 per 100,000 live births .[1] When disaggregated by race, the ratio of maternal death for non-Hispanic Black people (41.4 deaths for 100,000 live births) was three times the rate for non-Hispanic White people (13.7 deaths per 100,000) and three times that of Hispanic people (14.1 people per 100,000 live births).[1] Non-Hispanic American Indian and Alaska Native people also experienced pregnancy-related death ratios that were twice as high (26.4 per 100,000 live births) as those of non-Hispanic White people.[1]

Near-miss morbidity events or severe maternal morbidity (SMM) have increased nearly 200% from 1993 (49.5 per 10,000 delivery hospitalizations) to 2014 (144), with non-Hispanic Black people also experiencing higher rates of SMM.[1,2]

According to the CDC, the prevalence of hypertensive disorders in pregnancy affected at least 1 in 7 delivery hospitals during 2019 (1 in 5 for Black women and 1 in 6 for American Indian and Alaska Native women). The overall rate was an increase from about 13 percent in 2017 to 16 percent in 2019. During 2019, about one third of all deaths during a delivery hospitalization had a hypertensive disorder of pregnancy documented. Hypertension in pregnancy is a leading cause of preventable, pregnancy-related complications and death, with an estimated 60 percent of deaths related to severe hypertension being identified as preventable since 2005.[3–5] Indeed, there are many strategies to reduce hypertension-related deaths and complications.[6]

The goal of this change package is to aid teams implementing the AIM Severe Hypertension in Pregnancy Patient Safety Bundle by preparing them to recognize and respond to hypertension at all stages of care, and laying the foundation for respectful, equitable, and supportive care for all. It is imperative that the structural and process barriers to equitable care for Black birthing people be eliminated. Eliminating these structural and process barriers will require focus and resources. Thank you for joining the national efforts to work more effectively to end all hypertension-related preventable deaths and complications in pregnancy.

What is a change package?

A change package is a document listing evidence-based, or best-practice changes specific to a topic and is usually organized around a framework or model. In this case, the Severe Hypertension in Pregnancy Change Package is structured around the AIM Severe Hypertension in Pregnancy Patient Safety Bundle.[7]

Changes packages, including this one, are structured around the following components:

- **Primary Drivers**: Major processes, operating rules, or structures that will contribute to moving toward the aim. In this change package, the primary drivers are based on AIM's Five Rs Framework (Readiness, Recognition & Prevention, Response, Reporting/Systems Learning, and Respectful Care).
- **Change Concepts:** Broad concepts (e.g., "move steps in the process closer together") that are not yet specific enough to be actionable but that will be used to generate specific ideas for change.
- **Change Ideas**: Actionable, specific idea for changing a process. Change ideas can come from research, best practices, or from other organizations that have recognized a problem and have demonstrated improvement on a specific issue related to that problem.

Taken as a whole, a change package has the potential to seem overwhelming. Based on the priorities of your state and community, we encourage you to start small by testing a couple of ideas connected to the aim you set. Through iterative tests of change (also known as Plan-Do-Study-Act (PDSA) cycles), you will have an opportunity to learn what works and what does not in your efforts to improve your processes. Initially, these cycles are carried out on a small scale (e.g., one patient on one day) to see if they result in improvement. Teams can then expand the tests and gradually incorporate larger and larger samples until they are confident that the changes will result in sustained improvement.

How to prioritize changes?

No team is expected to test all the listed change ideas. Consider this a menu of options from which you may choose what to tackle first. Each team will review their baseline data, progress to date, organizational priorities, and select an area(s) to prioritize. For example, some may start with one driver. Others may start by tackling one idea across all drivers. Start by choosing an area that you think could lead to an easy win.

You can also leverage the following tools to help you decide where to start:

1. Pareto chart: A type of bar chart in which the various factors that contribute to an overall effect are arranged in order according to the magnitude of their effect. This ordering helps identify the "vital few" — the factors that warrant the most attention.[8]
2. Priority matrix: A tool that can better help you to understand important relationships between two groupings (e.g., steps in a process and departments that conduct that step) and make decisions on where to focus.[9]
3. Impact-effort matrix: A tool that helps identify which ideas seem easiest to achieve (least effort) with the most effects (highest impact). The ideas identified via this tool would be a great place to start.[10]

The IHI QI Workbook Better Maternal Outcomes: Reducing Harm from Hypertension During Pregnancy is another great resource to use as you begin this work, containing relevant descriptions, examples, and templates for QI tools.[11]

Change Package

A Note on Symbols

Respectful, Equitable, and Supportive Care

In the latest revision of the AIM Severe Hypertension in Pregnancy Patient Safety Bundle, a fifth R was added; Respectful, Equitable, and Supportive Care. This R is integrated throughout the change package, and all change ideas that fall under this R are marked with a ◊ symbol.

Additional Considerations

It is understood that every team utilizing this change package will be at a different point in this work. If your organization is further along in your severe hypertension improvement work and has found reliability in some of the change ideas below, we suggest testing the additional considerations that are in *italics* and marked by the * symbol.

