SEVERE HYPERTENSION IN PREGNANCY RESOURCE WORKBOOK

MISSOURI PQC Perinatal Quality Collaborative | MHA

Acknowledgements

Improving the health outcomes of maternal and infant populations is a critical priority in Missouri. The Missouri Perinatal Quality Collaborative serves as a statewide convener, resource, and change agent to support decreased variations in care and outcomes, support optimized use of evidence-based practice, and support clinical-community integration — all noted gaps in achieving equitable and improved health.

These efforts would not be possible without the collective vision and collaboration of the Missouri Department of Health and Senior Services, Missouri Hospital Association, and members of the Missouri Maternal-Child Learning and Action Network. MC LAN members represent a diverse group of stakeholders from clinical backgrounds, professional associations, government agencies, community-based organizations and community representatives who have committed support to reducing maternal morbidity and mortality in Missouri, including the March of Dimes, Missouri Section of the American College of Obstetricians and Gynecologists, Missouri Chapter of the American Academy of Pediatrics, Missouri Primary Care Association, Missouri DHSS, Missouri Department of Social Services MO HealthNet Division, Missouri Foundation for Health, Missouri Chapter of the Association of Women's Health, Obstetric and Neonatal Nurses, Nurse Practitioners in Women's Health Association, Missouri Chapter of the Amniotic Fluid Embolism Foundation, Generate Health, St. Louis Integrated Health Network, Bootheel Perinatal Network, Healthy Blue MO, Home State Health, United Healthcare, Nurture KC, Promise 1000, M-Brace Birthing, SafiMoms365, the Doula Foundation and Simply Strategy. These partners successfully aligned efforts to bring Alliance for Innovation on Maternal Health initiatives to Missouri in 2019 and connect directly to the Missouri Pregnancy-Associated Mortality Review Board, which identifies leading causes of morbidity and mortality.

The MO PQC also acknowledges the contributions of AIM, the national, cross-sector commitment designed to lead in developing and implementing patient safety bundles to promote safe care for every U.S. birth. Founded in 2014 through a cooperative agreement funded by the Health Resources and Services Administration, and executed by ACOG, the AIM program provides expert technical support and capacity building to multidisciplinary state-based teams, most often perinatal quality collaboratives, leading targeted rapid-cycle quality improvement via implementation of patient safety bundles. An AIM patient safety bundle is a structured way of improving the process of care and patient outcomes: a small, straightforward set of evidence-based practices that, when performed collectively and reliably, have been proven to improve patient outcomes. Patient safety bundles are developed by expert multidisciplinary working groups, supported by the AIM staff at ACOG. Working groups include representatives appointed by professional member organizations, known experts and researchers specializing in the clinical topic, and patients with lived experience. The bundle development process includes design of measures and metrics for implementation and multiple levels of review from engaged stakeholders.[1,2]

The MO PQC leverages AIM patient safety bundles as one option to support implementation of evidence-based practice and care delivery redesign for birthing units, providers and communities throughout the state.

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The Evidence

Hypertensive disorders of pregnancy represent one of the leading causes of maternal and perinatal mortality globally, with preeclampsia complicating 2%-8% of pregnancies.[3,4] Hypertensive disorders are responsible for approximately 7.1% of pregnancy-related deaths in the United States.[5] "Serious maternal morbidities associated with hypertensive disorders of pregnancy, especially preeclampsia, include cerebrovascular accidents, retinal detachment, organ damage or failure, and eclamptic seizures."[6] The association between HDP and cardiovascular disease is well-established, especially among patients with preeclampsia. The increased cardiovascular demand during pregnancy may uncover latent hypertension.[7] "In the decades that follow an HDP-complicated pregnancy, the risk of heart failure, stroke and ischemic heart disease are almost four-, two-, and two-fold higher, respectively, than in women with normotensive pregnancies."[7,8] Additionally, patients with HDP are at higher risk for developing chronic conditions that can predispose them to cardiovascular disease (e.g., diabetes).[9,10,11]

ACOG convened *The Task Force on Hypertension in Pregnancy* to develop criteria related to the classification, diagnosis and management of maternal hypertensive disorders, including preeclampsia.[12] HDPs have continued to be a focus of ACOG and other maternal health organizations as maternal morbidity and mortality continue to rise. Five classifications of maternal hypertension are currently defined (Table 1).[3]

