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Management of Hypertension in Pregnancy

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Topics

- Verbalize common risk factors associated with hypertensive disorders in pregnancy.
- Define current terminology and classifications associated with hypertensive disorders in pregnancy.
- Explore diagnostic criteria used to screen and monitor women with potential preeclampsia.
- Examine pathophysiologic changes that occur in women with preeclampsia.
- Review appropriate treatment regimen for administration and management of the woman receiving magnesium sulfate therapy.
- Discuss recommended guidelines for administration of antihypertensive agents in women experiencing acute, severe hypertension.

Incidence

- Occurs in approximately 12-22% of pregnancies
- Most common medical condition in pregnancy
- Increased over time
  - Due to increase in maternal age, obesity, comorbidities, and assisted reproduction
- Leading cause of maternal mortality
  - Directly responsible for 17.6% of maternal deaths in the United States

Classifications

- Preeclampsia/eclampsia
  - HELLP syndrome – preeclampsia subtype
- Chronic hypertension
- Chronic hypertension with superimposed preeclampsia
- Gestational hypertension

Characteristics of preeclampsia/eclampsia

- Usually occurs after 20 weeks gestation
- Pregnancy-specific syndrome with multiple organ system involvement
- New onset hypertension (systolic blood pressure (SBP) of ≥140 mmHg or diastolic blood pressure (DBP) of ≥90 mmHg on two occasions at least 4 hours apart) plus new onset proteinuria
  - In absence of protein, other diagnostic criteria may be present

Diagnostic criteria

- New onset of hypertension after 20 weeks plus:
  - Proteinuria
    - >300 mg in 24-hour period
    - Protein/creatinine ratio ≥0.3
    - Urine dipstick ≥1+

Diagnostic criteria

- New onset of hypertension after 20 weeks plus:
  - In absence of proteinuria
    - Thrombocytopenia (platelets <100,000)
    - Impaired liver function (elevated aspartate transaminase (AST) or alanine transaminase (ALT))
    - New development of renal insufficiency (serum creatinine >1.1 mg/dL or doubling of serum creatinine)
  - Pulmonary edema
  - New onset of cerebral edema/visual disturbances

Preeclampsia with severe features

- Systolic BP ≥160 mmHg
- Diastolic BP ≥110 mmHg
- Thrombocytopenia
- Impaired liver function
- Severe right upper quadrant or epigastric pain, unrelieved by pain medicine
- Progressive renal insufficiency
- Pulmonary edema
- Cerebral or visual disturbances

HELLP Syndrome

Preeclampsia subtype

- **H**emolysis
- **E**levated **L**iver enzymes
- **L**ow **P**latelets

Chronic hypertension

- Hypertension present before pregnancy

OR

- Onset of hypertension (SBP ≥140 or DBP ≥90) prior to 20 weeks gestation if pre-pregnancy blood pressure unknown
- Persists >12 weeks postpartum

Characteristics

- Increased risk of preeclampsia
- Associated with increased rates of adverse outcomes
  - Intrauterine fetal death, intrauterine growth restriction (IUGR), premature birth, and placental abruption

Management

- Antihypertensive therapy
  - Labetalol
  - Methyldopa
  - Nifedipine
  - Thiazide diuretics
- Angiotensin-converting enzyme (ACE) inhibitors contraindicated (congenital malformations, oligohydramnios, neonatal renal failure)
- Goal: maintain SBP 130-155 mmHg and DBP 80-105 mmHg

Chronic hypertension with superimposed preeclampsia

- Occurrence of preeclampsia in women with existing hypertension
- Chronic hypertension AND preeclampsia

Characteristics

- Develops in about 40% of women with chronic hypertension
- Prognosis for mother & fetus worse than with chronic hypertension or preeclampsia alone
  - Greater risk of fetal growth restriction
- Strong association between chronic hypertension and cardiovascular disease
  - The higher the blood pressure, the greater the risk

Gestational hypertension

<u>Characteristics</u>

- New onset of hypertension after 20 weeks gestation
- Absence of proteinuria
- May evolve to preeclampsia
- Normalization of BP by 12 weeks postpartum

<u>Diagnostic criteria</u>

- Systolic blood pressure >140 mmHg OR
- Diastolic blood pressure >90 mmHg

Normal placental implantation

- Trophoblast cells migrate through endometrium and part of myometrium to invade endothelium and middle layer of spiral arteries
- Spiral arteries
  - Remodeled from small arterioles to large vessels
    - 5-10 times greater dilation at mouth of vessel
    - Large arterial bed
  - Enhanced blood supply to placenta and fetus