Readiness

Every Care Setting

Change Concept	Change Idea	Key Resources and Tools
Develop processes for management of patients with severe hypertension, including: • A standard protocol for early warning signs, diagnostic criteria, monitoring, and treatment of severe preeclampsia/eclampsia (including order sets and algorithms)	Implement a standardized protocol for measurement and assessment of blood pressure for all pregnant and postpartum patients	Oklahoma Perinatal Quality Improvement Collaborative (PQIC) Accurate Blood Pressure Measurement handout[12] California Maternal Quality Care Collaborative (CMQCC) Accurate Blood Pressure Measurement Toolkit[13] Safety Action Series: Blood Pressure Basics[14]
	Implement a standardized response to early warning signs including listening to and investigating symptoms, laboratory assessment, fetal testing, and patient (both birthing person and fetal) follow-up	AIM Maternal Early Warning Signs Protocol[15] Treatment for Acute-Onset Severe Hypertension during Pregnancy and the Postpartum Period[16]
	Ensure ready reference to the algorithms for identifying, assessing, and treating severe hypertension/preeclampsia *Consider posting the hypertension algorithms in locations visible to clinicians, such as nurses' stations and triage areas and in all departments where a pregnant person or a person who recently gave birth who is experiencing severe hypertension/preeclampsia might present and be taken care of, such as labor and delivery (L&D), emergency department (ED), and intensive care unit (ICU). Ensure that all clinicians are working from the same definitions.* *	

	Clearly post warning signs for severe hypertension/preeclampsia in all care settings where people receive prenatal or postpartum care *For example, prenatal care providers, L&D, postpartum critical care, ED, urgent care centers, outpatient settings, primary care facilities, and pediatrician offices* *	Hear Her Campaign[17] Association of Women's Health, Obstetric and Neonatal (AWHONN) Post-Birth Warning Signs Education Program[18]
	Develop a process for all members of the care team to be able to be aware of baseline labs and blood pressure to assess trends over time. Refer to evidence-based algorithms to support efforts to recognize abnormal trends consistently and quickly. Do not delay treatment waiting for blood pressures to become lower. *Always refer to a patient's baseline blood pressure when assessing risk* * *Do not assume that people of color have a higher "normal" baseline blood pressure* ◊ *	CMQCC Preeclampsia Early Recognition Tool (PERT)[19]
	Train all providers to not make assumptions that a patient's hypertension is being caused by something else, e.g., race, obesity, socioeconomic status, mental health, diet, pain, or anxiety ◊ *Educate providers on the fact that racism, not race, is a risk factor for maternal morbidity/mortality caused by severe hypertension. Clarify that race is a social construct, not a biological trait* ◊ *	American Medical Association (AMA): New AMA policies recognize race as a social, not biological, construct[20] American College of Obstetricians and Gynecologists (ACOG): Joint Statement: Collective Action Addressing Racism[21]
	Consider prescribing a low-dose aspirin for patients with a high risk of preeclampsia	Preeclampsia Foundation "Ask About Aspirin"[22] ACOG Committee Opinion 743: Low-Dose Aspirin Use During Pregnancy[23]

		The role of aspirin dose on the prevention of preeclampsia and fetal growth restriction: systematic review and meta-analysis[24]
	Develop protocols detailing what type of educational materials should be shared with patients and their support people; who will share these materials with patients; when materials should be shared; and how clinicians should document those educational materials have been provided	CMQCC Patient Education Checklists[25]
• A process for the timely triage and evaluation of pregnant and postpartum patients with severe hypertension or related symptoms	Educate all staff and clinicians throughout the continuum of care, from reception to triage to inpatient and outpatient providers, on the warning signs of severe hypertension/preeclampsia and how to ask patients about their signs and symptoms	AIM eModule I Maternal Early Warning Criteria (MEWS)[26] ACOG Urgent Maternal Warning Signs[27]
	Use checklists to quickly triage and evaluate pregnant or postpartum patients presenting with signs or symptoms of hypertension	ACOG Checklist: Hypertensive Emergency[28] ACOG Checklist: ED Postpartum Preeclampsia[29]
	Develop a system for alerting the care team if an individual does not make their follow-up appointment	
• A system plan for escalation, obtaining appropriate consultation, and maternal transport as needed	Implement a protocol, in both the inpatient and outpatient settings, that supports nurses' and providers' ability to recognize a crisis, escalate as required, and quickly mobilize a care team to implement timely management. Ensure treatment within 30 – 60 minutes of arrival.	ACOG Committee Opinion No. 767: Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period[30] AIM Maternal Early Warning Signs Protocol[15] Sample process: Maternal Hypertension ED Flowchart[31]

	Implement a protocol to support outpatient providers in quickly connecting with inpatient care team, and transferring and safely transporting a patient in need of further evaluation and treatment	
	Identify supportive services for patients who face barriers in getting to their appointments, e.g., telehealth, transportation support, home blood pressure monitoring ◊	
Ensure rapid access to medications used for severe hypertension/eclampsia with a brief guide for administration and dosage in all areas where patients may be treated	Establish locations of key medications used for severe hypertension/preeclampsia with instructions for dosage and administration. Develop methods for staff to rapidly access emergency packs of medications to treat hypertension/ preeclampsia. Develop process to ensure medication availability is checked regularly (e.g., at the start of each shift).	CMQCC Sample Preeclampsia/Eclampsia Medication Toolbox List[32]
	Develop and utilize standard order sets for hypertension/preeclampsia medications	Steps for Preparation, Storage, Ordering, and Administration of Magnesium Sulfate[33] ACOG Sample Order Sets[34]
Conduct interprofessional and interdepartmental team-based drills with timely debriefs that include the use of simulated patients	Plan and conduct simulations of severe hypertension/preeclampsia scenarios, including use of antihypertensive algorithms, treatment of eclampsia, treating magnesium toxicity, and treating postpartum onset of hypertension/preeclampsia *Ensure that simulation drills are multidisciplinary in nature, from design and planning through execution* * *Include L&D, ED, anesthesiology and ICU providers and nurses* * *In addition to simulations involving inpatient team, conduct simulations that start in an outpatient obstetrician (OB) office (e.g., patient presents with severe hypertension or preeclampsia at prenatal or postpartum visit)* *	CMQCC Simulation Scenario: Hypertension in Pregnancy, HELLP with Seizure[35]