Table 1:

Maternal Hypertension and Preeclampsia Classifications

Chronic hypertension — blood pressure of ≥ 140/90 mm Hg diagnosed before pregnancy, before the 20th week of pregnancy or that persists more than 12 weeks after delivery

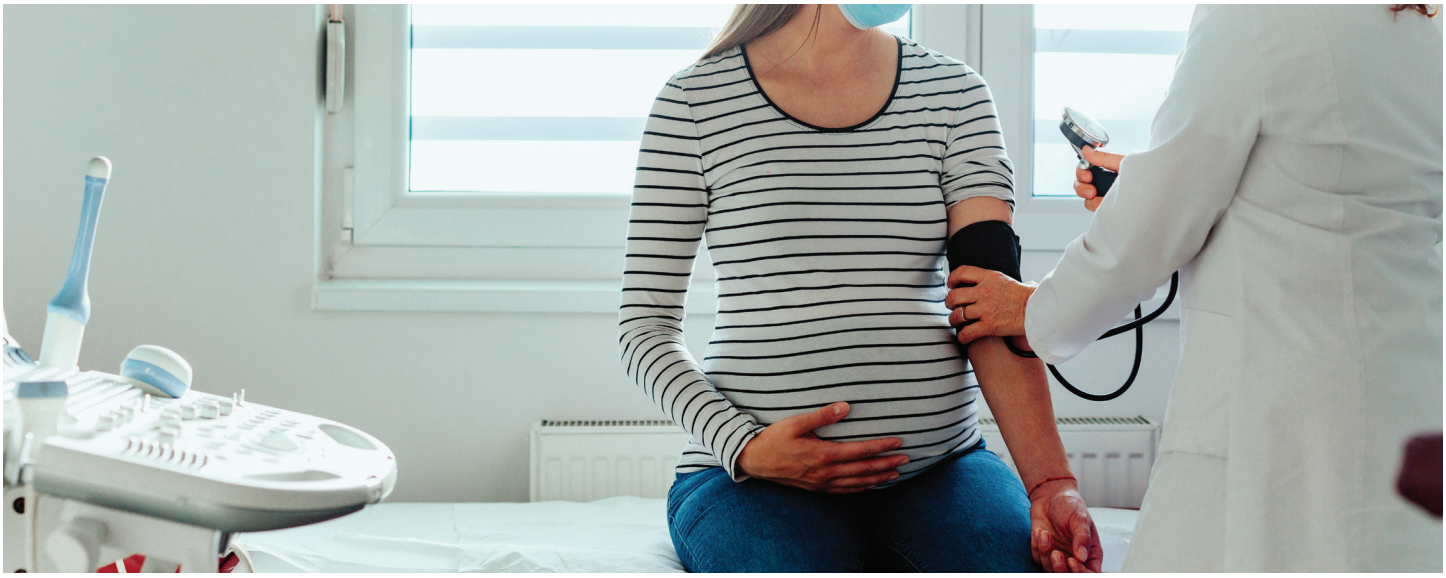
Chronic hypertension with superimposed preeclampsia — a woman with chronic hypertension who develops signs of preeclampsia at any time

Gestational hypertension — Women with gestational hypertension have all of the following.

- blood pressure of ≥ 140/90 mm Hg
- no protein in the urine (proteinuria) or severe features
- pregnancy duration of at least 20 weeks
- no previous history of high blood pressure

Preeclampsia without severe features — new onset blood pressure of ≥ 140/90 mm Hg, > 20 weeks gestation, may have proteinuria based on 24-hour urine protein collection of > 300 mg or urine protein to creatinine ratio (P:C) of > 0.3 mg/mg

Preeclampsia with severe features — meets criteria for preeclampsia without severe features with end organ involvement OR new onset blood pressure of > 160/110 mm Hg regardless of the presence of proteinuria, other symptoms or lab abnormalities. End organ involvement is indicated by any of the following: persistent headache, scotoma, epigastric pain, thrombocytopenia (< 100,000 platelets per microliter), liver function tests > twice the upper limit of normal, serum creatinine > 1.1 or twice the upper limit of normal.