Normal placental implantation

- Trophoblasts invade endometrium but do not completely invade myometrium
  - Leads to:
    - Spiral arteries with thick, narrow walls
    - High resistance and decreased blood supply to placenta
    - Placental ischemia and low oxygen delivery
- Placental development abnormalities occur before clinical manifestations of preeclampsia

Possible factors associated with abnormal placental development

- Vascular
  - Preexisting vascular disease may indicate preexisting endothelial cell damage
- Environmental
- Genetic
  - Maternal & paternal additions to fetal genes
- Immunological
  - Exposure to paternal/fetal antigens may offer some protection against preeclampsia

Placental ischemia

- Inflammatory & antiangiogenic placental factors are released into maternal circulation
- Endothelial cells line interior surface of blood vessels
- Antiangiogenic proteins counteract proangiogenic proteins
- Leads to systemic endothelial dysfunction

Mechanisms that foster pathophysiologic progression

- Oxidative stress
- Inflammatory response
- Altered coagulation

Mechanisms that foster pathophysiologic progression

Decrease in end organ profusion in preeclampsia due to endothelial damage

Oxidative stress

- Diminished antioxidant response to oxygen stimulation
  - Leads to development of oxygen free radicals which fosters tissue damage causing neutrophil activation and production of cytotoxic ions
    - Leads to exaggerated activation of vascular endothelium

Inflammatory response

- Enhanced immune response
  - Elevated levels of pro-inflammatory mediators
- Vascular injury extends inflammatory response & promotes coagulation
  - Decreased placental perfusion and endothelial damage
    - Promotes platelet aggregation and coagulation
      - Leads to imbalance between prostacyclin & thromboxane (vasoactive prostaglandins)
      - Deficiency in prostacyclin and an increase in thromboxane which exasperate preeclampsia

Altered coagulation

- Increased arterial pressure and vasospasm further promoting endothelial damage
- Fluid or fluid components leak out of blood vessels into interstitial space
- Platelets gather at sites of endothelial damage with further narrowing of blood vessels
  - Consumption of platelets reflected in platelet count
- Blood flow under high pressure through narrow blood vessels
  - Results in hemolysis
  - Continued compromise to end organs

Clinical findings associated with pathophysiologic changes

- Cardiovascular
  - Hypertension, hypovolemia, edema in face or hands
- Pulmonary
  - Difficulty breathing, pulmonary edema
- Hematologic
  - Thrombocytopenia, abnormal peripheral smear, elevated lactate dehydrogenase (LDH), decrease in hemoglobin
- Renal
  - Proteinuria, oliguria, increased serum creatinine, increased uric acid

Clinical findings associated with pathophysiologic changes

- Hepatic
  - Elevated bilirubin, elevated liver enzymes, right upper quadrant pain
- Neurologic
  - Visual disturbances, headache that will not go away, eclampsia
- Uteroplacental
  - IUGR, abnormal fetal heart rate, low BPP score

Predisposing factors for development of preeclampsia

- Paternal factors
- Genetic predisposition
- Preexisting vascular disease & metabolic abnormalities

Predisposing factors for development of preeclampsia

- Protective effects from long-term exposure to sperm from same partner
- Reduced risk of preeclampsia from prior normal pregnancy with same partner
- A man who fathered a prior preeclamptic pregnancy is almost twice as likely to father a preeclamptic pregnancy with a new partner

Predisposing factors for development of preeclampsia

- Women with mothers or sisters with preeclampsia have a higher chance of developing preeclampsia
- Women that have a preexisting cardiovascular disease have a greater chance of developing preeclampsia

Preeclampsia risk factors

- First pregnancy
- Prior pregnancy with preeclampsia
- Chronic hypertension
- Chronic renal disease
- History of thrombophilia
- Multi-fetal pregnancy
- Family history of preeclampsia
- Diabetes Type I or II
- Obesity
- Collagen vascular disease (Lupus)
- Advanced maternal age

Complications of preeclampsia

- Obstetric/fetal
  - Placental abruption
  - IUGR
  - Preterm birth
- Hematological
  - Hemolysis
  - Hemorrhage
  - Disseminated intravascular coagulation (DIC)
  - Venous thromboembolism
- Urinary
  - Acute renal failure
- Neurological
  - Eclampsia
  - Stroke
- Respiratory
  - Pulmonary edema
  - Acute respiratory distress syndrome (ARDS)
- Hepatic
  - Liver rupture