	*Consider engaging emergency medical technicians (EMTs)/paramedics in situations, especially in rural areas** *In rural settings, also run simulations specifically focused on referral pathways to tertiary and quaternary care**	
	Address respectful care and implicit/explicit racial bias in all simulations ◊	ACOG District IV Respectful Care Videos • How to greet patients • How NOT to greet patients • How to refer patients • How NOT to refer patients • Unbiased interaction • Biased interaction • How to enter a patient's room • How NOT to enter a patient's room • How to handle patient concerns • How NOT to handle patient concerns
	Require participation in a hypertension/preeclampsia simulation at least once a year as a condition of employment *Frame this as an opportunity to provide clinicians with a safe space to practice, learn from mistakes, and gain confidence**	Team STEPPS[36] AWHONN Respectful Maternity Care Implementation Toolkit[37]
Develop and maintain a set of referral resources and communication pathways between obstetric providers, community-based organizations, and state and public health agencies to enhance services	Connect patients/families with resources for people who experience severe hypertension or preeclampsia in pregnancy	Preeclampsia Foundation: Women and Families[38]
	Develop relationships with community-based organizations that provide robust, evidence-based, trauma-informed parenting supports	Center for Health Care Strategies: An Inside Look at Partnerships between Community-Based Organizations and Health Care Providers[39]

Commented [LE1]: Unsure how to best cite these video resources

and supports for pregnant and postpartum families		Fierce Healthcare: 4 steps to build effective community partnerships[40]
	Encourage site visits across health care systems, community-based organizations, public health agencies, etc. to support shared understanding of services and supports available	
Develop trauma-informed protocols and provider education to address health care team member biases to enhance equitable care	Train all staff, from reception to triage to inpatient and outpatient providers, in active listening and trauma-informed care to ensure that all patients, regardless of their race, ethnicity, religion, gender expression, sexual orientation, etc., are truly heard and respected ◊ *Invite a person with lived experience to participate in training to share their perspective with the health care team* * *Include staff and providers from hospital and outpatient settings* *	Integrating Trauma-Informed Care into Maternity Care Practice: Conceptual and Practical Issues[41] Refining Trauma-Informed Perinatal Care for Urban Prenatal Care Patients with Multiple Lifetime Traumatic Exposures: A Qualitative Study[42]
	Develop a protocol for patients experiencing infant loss *Implement a bereavement checklist that includes methods for notifying all members of the care team of the situation, e.g., put sign on door* * *Provide emotionally sensitive care and privacy where care is provided, e.g., move out of L&D as soon as possible* *	
	Make it an organizational policy and train teams to use an anti-racism, birth equity, and social justice lens ◊ *Focus on opportunities to improve the system* *	Health Equity Rounds: An Interdisciplinary Case Conference to Address Implicit Bias and Structural Racism for Faculty and Trainees[43]

Recognition and Prevention

Every Patient

Change Concept	Change Idea	Key Resources and Tools
Determine and document if a patient presenting is pregnant or has been pregnant within the past year, in all care settings	Build inquiry into all entrance portals for care and ensure gender inclusivity in assessment	The Imperative for Transgender and Gender Nonbinary Inclusion[44]
	Push information about recent pregnancies to new providers	
Ensure accurate measurement and assessment of blood pressure for every pregnant and postpartum patient	Ensure that blood pressure is measured accurately every time. Consider cuff size, arm position, patient at rest, legs uncrossed, and recent nicotine use. Document the patient's blood pressure cuff size in chart or electronic health record (EHR). During a hospitalization, utilize the same cuff on the patient throughout, either all automatic or all manual. Do not go back and forth.	CMQCC Accurate Blood Pressure Measurement[13] Oklahoma PQIC Poster[12] 7 Simple Tips to Get an Accurate Blood Pressure Reading[45] The assessment of blood pressure in pregnant women: pitfalls and novel approaches[46]
	Conduct and document a severe hypertension/preeclampsia risk assessment at initial prenatal visit and co-design a care plan that takes that risk into consideration and identifies when to reassess	CMQCC Preeclampsia Early Recognition Tool (PERT)[19]
	Complete baseline labs at initial prenatal visit for those with elevated risk of hypertensive disease in pregnancy. Include at minimum platelets, Asparate Aminotransferase (AST), Alanine Aminotransferease (ALT), creatinine, 24-hour urine for protein or protein-to- creatinine ratio (PCR)	The assessment of blood pressure in pregnant women: pitfalls and novel approaches[46]
	Document the patient's risk assessment, treatments, and baseline labs in EHR	

	Assist patients in acquiring a home blood pressure monitoring device *Ensure that the blood pressure monitoring device is validated to confirm accuracy and that patient can demonstrate how to take an accurate blood pressure* * *Consider whether a patient's insurance covers the costs and if there are community-based resources the patient could connect with* ◊ *	Penn Medicine Heart Safe Motherhood Home Monitoring Program[47] Preeclampsia Foundation: The Cuff Project[48]
	Develop clear patient education to correctly monitor blood pressure at home (e.g., how to take accurate blood pressure, when to call doctor or seek care)	Preeclampsia Foundation: Check Your Blood Pressure at Home[49]
	Support patients in documenting and tracking their blood pressure over time using whichever tool is easiest for that person to use (e.g., in an Excel sheet, on a paper log, or in a tracking app that syncs with a blood pressure cuff) ◊ Make sure patients know when and how to call their provider or 911 *Consider how far a patient lives from the hospital when informing them of when they should call in blood pressure information* ◊	Example: Blood Pressure Log (included in Appendix B) Patient perceptions, opinions, and satisfaction of telehealth with remote blood pressure monitoring postpartum[50]
Screen for structural and social drivers of health that might impact clinical recommendations or treatment plans and provide linkage to resources that align with the pregnant or postpartum person's health literacy, cultural needs, and language proficiency	Work with a multidisciplinary team that includes people with lived experience to develop protocol for obtaining informed consent for social drivers of health screening and ensuring informed consent before screening ◊	American Hospital Association: Screening for Social Needs[51]
	With informed consent, screen all patients for history of trauma, including sexual violence or exploitation *Due to historic racism, people of color in the United States have a history of not being asked for informed consent. This history means that additional efforts must be made to establish open dialogue and build trust in the health care team* ◊*	ACOG Committee Opinion: Intimate Partner Violence[52] The EveryONE Project: Social Determinants of Health Guide to Social Needs Screening[53]