In February 2019, ACOG released their revised *Committee Opinion Number 767*, reconfirming that acute onset and/or persistence of severe systolic and/or diastolic hypertension (≥ 160/110 mm Hg) during pregnancy or the postpartum period is a **medical emergency** requiring urgent antihypertensive therapy with one of the first-line medications (IV labetalol, IV hydralazine or immediate-release oral nifedipine). Use of standardized, evidence-based clinical guidelines for the management of maternal hypertension and preeclampsia have been shown to reduce the incidence of adverse maternal outcomes. Clinicians and organizations caring for maternal patients across the pregnancy timeline through one year postpartum should be able to initiate treatment with first-line agents as soon as possible within 30 to 60 minutes of confirmed severe hypertension to minimize morbidity and mortality from stroke.[13]

According to ACOG, "the" goal of antihypertensive therapy is not to normalize the maternal patient's blood pressure, but rather to achieve a range of 140-150/90-100 mm Hg to prevent repeated, prolonged exposure to severe systolic hypertension with subsequent loss of cerebral vasculature autoregulation."[13]

New onset and/or persistent severe maternal hypertension is a clinical emergency requiring time-critical intervention to reduce risk of morbidity and mortality, and all providers and units that care for pregnant and postpartum patients should be prepared to initiate timely treatment protocols.

To date, much emphasis has been placed on prevention of eclamptic seizures associated with preeclampsia, which have a significant associated risk of increased maternal and neonatal morbidity and mortality. However, priority also should be placed on controlling blood pressure to reduce the incidence of stroke. Ideally, antihypertensive medications and magnesium sulfate should be given concurrently. However, if this is not achievable, antihypertensive medications should take priority.[14]

Borderline Severe-Range Blood Pressures[14]

Although borderline severe blood pressures of 155-159 mm Hg systolic do not meet the strict criteria outlined by ACOG for diagnosis of severe gestational hypertension or preeclampsia, blood pressures in those ranges are clinically significant and may pose significant risk for patients if not treated. Several studies suggest that patients with blood pressures in this borderline severe range may experience severe morbidity and possibly death at similar rates to patients with severe features.[14]

At a minimum, for any patient with new-onset blood pressure values of 155-159/105-109 mm Hg, the following is recommended.

- immediately notify physician of borderline severe blood pressure values
- consideration of the administration of antihypertensive therapy and magnesium sulfate for preeclampsia without severe features given the association with increased maternal morbidities at this threshold in several studies
- physician evaluation of the patient, with particular emphasis on overt manifestations of severe disease, such as headache, visual disturbance and right upper quadrant or epigastric pain, or change since admission or last assessment
- continuous electronic fetal monitoring as fetal deterioration and abruptio placentae often follow episodes of marked elevations in maternal blood pressures
- inpatient observation for a prolonged period (minimum of 24-48 hours)
- frequent assessment of vital signs and symptoms (every two hours for a minimum of 24 hours)
- serial assessment of serum labs (at least daily for two days)[14]

Patients that progress to severe blood pressures should be treated with one of the first-line medications (IV labetalol, IV hydralazine or immediate-release oral nifedipine) as soon as possible within 30 to 60 minutes. An acute hypertension treatment algorithm is included in the Resources section of this document.

Preeclampsia

Preeclampsia is new onset maternal hypertension with additional pregnancy-specific multiorgan effects. Without timely and adequate medical intervention, preeclampsia is likely to progress, increasing the odds of maternal morbidity and mortality.

According to new ACOG guidelines, the diagnosis of severe preeclampsia is no longer dependent on the presence of proteinuria. Guidelines now focus on recognition and treatment of severe-range maternal blood pressure, which is potentially life-threatening to pregnant people and infants regardless of the presence or absence of urine protein. **Clinicians should not delay management of preeclampsia in the absence of proteinuria.** Evidence shows organ problems with the kidneys and liver can occur without signs of proteinuria, and that the amount of protein in the urine does not predict disease progression. Massive proteinuria (> 5 g) has been eliminated from consideration in the diagnosis of severe preeclampsia.[3]

Preeclampsia is diagnosed by new onset of high blood pressure that develops after 20 weeks gestation and up to six weeks postpartum that can be associated with protein in the urine, new development of decreased blood platelets, kidney or liver dysfunction as defined through lab diagnostics, and pulmonary or cerebral edema causing potential seizures and/or visual disturbances.[3]