Eclampsia characteristics

- New onset of grand mal seizure in woman diagnosed with preeclampsia with no history of neurologic pathology or new onset seizures 48-72 hours postpartum
- Incidence: 2-3% of preeclamptic women (about 1 in 1,000 births)
- Usually occurs prior to delivery, but can occur days to weeks after birth (approximately 26%)
- Morbidity and mortality related to:
  - Placental abruption, DIC, pulmonary edema, aspiration pneumonia, renal failure, and cardiac arrest

Features

- Wide range of clinical presentation
  - No signs and symptoms of preeclampsia **or** signs of preeclampsia with severe features
  - Potential signs and symptoms of impending seizure:
    - Persistent occipital or frontal headache
    - Blurred vision
    - Photophobia
    - Altered mental status
    - Right upper quadrant and/or epigastric pain

Nursing care during seizure activity

- Call for help and notify physician
- Promote maternal and fetal oxygenation
  - Position patient in left lateral position
  - Assure open airway & breathing
  - Provide supplemental oxygen
  - Check O2 level, blood pressure, and pulse
  - Provide suction as needed
  - Obtain IV access
    - Administer magnesium sulfate per physician order/protocol

Post-eclamptic seizure

- Maintain magnesium sulfate infusion for 24 hours
- Maintain patient in left lateral position
- Patient assessment:
  - Spontaneous respirations & breathing
  - Level of consciousness (LOC), O2 level, blood pressure, pulse
  - Signs of neurologic injury
- Resume or initiate fetal heart rate monitoring as soon as possible
- Prepare for possible delivery once stabilized
- Close observation for 24 hours
  - Eclamptic seizure may reoccur

Detection of preeclampsia

- Review past medical history and prenatal record
- Evaluate blood pressure
- Evaluate deep tendon reflexes
- Note excessive weight gain (not diagnostic but may be indication of impending preeclampsia)
- Clean catch urine for dipstick urinalysis or lab specimen

Detection of preeclampsia

- Assess for patient complaints
  - Headache
  - Dizziness
  - Blurred vision
  - Epigastric pain
- Patient complaints of vague symptoms
  - Nausea/vomiting
  - Malaise

Detection of preeclampsia with severe features

- Evaluate for SBP 160 mmHg or higher **or** DBP 110 mmHg or higher
- For elevated result:
  - Repeat blood pressure in 15 minutes
  - If still elevated, notify physician immediately
    - Facilitation of antihypertensive therapy

Detection of preeclampsia with severe features

- Evaluate for oliguria
  - Urine output <30 mL per hour for two hours
  - Urine output <100 mL over 4 hours
  - Urine output <400 mL in 24 hours

Detection of HELLP syndrome

Hemolysis

- Results from red blood cells being forced through narrowed network under high pressure, which damages erythrocytes
  - Abnormal red blood cells on smear
  - Bilirubin of >1.2 mg/dL or greater
  - Elevated LDH
  - Declining hemoglobin & hematocrit (unrelated to blood loss)

Detection of HELLP syndrome

Elevated liver enzymes

- Results from microemboli in hepatic vasculature, causing ischemia and tissue damage within liver
  - AST & ALT (more than twice the normal level)
  - Elevated LDH >600 U/L
  - Assess for the following symptoms:
    - Feelings of malaise
    - Viral-like syndrome
    - Right upper quadrant pain or epigastric pain

Detection of HELLP syndrome

Low platelets <100,000

- Results from increased platelet consumption
  - Low: <100,000
  - Severe: <50,000
  - Assess for the following symptoms:
    - Hematuria
    - Mucosal bleeding, bleeding from IV site or incision
    - Petechiae
    - Easy bruising

Differential diagnosis in women with HELLP

- Acute fatty liver of pregnancy
- Antiphospholipid syndrome
- Cholecystitis
- Hepatitis
- Acute pancreatitis
- Lupus
- Thrombotic thrombocytopenic purpura (TTP)
- Immune thrombocytopenic purpura (ITP)

Management of preeclampsia

Goals

- Control of hypertension
- Optimization of organ perfusion
- Prevention of seizures
- Stabilization of mother and fetus

Treatment

Definitive treatment is delivery

- Conservative management without severe features present:
  - Once or twice weekly office visits:
    - Physical assessment
    - Monitoring of labs
    - Non-stress tests
    - Biophysical profile