	With informed consent, partner with patients to connect them to community-based resources with a warm handoff	
Provide ongoing education to all patients on the signs and symptoms of hypertension and preeclampsia, and empower them to seek care	Share patient education materials through a variety of modalities (e.g., written, video, audio) throughout the perinatal phases Include family/support people in all aspects of education ◊ *Consider including information on warning signs in standard after-visit summaries and hospital discharge instructions* *	Preeclampsia Foundation: Educating Patients[54] AWHONN Post-Birth Warning Signs[18] Not Just Physical: The Psychological Burden of Preeclampsia and HELLP Syndrome[55]
	Ensure that translated and/or culturally relevant patient education materials are available ◊	
	Ensure that patients who experience severe hypertension/preeclampsia during pregnancy and/or post-birth know about long-term complications that may arise	Preeclampsia Foundation: Understanding Long-Term Effects of Preeclampsia[56] Long-Term Cardiovascular Risk in Women With Hypertension During Pregnancy[57]
	Clearly communicate discharge instructions, including signs and symptoms of hypertension/preeclampsia and a follow-up appointment to patient and family/support person *Include a one-page visual or refrigerator magnet on warning signs as part of discharge instructions to all patients and encourage people to post somewhere prominent in their home* *	CMQCC Sample Discharge Sheet for Preeclampsia, Eclampsia, and HELLP Syndrome Patients[58] AIM Urgent Maternal Warning Signs[27] AWHONN Post-Birth Warning Signs[18]
	Use teach-back method to ensure that discharge instructions are understood	Always Use Teach Back[59]

		Use and Effectiveness of the Teach-Back Method in Patient Education and Health Outcomes[60]
Provide ongoing education to all health care team members on the recognition of signs, symptoms, and treatment of hypertension	Use a checklist of signs and symptoms of severe hypertension/preeclampsia during pregnancy and post-birth, birth, and postpartum *Do not include race as a risk factor on any checklist* ◊ *Ensure that checklist is used across all departments/clinical areas serving patients at risk for severe hypertension/preeclampsia during pregnancy, birth, and postpartum* *	ACOG Severe Hypertension in Pregnancy Checklist[61]

Response

Every Event

Change Concept	Change Idea	Key Resources and Tools
Utilize a standardized protocol with checklists and escalation policies, including a standard response to maternal early warning signs, listening and investigating patient-reported and observed symptoms, and assessment of standard labs for the management of patients with severe hypertension or related symptoms	Institute facility-wide standard protocol(s) that meets minimum requirements outlined in AIM Severe Hypertension in Pregnancy Patient Safety Bundle	AIM Severe Hypertension in Pregnancy Patient Safety Bundle[7]
	Offer mental health services and supports (e.g., social work consult, therapy resources, psychiatry consult) to everyone. Offering these services to everyone will help increase access to mental health supports and mitigate any stigma that may be associated with seeking mental health services and support. ◊	Postpartum Progress: Local Postpartum Depression Support Organizations[62] Postpartum Support International: Find Local Support[63] Massachusetts General Hospital (MGH) Center for Women's Mental Health[64]
	All postpartum providers review antenatal and intrapartum record with patients/families during the first postpartum visit, including blood pressure trends. Review unexpected outcomes or specific risks for future pregnancies and recommend early (1st trimester) care with patient and care team.	
	Talk with each patient, in a supportive and informative way, about their plans to feed their baby when considering which medications to prescribe ◊ *If a birthing person plans to breastfeed, discuss safe medication options, long- and short-term risks and benefits both of not breastfeeding and of hypertension medications in breast milk. Discuss timing of taking medications and breastfeeding.* *	

	If a birthing person isn't planning to breastfeed, they might be able to take additional medications that are unsafe when feeding a baby breast milk *	
Initiate postpartum follow-up visit to occur within three days of birth hospitalization discharge date for individuals whose pregnancy was complicated by hypertensive disorders	Schedule all necessary general and specialist follow-up visits, including mental health and cardiology referrals, prior to discharge as part of discharge criteria. Consider home blood pressure monitoring for patients who will have difficulty attending an appointment within three days of discharge. *If this is not possible (e.g., due to weekend/holiday delivery), assign a navigator or nurse to follow up with this patient* *	March of Dimes: Your Postpartum Checkups[65]
	If a patient does not make it to their follow-up appointment, contact the individual and consider care management resource or home visit	
Provide trauma-informed support for patients, identified support network, and staff for serious complications of severe hypertension, including discussions regarding birth events, follow-up care, resources, and appointments	Give a written summary of events to patient and family/support people *Provide ICU diaries to family of patient in ICU to share with patient later* *	Improving the Patient Experience by Implementing an ICU Diary for Those at Risk of Post-Intensive Care Syndrome[66]
	Begin trauma-informed care in postpartum setting with conversation and referral to a trauma specialist ◊ *Use trauma-informed best practices to explain what happened to a patient with severe hypertension/preeclampsia and what follow-up care might look like* ◊ *	ACOG Committee Opinion 825: Caring for Patients Who Have Experienced Trauma[67]
	Educate patients about the long-term health risks of severe hypertension/preeclampsia in pregnancy and the importance of sharing this diagnosis with their primary care provider and other care providers throughout their lifetime	Incidence and Long-Term Outcomes of Hypertensive Disorders of Pregnancy[68] Preeclampsia Foundation: Long-Term Impact[69]