There is no single reliable, cost-effective screening test for preeclampsia, and there are no well-established measures for primary prevention, although studies on biomarkers show promise regarding early high-risk identification.[15] At present, there is no agreement on the recommended use of angiogenic biomarkers in clinical practice for diagnosing and managing preeclampsia. However, the ratio of soluble fms-like tyrosine kinase/placental growth factor (sFlt-1/PlGF) demonstrates a high negative

predictive value for ruling out the onset of preeclampsia within seven days in pregnant patients anticipated to develop the condition.[16] The U.S. Food and Drug Administration approved the sFlt-1/PlGF ratio test in 2023.[17]

Evidence shows that preeclampsia is a dynamic process. Diagnosing a pregnant person's condition as "mild preeclampsia" is not helpful because it is a disease that progresses at different rates in different women. Appropriate care requires frequent reevaluation for the development of severe features and appropriate actions outlined in the new ACOG guidelines.[14,18]

ACOG and the Society for Maternal-Fetal Medicine recommend initiating low-dose aspirin prophylaxis beginning at 12 to 16 weeks for pregnant people with high risk for preeclampsia.[19] In clinical trials, LDA (60-150 mg) in women at increased risk for preeclampsia, preterm birth and intrauterine growth restriction showed substantial benefit. LDA reduced the risk for preeclampsia by 15%, preterm birth by 20% and intrauterine growth restriction by 18%.[20]

Key Considerations in Recognition and Treatment of Preeclampsia[3, 14]

- Mild to moderate high blood pressure (140-159 mm Hg systolic or 90-100 mm Hg diastolic measured on two occasions at least four hours apart) warrants close, ongoing evaluation and monitoring.
- Systolic blood pressure of 160 mm Hg or more or diastolic blood pressure of 110 mm Hg or more (severe hypertension can be confirmed within a short interval [minutes] to facilitate timely antihypertensive therapy). Blood pressures ≥ 160 mm Hg systolic and/or ≥ 110 mm Hg diastolic are features of severe preeclampsia and warrant **immediate** treatment to prevent stroke.
- To prevent eclamptic seizures, magnesium sulfate should be given intravenously if blood pressure is 160/110 mm Hg or higher, or if other severe symptoms that usually precede seizures are present.
- One of the biggest changes in preeclampsia management relates to the timing of delivery in women with preeclampsia without severe features. Studies suggest that delivery at 37 weeks of gestation is best for maternal and neonatal outcomes.
- Patients with preeclampsia with severe features should be delivered no later than 34 weeks gestation with a neonatal care team present at delivery.
- Evidence shows that preeclampsia can worsen or become apparent for the first time after delivery. The ACOG guidelines include specific recommendations to improve outcomes for women who have postpartum preeclampsia.
- Evidence firmly indicates that preeclampsia is associated with cardiovascular disease later in life, and the ACOG report calls for research to learn how to use this information to help patients mitigate risks.
- Educate all pregnant and postpartum patients about the signs and symptoms of preeclampsia. The Preeclampsia Foundation advocated for this addition to patient education based on the evidence of its own research study.[21]

Diagnosis of severe preeclampsia is no longer dependent on the presence of proteinuria. Guidelines now focus on recognition and treatment of severe-range maternal blood pressure, which is potentially life-threatening to pregnant people and infants regardless of the presence or absence of urine protein. Clinicians should not delay management of preeclampsia in the absence of proteinuria.

Missouri's Call to Action

The Missouri PAMR Board reviews all deaths of women and birthing people while pregnant or within one year of the end of the pregnancy. Pregnancy-associated death is the overarching term used when referring to maternal deaths. Within this broad categorization are more specific terms to describe the cause of death, including pregnancy-related death; pregnancy-associated, but not related (PANR) death; and pregnancy-associated, but unable to determine relatedness.[22]
See definitions below.

Pregnancy-related death: Death occurring during or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiological effects of pregnancy[22]

PANR: Death during or within one year of pregnancy from a cause that is not related to pregnancy (e.g., pregnant person who dies in a natural disaster)[22]

Pregnancy-associated, but unable to determine relatedness: Cases when the board was unable to determine if a death was pregnancy-related or PANR[22]

Maternal morbidity: Any health condition attributed to and/or aggravated by pregnancy and childbirth that negatively impacts women's health short-term or long-term. (Updated June 2024).[22]