Treatment

- Hospitalization may be required for the following:
  - SBP $\geq$160 mmHg or DBP $\geq$110 mmHg
  - IUGR
  - Elevated liver function tests
  - Decreased platelets
  - Onset of labor or rupture of membranes

Nursing assessment frequency
Preeclampsia **without** severe features

	Antepartum
BP, pulse, respirations, oxygen saturation	Every 4 hours
Lung sounds	Every 4 hours
Edema, DTR, clonus, LOC	Every 8 hours
Assessment of patient complaints of headache, visual disturbances, epigastric pain	Every 8 hours
Fetal heart rate & uterine activity	Every shift
Temperature	Per physician order or facility protocol
Intake & output	At least once every shift

Nursing assessment frequency
Preeclampsia **without** severe features

	Intrapartum
BP, pulse, respirations, oxygen saturation	Every 60 minutes
Lung sounds	Every 4 hours
Edema, DTR, clonus, LOC	Every 8 hours
Assessment of patient complaints of headache, visual disturbances, epigastric pain	Every 8 hours
Fetal heart rate & uterine activity	Continuous
Temperature	Per physician order or facility protocol
Intake & output	At least once every shift

Nursing assessment frequency
Preeclampsia **without** severe features

	Postpartum
BP, pulse, respirations, oxygen saturation	Every 4 hours
Lung sounds	Every 4 hours
Edema, DTR, clonus, LOC	Every 8 hours
Assessment of patient complaints of headache, visual disturbances, epigastric pain	Every 8 hours
Fetal heart rate & uterine activity	N/A
Temperature	Per physician order or facility protocol
Intake & output	At least once every shift

Management of preeclampsia with severe features

Goals

- Monitoring for progression of severity of preeclampsia
- Monitoring for maternal or fetal instability

Treatment

Expectant management versus delivery

- Expedited delivery recommended
  - Gestational age 34 weeks or greater
  - Any of the following regardless of gestational age
    - Eclampsia
    - Pulmonary edema
    - DIC
    - Uncontrolled, severe hypertension
    - Nonviable fetus
    - Abnormal fetal surveillance
    - Placental abruption
    - Intrauterine fetal demise

Treatment
Expectant management versus delivery

- For stable women <34 weeks, the American Congress of Obstetricians and Gynecologists (ACOG) recommends hospitalization with delivery after 48 hours of steroids for any of the following:
  - Persistent severe symptoms
  - HELLP syndrome
  - IUGR with estimated fetal weight <5th percentile
  - Umbilical artery reverse end-diastolic flow
  - Labor or premature rupture of membranes (PROM)
  - Significant renal dysfunction

Treatment

- Hospitalization prior to delivery
  - Appropriate patient care assignments
    - Experienced nurse
    - 1:1 nurse to patient ratio
  - Frequent vital signs, intake and output, and assessment of deep tendon reflexes (DTR)
  - Lab evaluation
    - CBC, liver function tests, LDH, uric acid, 24-hour urine for protein and creatinine clearance
  - Fetal monitoring

Nursing assessment frequency
Preeclampsia **with** severe features

	Antepartum
BP, pulse, respirations, oxygen saturation	Hourly
Lung sounds	Every 2 hours
Edema, DTR, clonus, LOC	Every 4 hours
Assessment of patient complaints of headache, visual disturbances, epigastric pain	Every 4 hours
Temperature	Per physician order or facility protocol
Intake & output	Hourly ≤125 mL/hour
Fetal heart rate & uterine activity	Continuous

Nursing assessment frequency
Preeclampsia **with** severe features

	Intrapartum
BP, pulse, respirations, oxygen saturation	Every 30 minutes
Lung sounds	Every 2 hours
Edema, DTR, clonus, LOC	Every 4 hours
Assessment of patient complaints of headache, visual disturbances, epigastric pain	Every 4 hours
Temperature	Per physician order or facility protocol
Intake & output	Hourly ≤125 mL/hour
Fetal heart rate & uterine activity	Continuous

Nursing assessment frequency

Preeclampsia **with** severe features

	Postpartum
BP, pulse, respirations, oxygen saturation	Every 60 minutes for first 24 hours then every 4 hours
Lung sounds	Every 2 hours for first 24 hours then every 4 hours
Edema, DTR, clonus, LOC	Every 4 hours
Assessment of patient complaints of headache, visual disturbances, epigastric pain	Every 4 hours
Temperature	Per physician order or facility protocol
Intake & output	Hourly for first 24 hours, then every 4 hours
Fetal heart rate & uterine activity	N/A