	Screen for postpartum mental health conditions and offer referrals when needed	Postpartum Depression Screening Tools, Trainings, & Continuing Education[70] Postpartum Progress: Postpartum Depression Support Organizations[62]

Reporting and Systems Learning

Every Unit

Change Concept	Change Idea	Key Resources and Tools
Establish a culture of multidisciplinary planning, huddles, and post-event debriefs for every case of severe hypertension, which identifies successes, opportunities for improvement, and action planning for future events	Conduct short team huddles upon admission for all high-risk patients	IHI: Huddles Tool[71]
	Invite people from all races and ethnicities with the lived experience of having hypertension/preeclampsia during and/or after pregnancy to share their stories with providers and staff in rounds or trainings ◊ *Ensure psychological safety for the patients who share their stories*	Hear Her Campaign: Hear Personal Stories of Pregnancy-Related Complications[72]
	Create a safety culture with multiple tools that support effective individual, team, and patient/family communication through a health equity lens ◊	Team STEPPS[36] Stop the Line for Patient Safety Video[73] Read-back improves information transfer in simulated clinical crises[74] Teaching residents the two-challenge rule: a simulation-based approach to improve education and patient safety[75]
	Hold post-event debriefs from a racial equity lens for support and learning immediately after events, then schedule a more formal after-action review and standardized content ◊	'Take 10 to talk about it': Use of a scripted, post-event debriefing tool in a neonatal intensive care unit[76] Debrief it all: a tool for inclusion of Safety-II[77] Performing Team and Family Debriefs from a Racial/Equity Lens[78]

Perform multidisciplinary reviews of all severe hypertension/eclampsia cases per established facility criteria to identify systems issues	Host a formal, multidisciplinary review for all cases of severe hypertension/preeclampsia. Review data by race/ethnicity and from a racial and birth equity lens. ◊	ACOG: Severe Maternal Morbidity: Screening and Review[79] Improving Data Collection and Review Process by Race/Ethnicity Video[80]
Monitor outcomes and process data related to severe hypertension, with disaggregation by race and ethnicity due to known disparities in rates of severe hypertension	Have run charts of data visible to staff with both outcome and process measures	
	Include staff training metrics among run charts	
	Collect and report REAL (race, ethnicity, ability, language, geography, and gender identity) data ◊	
	Review all operations and outcome data stratified by REAL to assess for disparities	
	Set specific goals for eliminating disparities using SMARTIE (Strategic, Measurable, Ambitious, Realistic, Time-bound, Inclusive, and Equitable) format	
	Review and eliminate long-standing racist structures. Ensure patients with the greatest needs and with the greatest inequities in outcomes receive the needed support and are cared for by the health care team with the greatest level of expertise	ACOG Levels of Maternal Care[81]

Respectful, Equitable, and Supportive Care*

Every Unit, Provider, and Team Member

Change Concept	Change Idea	Key Resources and Tools
Engage in open, transparent, and empathetic communication with pregnant and postpartum people and their identified support network to understand diagnoses, options, and treatment plans	Clarify patient's goals for pregnancy and values that need consideration in co-creation of treatment plan	
	Include patient's identified support network contact information in EHR	
Include pregnant and postpartum people as part of the multidisciplinary care team to establish trust and ensure informed, shared decision-making that incorporates the pregnant and postpartum person's values and goals	Reliably use interpreter services at all points of care *Check in with patients regularly to see if their preference has changed (e.g., someone who preferred English in prenatal care may need an interpreter in a crisis)* ◊ *	
	Schedule time for a formal debrief including the patient and family prior to discharge ◊ *Incorporate perspectives of patients and people with lived experience into reviews in a trauma-informed and equitable manner** ◊	Achieving Health Equity: A Guide for Health Care Organizations[46]

*Further respectful care change ideas are integrated throughout the previous primary drivers as well. They are indicated by the ◊ symbol.

Appendix A

1. Pregnancy Mortality Surveillance System | Maternal and Infant Health. Centers for Disease Control and Prevention. Published June 23, 2022. Accessed July 5, 2022. https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm

2. Severe Maternal Morbidity in the United States | Pregnancy | Reproductive Health. Centers for Disease Control and Prevention. Published February 2, 2021. Accessed July 5, 2022. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html

3. Berg CJ, Harper MA, Atkinson SM, et al. Preventability of pregnancy-related deaths: results of a state-wide review. *Obstetrics & Gynecology.* 2005;106(6):1228-1234. doi:10.1097/01.AOG.0000187894.71913.e8

4. Cantwell R, Clutton-Brock T, Cooper G, et al. Saving Mothers' Lives: Reviewing maternal deaths to make motherhood safer: 2006-2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG.* 2011;118 Suppl 1:1-203. doi:10.1111/j.1471-0528.2010.02847.x

5. Clark SL. Strategies for reducing maternal mortality. *Seminars in Perinatology.* 2012;36(1):42-47. doi:10.1053/j.semperi.2011.09.009

6. CDC Press Release: Hypertensive disorders in pregnancy affect 1 in 7 hospital deliveries. Centers for Disease Control and Prevention. Published January 1, 2016. Accessed July 5, 2022. https://www.cdc.gov/media/releases/2022/p0428-pregnancy-hypertension.html

7. Severe Hypertension in Pregnancy (+AIM). AIM Program (Previously Council on Patient Safety). Accessed May 5, 2022. https://safehealthcareforeverywoman.org/council/patient-safety-bundles/maternal-safety-bundles/severe-hypertension-in-pregnancy-aim/

8. Pareto Chart. Institute for Healthcare Improvement. Accessed April 13, 2022. https://www.ihi.org/resources/tools/pareto-chart

9. Priority Matrix: An Overlooked Gardening Tool. Institute for Healthcare Improvement. Accessed April 13, 2022. https://www.youtube.com/watch?v=PtEMrYVGGgI