Maternal mortality: The World Health Organization defines a maternal death as "a death while pregnant or within 42 days of the end of the pregnancy from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes."[23] In Missouri, the term maternal mortality the term maternal mortality is used to describe the death of a person during pregnancy, childbirth, and the postpartum period up to 365 days from the end of the pregnancy. (Updated June 2024).[22]

The 2023 Missouri PAMR report, reviewing maternal deaths from 2018 to 2020, found 6,691 instances of chronic hypertension in pregnancy, 18,610 instances of gestational hypertension and 1,294 instances of eclampsia.[24] In 2023, there was a 27% increase in birthing persons identified with hypertension and eclampsia at delivery.[25] Black women had the highest rates of these three forms of hypertension. **Cardiovascular disease, which includes hypertensive disorders along with cardiomyopathy and other cardiovascular conditions, was the leading cause of pregnancy-related death**.[22]

The ability of clinical providers to accurately measure blood pressure, identify severe-range blood pressure readings, intervene early, and educate patients and families on severe hypertension risks and signs during pregnancy and the postpartum period directly correlates to decreased SMM and MM related to severe hypertension. Maternal health providers across the care continuum have specific opportunities to ensure correct blood pressure readings are obtained from every patient, followed by prompt treatment of severe-range readings with antihypertensive medication, which may include the need for close observation, early delivery, and/or transfer to a higher level of care. Educating birthing patients and families on warning signs of hypertensive disorders during pregnancy and the postpartum period and the use of home blood pressure monitoring devices are critical to early identification.

Community birth workers and supportive organizations, as well as family members, can assist with the early identification of severe hypertension symptoms, educate on signs to monitor for during and after pregnancy, and support early access to care and intervention through a culturally congruent approach.

The MO PQC encourages all stakeholders in maternal-infant health to take action to reduce SMM and MM from severe hypertension during and after pregnancy.

Birthing organizations interested in implementing the AIM Severe Hypertension in Pregnancy Patient Safety Bundle may register with the MO PQC.

AIM Bundle Components[26]

An AIM patient safety bundle is a structured way of improving the process of care and patient outcomes: a small, straightforward set of evidence-based practices that, when performed collectively and reliably, have been proven to improve patient outcomes.

Readiness — Every Care Setting

- ☐ Develop processes for management of pregnant and postpartum patients with severe hypertension, including the following.
  - ☐ a standard protocol for maternal early warning signs, diagnostic criteria, monitoring and treatment of severe preeclampsia/eclampsia (including order sets and algorithms)
  - ☐ a process for the timely triage and evaluation of pregnant and postpartum patients with severe hypertension or related symptoms
  - ☐ a system plan for escalation, obtaining appropriate consultation and maternal transfer as needed
- ☐ 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.
- ☐ Conduct interprofessional and interdepartmental team-based drills with timely debriefs that include the use of simulated patients.
- ☐ 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 and supports for pregnant and postpartum families.
- ☐ Develop trauma-informed protocols and provider education to address health care team member biases to enhance equitable care.

Recognition and Prevention — Every Patient

- ☐ Assess and document if a patient presenting is pregnant or has been pregnant within the past year in all care settings.
- ☐ Ensure accurate measurement and assessment of blood pressure for every pregnant and postpartum patient.
- ☐ 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.
- ☐ Provide ongoing education to all patients on the signs and symptoms of hypertension and preeclampsia and empower them to seek care.
- ☐ Provide ongoing education to all health care team members on the recognition of signs, symptoms and treatment of hypertension.

Response — Every Event

- ☐ Utilize a standardized protocol with checklists and escalation policies, including a standard response to maternal early warning signs, listening to and investigating patient-reported and observed symptoms, and assessment of standard labs for the management of patients with severe hypertension or related symptoms.
- ☐ Initiate a postpartum follow-up visit to occur within three days of the birth hospitalization discharge date for individuals whose pregnancy was complicated by hypertensive disorders.
- ☐ 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.

Reporting and Systems Learning — Every Unit

- ☐ 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.
- ☐ Perform multidisciplinary reviews of all severe hypertension/eclampsia cases per established facility criteria to identify systems issues.
- ☐ Monitor outcomes and process data related to severe hypertension, with disaggregation by race and ethnicity due to known disparities in rates of severe hypertension.

Respectful, Equitable and Supportive Care — Every Unit/Provider/Team Member

- ☐ Engage in open, transparent and empathetic communication with pregnant and postpartum people and their identified support network to understand diagnoses, options and treatment plans.
- ☐ Include pregnant and postpartum persons 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.