Treatment

- Hospitalization prior to delivery
  - Seizure precautions:
    - Oral airway, suction, padded side rails
    - Magnesium sulfate therapy
    - Promotion of a quiet, calm atmosphere
  - Assess for patient complaints
    - Headache, visual disturbances, clonus, right upper quadrant/epigastric pain, or shortness of breath

Magnesium sulfate administration

Indications & dosage

- Drug of choice for seizure prophylaxis
  - Preeclampsia with severe features
  - Eclampsia
- Dosage
  - Loading dose: 4-6 grams over 20-30 minutes
  - Maintenance dose: 1-2 grams/hour for 24 hours
  - Some women may require a higher dosage to achieve therapeutic magnesium levels

Eclampsia

- Eclamptic seizure prior to magnesium sulfate therapy:
  - Loading dose of 4-6 grams IV followed by maintenance dose of 1-2 grams/hour
  - Note: if no IV access, magnesium sulfate 10 grams intramuscular (5 grams each buttock) may be given
- Eclamptic seizure during magnesium sulfate therapy:
  - Administer an additional 2 grams IV bolus
- Seizures responding poorly to magnesium sulfate:
  - May treat with Ativan® 4 mg IV, Valium® 5-10 mg IV, or Versed® 1-2 mg IV

Intrapartum & intraoperative

- ACOG recommendation
  - Magnesium sulfate should continue during intrapartum or intraoperative period
    - Half-life is 5 hours, thus little benefit in preventing anesthetic interaction
    - May lead to eclamptic seizure due to drop in serum level
    - Stress of anesthesia, induction, or delivery may increase risk of eclamptic seizure

Recommended safety practices

High alert medication

- Use standardized pre-mixed concentration:
  - 4 grams in 50 mL in lactated Ringer's
  - 20 grams in 500 mL lactated Ringer's
- Use separate IV bags for bolus and maintenance doses
- Administer on IV infusion pump
- Double-checks during initial rate administration, rate changes, and during hand-offs
- Monitor for signs and symptoms of toxicity
  - Calcium gluconate readily available
- Appropriate nurse to patient ratios

Nursing assessment during administration

- Loading dose:
  - Continuous nursing presence at bedside
  - Baseline assessment prior to initiation
    - Vital signs, level of consciousness, fetal heart rate
- Evaluate and document assessments every 15 minutes x1 hour, every 30 minutes x1 hour, then hourly
  - Respiratory rate, oxygen saturation, DTR, level of consciousness, urine output, and toleration of medication

Side effects

- Drowsiness
- Sweating
- Weakness
- Flushing
- Decreased reflexes
- Decreased respiratory rate
- Malaise
- Pulmonary edema

Magnesium sulfate toxicity

- Therapeutic range 3-7 mEq/L
  - Greater than 7 mEq/L may indicate toxicity
- Signs and symptoms:
  - Loss of DTR
  - Shortness of breath
  - Chest pain
  - Respiratory depression
  - Loss of consciousness
- Respiratory and cardiac arrest may develop if toxicity is not corrected

mEq/L = milliequivalents per liter

Management of toxicity/overdose

- Obtain serum magnesium level
- Discontinue infusion for decreased level of consciousness or respiratory depression
- Administer calcium gluconate 1 gram IV over 3 minutes
- Provide respiratory support as indicated

Antihypertensive therapy

Severe hypertension

- Systolic blood pressure ≥160 or diastolic blood pressure ≥110
- Hypertensive emergency
  - Acute onset, severe hypertension that persists for 15 minutes or more
  - All pregnant or postpartum patients should be treated

Note: Goal is not to normalize BP but to drop BP to a lower range to reduce risk of intracranial hemorrhage

First-line therapy for management of severe hypertension

- SBP 160 mmHg or DBP 110 mmHg or higher considered obstetric emergency
  - Requires immediate administration of antihypertensive medication
    - IV hydralazine
    - IV labetalol
    - Oral nifedipine

First-line therapy for management of severe hypertension

- Guidelines
  - After initial reading of SBP ≥160 mmHg or DBP ≥110 mmHg, repeat blood pressure in 15 minutes
  - Notify physician immediately if blood pressure remains in this range
    - Anticipate orders for IV antihypertensive agent(s)
  - Administer IV hypertensive agent according to physician order