10. Impact Effort Matrix. American Society for Quality. Accessed April 13, 2022. https://asq.org/quality-resources/impact-effort-matrix

11. Better Maternal Outcomes Quality Improvement Workbooks. Institute for Healthcare Improvement. Accessed April 21, 2022. https://www.ihi.org/resources/tools/better-maternal-outcomes-quality-improvement-workbooks

12. Taking a Blood Pressure. Wisconsin Perinatal Quality Collaborative. https://wispqc.org/wp-content/uploads/2021/05/Oklahoma-PQC_Accurate-BP-Flyer.pdf

13. Accurate Blood Pressure Measurement (toolkit pdf). California Maternal Quality Care Collaborative. Accessed May 5, 2022. https://www.cmqcc.org/resource/accurate-blood-pressure-measurement-toolkit-pdf

14. Safety Action Series: Blood Pressure Basics. American College of Obstetricians and Gynecologists. Published online July 2015. https://cpb-us-w2.wpmucdn.com/sites.uab.edu/dist/1/156/files/2021/01/SafetyActionSeries_BloodPressureBasicsJul2015.pdf

15. Maternal Early Warning Signs (MEWS) Protocol. AIM Program (Previously Council on Patient Safety). Published online 2015.

16. Main EK. Treatment for Acute-onset Severe Hypertension during Pregnancy and the Postpartum Period. Alliance for Innovation on Maternal Health. Published online 2016.

17. CDC's Hear Her Campaign. Centers for Disease Control and Prevention. Published February 16, 2022. Accessed May 5, 2022. https://www.cdc.gov/hearher/index.html

18. POST-BIRTH Warning Signs Education Program. AWHONN. Accessed May 5, 2022. https://www.awhonn.org/education/hospital-products/post-birth-warning-signs-education-program/

19. Preeclampsia Early Recognition Tool (PERT). Wisconsin Perinatal Quality Collaborative. Published online 2013. https://wispqc.org/wp-content/uploads/2021/05/CMQCC_Preeclampsia_Early_Recognition_Tool.pdf

20. New AMA policies recognize race as a social, not biological, construct. American Medical Association. Accessed July 5, 2022. https://www.ama-assn.org/press-center/press-releases/new-ama-policies-recognize-race-social-not-biological-construct

21. Joint Statement: Collective Action Addressing Racism. American College of Obstetricians and Gynecologists. Accessed July 5, 2022. https://www.acog.org/en/news/news-articles/2020/08/joint-statement-obstetrics-and-gynecology-collective-action-addressing-racism

22. Ask About Aspirin. Preeclampsia Foundation. Accessed May 6, 2022. https://www.preeclampsia.org/aspirin

23. Low-Dose Aspirin Use During Pregnancy. American College of Obstetricians and Gynecologists. Accessed May 6, 2022. https://www.acog.org/en/clinical/clinical-guidance/committee-opinion/articles/2018/07/low-dose-aspirin-use-during-pregnancy

24. Roberge S, Nicolaides K, Demers S, Hyett J, Chaillet N, Bujold E. The role of aspirin dose on the prevention of preeclampsia and fetal growth restriction: systematic review and meta-analysis. *American Journal of Obstetrics and Gynecology*. 2017;216(2):110-120.e6. doi:10.1016/j.ajog.2016.09.076

25. Appendix I: Patient Education Checklists. California Maternal Quality Care Collaborative. Accessed July 5, 2022. https://www.cmqcc.org/content/appendix-i-patient-education-checklists

26. AIM eModule Introduction. AIM Program (Previously Council on Patient Safety). Accessed May 5, 2022. https://safehealthcareforeverywoman.org/eModules/eModule-MEWS-1/presentation_html5.html

27. Urgent Maternal Warning Signs. AIM Program (Previously Council on Patient Safety). Accessed May 5, 2022. https://safehealthcareforeverywoman.org/council/patient-safety-tools/urgent-maternal-signs/

28. Hypertensive Emergency Checklist. Published online January 2019. https://www.acog.org/-/media/project/acog/acogorg/files/forms/districts/smi-hypertension-bundle-emergency-checklist.pdf

29. Postpartum Preeclampsia Checklist. American College of Obstetricians and Gynecologists. Published online January 2019. https://www.acog.org/-/media/project/acog/acogorg/files/forms/districts/smi-hypertension-bundle-postpartum-preeclampsia-checklist.pdf

30. ACOG Committee Opinion No. 767: Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period. *Obstetrics & Gynecology*. 2019;133(2):e174-e180. doi:10.1097/AOG.0000000000003075

31. Maternal Hypertension Protocol: Clinical Alogrithm for EDs. Published online 2020. https://cpb-us-w2.wpmucdn.com/sites.uab.edu/dist/1/156/files/2020/12/MaternalHTN_EDFlowchart_Rev.-04.27.2020.pdf

32. Appendix S: Sample Preeclampsia/Eclampsia Medication Toolbox List. Wisconsin Perinatal Quality Collaborative. Published online 2013. https://wispqc.org/wp-content/uploads/2021/05/CMQCC_Sample_Preeclampsia_Eclampsia_Medication_Toolbox_List.pdf

33. Berg O, Lee R, Chagolla B. CMQCC Steps for Magnesium Sulfate. California Maternal Quality Care Collaborative. Published online 2013.

34. ACOG: Sample Order Sets. American College of Obstetricians and Gynecologists. Published online 2016. https://wispqc.org/wp-content/uploads/2021/05/ACOG_sample-order-sets.pdf

35. Cragin L, Delgado A, Berg O. Appendix N: Simulation Scenario: Hypertension in Pregnancy, HELLP With Seizure. California Maternal Quality Care Collaborative. Published online 2013.