Resources Section

General Resources

AIM: AIM Severe Hypertension in Pregnancy Bundle
AIM: Severe Hypertension in Pregnancy Element Implementation Details
AIM: Severe Hypertension in Pregnancy Implementation Resources
AIM: Severe Hypertension in Pregnancy Change Package
California Maternal Quality Care Collaborative : Improving Health Care Response to Hypertensive Disorders of Pregnancy: A California Quality Improvement Toolkit
Obstetrics & Gynecology: Hypertension in Pregnancy
ACOG: ACOG Resource Overview
ACOG: Practice Bulletin No. 222: Gestational Hypertension and Preeclampsia
The Preeclampsia Foundation: The Preeclampsia Foundation
Centers for Disease Control and Prevention: Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) Initiative
CDC: Hypertension in Pregnancy Change Package
ACOG: Severe Hypertension in Pregnancy Bundle (example algorithms, protocols, etc.)
The Preeclampsia Foundation: Ask About Aspirin (low-dose aspirin resources for patients and providers)
ACOG: Committee Opinion No. 736: Optimizing Postpartum Care
MHA: High Reliability Organization Toolkit

Patient Education

AWHONN: Post-Birth Warning Signs
ACOG: Preeclampsia and Pregnancy Infographic
CDC: Urgent Maternal Warning Signs
Reproductive Health National Training Center: Recognize Postpartum Warning Signs

Recognition, Triage, Order Sets and Algorithms

ACOG: Acute Hypertension in Pregnancy and Postpartum Algorithm
Illinois Perinatal Quality Collaborative: ACOG: Sample Order Sets: Pocket Guide
ACOG: Eclampsia Algorithm
ACOG: Cardiovascular Disease (CVD) in Pregnancy & Postpartum Algorithm
CMQCC: Preeclampsia Early Recognition Tool (PERT)

Health Care Professional-facing Materials

CDC: "Hear Her" Campaign
RHNTC: Recognize Postpartum Warning Signs

Simulation-based Training

AIM: Obstetric In-Situ Drill Program Manual

Emergency Department Resources

ACOG: Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period
ACOG: ED Postpartum Preeclampsia Checklist
ACOG: Acute Hypertension in Pregnancy & Postpartum Algorithm
CMQCC: Appendix G: Stop Sign for Patient Information

Huddles and Debriefings

Institute for Healthcare Improvement: Patient Safety Essentials Toolkit: Huddles
Agency for Healthcare Research and Quality: Daily Huddle Component Kit
AHRQ: Improving Patient Safety and Team Communication through Daily Huddles
AHRQ: Debriefing for Clinical Learning
AHRQ: Action Plan for the AHRQ Surveys on Patient Safety Culture
Trends in Anaesthesia and Critical Care: Clinical Debriefing: TALK© to Learn and Improve Together in Healthcare Environments
Clinical Excellence Commission: Post-Event Safety Huddles

Respectful, Equitable and Supportive Care

March of Dimes: Beyond Labels
ACOG: Respectful Care eModules
Institute for Healthcare Advancement: 10 Elements of Competence for Using Teach-back Effectively
IHA: Always Use Teach-back! Training Toolkit
IHA: Teach-back Quick Guide
Ottawa Hospital Research Institute: Patient Decision Aids: Implementation Toolkit
AHRQ: SHARE Approach Curriculum Tools
Centers for Medicare and Medicaid Services: Providing Language Services to Diverse Populations: Lessons from the Field
Rural Health Information Hub: Enhancing Services for Deaf, Hard of Hearing, and Deafblind Patients in Rural America

Trauma-informed Care

Substance Abuse and Mental Health Services Administration: SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach
Trauma-Informed Care Implementation Resource Center: All Resources
Medical Education Online: Trauma-Informed Care in the Emergency Department: Concepts and Recommendations for Integrating Practices Into Emergency Medicine
Journal of Obstetric, Gynecologic & Neonatal Nursing: National Partnership for Maternal Safety: Consensus Bundle on Support After a Severe Maternal Event
AIM: Patient Support After a Severe Event: The Importance of Providing Trauma-Informed Care
AIM: Implementing a Clinician and Staff Peer Support Program
Crisis Prevention Institute: 3 Keys to Help Staff Cope With Secondary Trauma

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