First-line therapy for management of severe hypertension

Labetalol

- Initial dose: 20 mg IV push over 2 minutes
  - Take blood pressure 10 minutes after dose – if still elevated, continue to next dose
- Second dose: 40 mg IV push over 2 minutes
  - Take blood pressure 10 minutes after dose – if still elevated, continue to next dose
- Third dose: 80 mg IV push over 2 minutes
  - Take blood pressure 10 minutes after dose – if still elevated, continue to hydralazine
- **Change medication to hydralazine:** Give 10 mg IV push over 2 minutes
  - Take blood pressure 20 minutes after hydralazine

First-line therapy for management of severe hypertension

Hydralazine

- Initial dose: 5-10 mg IV push over 2 minutes
  - Take blood pressure 20 minutes after dose – if still elevated, continue to next dose
- Second dose: 10 mg IV push over 2 minutes
  - Take blood pressure 20 minutes after dose – if still elevated, proceed to labetalol
- **Change medication to labetalol:** Give 20 mg IV push over 2 minutes
  - Take blood pressure 10 minutes after dose – if still elevated, continue to next dose

First-line therapy for management of severe hypertension

- Nifedipine
  - Initial dose: 10 mg orally
    - Take blood pressure 20 minutes after dose – if still elevated, continue to next dose
  - Second dose: 20 mg orally
    - Take blood pressure 20 minutes after dose – if still elevated, continue to next dose
  - Third dose: 20 mg orally
    - Take blood pressure 20 minutes after dose – if still elevated, continue to next dose
  - **Change medication to labetalol**: Give 40 mg IV push over 2 minutes
    - Take blood pressure 10 minutes after dose – if still elevated, notify physician

Target blood pressures

- Includes both of the following:
  - SBP 140-160 mmHg
  - DBP 90-100 mmHg

  ***Note: Lowering BP below this range may reduce placental perfusion**
- Frequency of blood pressure assessment after target achieved:
  - Every 10 minutes x1 hour
  - Every 15 minutes x1 hour
  - Every 30 minutes x1 hour
  - Every 4 hours

Second-line therapy for management of severe hypertension

- If hydralazine or labetalol do not adequately control blood pressure:
  - Continuous infusion of IV labetalol or nicardipine
  - Emergent consultation of maternal fetal medicine, internal medicine, or anesthesia recommended

Quality improvement recommendations

- Timely initiation of medications:
  - Within 30-60 minutes recommended
  - Initial therapy of labetalol or hydralazine
- Implementation of “preeclampsia box”
- Target blood pressures 140-159/90-100
- Possible anesthesia consultation:
  - Medication titration
  - Arterial line placement

Continuous management of hypertension during pregnancy

- Most common agents used during pregnancy:
  - Alpha-adrenergic agonist
    - Methyldopa (most common)
  - Nonselective beta-adrenergic blockers
    - Labetalol
  - Calcium channel blockers
    - Slow-release nifedipine

Planning and prevention

Postpartum management

- BP should be monitored either in hospital or outpatient basis for 72 hours
- Early post-discharge follow-up
  - 3-7 days if BP medication used during labor & delivery or postpartum
  - 7-14 days with diagnosis of preeclampsia and no medication used
- Effects of preeclampsia reported up to six weeks postpartum
  - 32-44% eclampsia occurs during this period

Long-term health complications

- Hypertension in pregnancy leads to increased risk (approximately double) of future cardiovascular disease, chronic hypertension, and cerebrovascular disease
  - Even greater risk with recurrent preeclampsia or preterm delivery
- Lifestyle and dietary management may help women manage risk of medical complications in later life
  - Weight management
  - Exercise
  - Yearly physicals with blood pressure & cholesterol checks

Patient education

- All patients should receive information describing signs and symptoms of preeclampsia
- Patients with history of hypertensive disorders in pregnancy
  - Risks of recurrent hypertensive disorders in pregnancy
    - Early reporting of possible signs and symptoms to physicians
  - Health and lifestyle management
  - Risks of cardiovascular disease later in life

Prevention

Baby aspirin

- High-risk women:
  - History of early-onset preeclampsia and preterm delivery <34 weeks
  - History of preeclampsia in more than one previous pregnancy
  - Chronic hypertension, multi-fetal gestation, diabetes, autoimmune disease, renal disease
- Recommendation
  - Initiation of low-dose aspirin in late 1st trimester (after 12 weeks) to reduce risk of preeclampsia

Prevention

Baby aspirin

- Meta analysis of 30,000 women in randomized trials showed decreased incidence in morbidity of preeclampsia

Management of Hypertension in Pregnancy

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