36. TeamSTEPPS®. Agency for Healthcare Research and Quality. Accessed May 5, 2022. https://www.ahrq.gov/teamstepps/index.html

37. Respectful Maternity Care Implementation Toolkit. AWHONN. Accessed May 5, 2022. https://www.awhonn.org/respectful-maternity-care-implementation-toolkit/

38. Women And Families. Preeclampsia Foundation. Accessed May 6, 2022. https://www.preeclampsia.org/women-and-families

39. An Inside Look at Partnerships between Community-Based Organizations and Health Care Providers - CHCS Blog. Center for Health Care Strategies. Published October 12, 2017. Accessed June 16, 2022. https://www.chcs.org/inside-look-partnerships-community-based-organizations-health-care-providers/

40. 4 steps to build effective community partnerships. Fierce Healthcare. Accessed June 16, 2022. https://www.fiercehealthcare.com/population-health/4-steps-to-building-effective-community-partnerships

41. Sperlich M, Seng JS, Li Y, Taylor J, Bradbury-Jones C. Integrating Trauma-Informed Care Into Maternity Care Practice: Conceptual and Practical Issues. *Journal of Midwifery and Women's Health*. 2017;62(6):661-672. doi:10.1111/jmwh.12674

42. Gokhale P, Young MR, Williams MN, et al. Refining Trauma-Informed Perinatal Care for Urban Prenatal Care Patients with Multiple Lifetime Traumatic Exposures: A Qualitative Study. *Journal of Midwifery and Women's Health*. 2020;65(2):224-230. doi:10.1111/jmwh.13063

43. Perdomo J, Tolliver D, Hsu H, et al. Health Equity Rounds: An Interdisciplinary Case Conference to Address Implicit Bias and Structural Racism for Faculty and Trainees. *MedEdPORTAL*. 15:10858. doi:10.15766/mep_2374-8265.10858

44. Moseson H, Zazanis N, Goldberg E, et al. The Imperative for Transgender and Gender Nonbinary Inclusion: Beyond Women's Health. *Obstetrics & Gynecology*. 2020;135(5):1059-1068. doi:10.1097/AOG.0000000000003816

45. 7 simple tips to get an accurate blood pressure reading. American Heart Association (AHA) and the American Medical Association (AMA). Published online 2016.

46. Hurrell A, Webster L, Chappell LC, Shennan AH. The assessment of blood pressure in pregnant women: pitfalls and novel approaches. *American Journal of Obstetrics and Gynecology*. 2022;226(2S):S804-S818. doi:10.1016/j.ajog.2020.10.026

47. Heart Safe Motherhood. Penn Medicine, Obstetrics and Gynecology. Accessed July 5, 2022.

48. The Cuff Project. Preeclampsia Foundation. Accessed July 5, 2022. https://www.preeclampsia.org/the-cuff-project

49. You Blood Pressure: Check, Know, Share. Preeclampsia Foundation. Published online 2020. https://www.preeclampsia.org/public/frontend/assets/img/gallery/Cuff%20Kit%20Blood%20Pressure%20Log%20English%20FINAL%20pfalog_v2%20(3).ai.pdf

50. Thomas NA, Drewry A, Racine Passmore S, Assad N, Hoppe KK. Patient perceptions, opinions and satisfaction of telehealth with remote blood pressure monitoring postpartum. *BMC Pregnancy Childbirth*. 2021;21(1):153. doi:10.1186/s12884-021-03632-9

51. Screening for Social Needs: Guiding Care Teams to Engage Patients. American Hospital Association. Published online June 2019. https://www.aha.org/system/files/media/file/2019/09/screening-for-social-needs-tool-value-initiative-rev-9-26-2019.pdf

52. Intimate Partner Violence. American College of Obstetricians and Gynecologists. Accessed June 16, 2022. https://www.acog.org/en/clinical/clinical-guidance/committee-opinion/articles/2012/02/intimate-partner-violence

53. Social Determinants of Health: Guide to Social Needs Screening. American Academy of Family Physicians. Published online 2019. https://www.aafp.org/dam/AAFP/documents/patient_care/everyone_project/hops19-physician-guide-sdoh.pdf

54. Educating Patients. Preeclampsia Foundation. Accessed May 6, 2022. https://www.preeclampsia.org/educating-patients

55. Not Just Physical: The Psychological Burden of Preeclampsia and HELLP Syndrome. Preeclampsia Foundation. Accessed May 6, 2022. https://www.preeclampsia.org/the-news/community-support/not-just-physical-the-psychological-burden-of-preeclampsia

56. Understanding Long-term Effects of Preeclampsia and Taking Charge. Preeclampsia Foundation. Accessed May 6, 2022. https://www.preeclampsia.org/the-news/Healthcare-practices/understanding-long-term-effects-of-preeclampsia-and-taking-charge

57. Honigberg MC, Zekavat SM, Aragam K, et al. Long-Term Cardiovascular Risk in Women With Hypertension During Pregnancy. *Journal of the American College of Cardiology*. 2019;74(22):2743-2754. doi:10.1016/j.jacc.2019.09.052

58. Discharge Information for Patients with Diagnosis of Preeclampsia, HELLP Syndrome or Eclampsia. Wisconsin Perinatal Quality Collaborative. Published online 2013. https://wispqc.org/wp-content/uploads/2021/05/APPENDIX_Q_Sample_Discharge_Sheet_For_Preeclampsia_Eclampsia_and_HELLP_Syndrome_Patients-1.pdf

59. Always Use Teach Back! Institute for Healthcare Improvement. Accessed May 6, 2022. https://www.ihi.org/resources/tools/always-use-teach-back

60. Yen PH, Leasure AR. Use and Effectiveness of the Teach-Back Method in Patient Education and Health Outcomes. *Federal Practitioner*. 2019;36(6):284-289.

61. Severe Hypertension in Pregnancy Checklist. American College of Obstetricians and Gynecologists. https://safehealthcareforeverywoman.org/wp-content/uploads/2016/09/Readiness-3-ACOG-District-II-Checklist-Severe-Hypertension-in-Pregnancy.pdf

62. Postpartum Depression Support Organizations. Postpartum Progress. Accessed May 6, 2022. https://postpartumprogress.com/postpartum-depression-support-organizations-in-the-us-canada-uk-south-africa-australia-new-zealand

63. Find Local Support. Postpartum Support International (PSI). Accessed May 6, 2022. https://www.postpartum.net/get-help/locations/

64. Center for Women's Mental Health at MGH. MGH Center for Women's Mental Health. Accessed May 6, 2022. https://womensmentalhealth.org/

65. Your postpartum checkups. March of Dimes. Accessed May 6, 2022. https://www.marchofdimes.org/pregnancy/your-postpartum-checkups.aspx

66. Blair KTA, Eccleston SD, Binder HM, McCarthy MS. Improving the Patient Experience by Implementing an ICU Diary for Those at Risk of Post-intensive Care Syndrome. *Journal of Patient Experience*. 2017;4(1):4-9. doi:10.1177/2374373517692927

67. Caring for Patients Who Have Experienced Trauma. American College of Obstetricians and Gynecologists. Accessed May 6, 2022. https://www.acog.org/en/clinical/clinical-guidance/committee-opinion/articles/2021/04/caring-for-patients-who-have-experienced-trauma

68. Garovic VD, White WM, Vaughan L, et al. Incidence and Long-Term Outcomes of Hypertensive Disorders of Pregnancy. *Journal of the American College of Cardiology.* 2020;75(18):2323-2334. doi:10.1016/j.jacc.2020.03.028

69. Long-Term Impact. Preeclampsia Foundation. Accessed May 6, 2022. https://www.preeclampsia.org/long-term-impact-healthcare-providers

70. Postpartum Depression screening tools, trainings, & continuing education. Mass.gov. Accessed May 6, 2022. https://www.mass.gov/service-details/postpartum-depression-screening-tools-trainings-continuing-education

71. Huddles. Institute for Healthcare Improvement. Accessed May 6, 2022. https://www.ihi.org/resources/tools/huddles

72. Hear Personal Stories of Pregnancy-Related Complications. Centers for Disease Control and Prevention. Published February 16, 2022. Accessed May 6, 2022. https://www.cdc.gov/hearher/personal-stories/index.html

73. Veterans Health Administration. *Stop The Line for Patient Safety.*; 2018. Accessed May 6, 2022. https://www.youtube.com/watch?v=ZfDGxheMPSo

74. Boyd M, Cumin D, Lombard B, Torrie J, Civil N, Weller J. Read-back improves information transfer in simulated clinical crises. *BMJ Quality & Safety.* 2014;23(12):989-993. doi:10.1136/bmjqs-2014-003096

75. Pian-Smith MCM, Simon R, Minehart RD, et al. Teaching residents the two-challenge rule: a simulation-based approach to improve education and patient safety. *Simulation in Healthcare*. 2009;4(2):84-91. doi:10.1097/SIH.0b013e31818cffd3

76. Gougoulis A, Trawber R, Hird K, Sweetman G. "Take 10 to talk about it": Use of a scripted, post-event debriefing tool in a neonatal intensive care unit. *Journal of Paediatrics and Child Health*. 2020;56(7):1134-1139. doi:10.1111/jpc.14856

77. Bentley SK, McNamara S, Meguerdichian M, Walker K, Patterson M, Bajaj K. Debrief it all: a tool for inclusion of Safety-II. *Advances in Simulation*. 2021;6(1):9. doi:10.1186/s41077-021-00163-3

78. Perinatal QI. *PNQIN MA SPEAK UP Equity Webinar #3 - 4/6/2022.*; 2022. Accessed May 6, 2022. https://www.youtube.com/watch?v=bBEMmqj6GNg

79. Severe Maternal Morbidity: Screening and Review. American College of Obstetricians and Gynecologists. Accessed May 6, 2022. https://www.acog.org/clinical/clinical-guidance/obstetric-care-consensus/articles/2016/09/severe-maternal-morbidity-screening-and-review

80. Perinatal QI. *PNQIN MA SPEAK UP Equity Webinar #2 - 2/2/2022*.; 2022. Accessed May 6, 2022. https://www.youtube.com/watch?v=0CzoMh6o9lc

81. Levels of Maternal Care. American College of Obstetricians and Gynecologists. Accessed April 20, 2022. https://www.acog.org/en/clinical/clinical-guidance/obstetric-care-consensus/articles/2019/08/levels-of-maternal-care

Appendix B

Example: Blood Pressure Log

Blood Pressure Log

Sit quietly for 5 minutes, rest arm at the same level as your heart, place cuff on, and press START. Do not move or talk during monitoring. Record blood pressure.

Date	AM Time	Blood Pressure SYS / DIA	Pulse HR		PM Time	Blood Pressure SYS / DIA	Pulse HR	Comments
		/				/		
		/				/		
		/				/		
		/				/		
		/				/		
		/				/		
		/				/		
Date	**AM Time**	**Blood Pressure SYS / DIA**	**Pulse HR**		**PM Time**	**Blood Pressure SYS / DIA**	**Pulse HR**	**Comments**
		/				/		
		/				/		
		/				/		
		/				/		
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		/				/		
		/				/		

Goal blood pressure is ≤ 140/90
Seek immediate care if blood pressure is ≥ 160/110

Call [redacted] or go to hospital:
-blood pressure ≥ 160/110
-severe headache not responsive to acetaminophen [Tylenol]
-visual disturbances (blurring/spots/flashes)
-right upper quadrant or epigastric pain, or other urgent concerns