Assessment and treatment for inpatients, ≥ 1 year of age, with previously undetected hypertension

Obtain blood pressure, preferably in right arm, with the correct sized blood pressure cuff at heart level

Is the blood pressure elevated?

Yes

Repeat blood pressure measurement, preferably in right arm, two times with 5 minutes between measurements*

Does the blood pressure remain elevated?

No

Continue patient’s care

Yes

Obtain a manual blood pressure measurement*

Does the blood pressure remain elevated?

No

Obtain four extremity blood pressure and notify patient’s physician*

Yes

Consult Cardiology

Consider ECHO

Evaluate:

- Review medication list for HTN associated drug
- Assess plotted BMI
- Assess for Obstructive Sleep Apnea
- Assess for Renal/Abdominal bruits
- Assess for femoral pulses

Obtain labs:

- Electrolytes, creatinine, serum calcium
- Plasma Renin Activity
- Urinalysis
- Free T4

Radiology:

- Doppler Renal Ultrasound

Are labs or radiology indicative of renal abnormalities?

Yes

Consult Renal Service

No

Prescribe antihypertensive(s) and/or lifestyle modifications

Hypertensive crisis symptoms and/or test findings:

- Encephalopathy
- Seizures
- Facial palsy
- Retinopathy
- Intracerebral hemorrhage
- Acute kidney injury
- Heart Failure
- Cardiac arrhythmias
- Cushing’s Triad

Patient experiencing hypertension urgency;
Consult Renal Service

Patient experiencing hypertension emergency;
Transfer to PICU for in-depth evaluation and BP control using continuous infusion of short-acting antihypertensive medication

If patient is continuing to receive antihypertensive(s) at discharge; patient to f/u in renal clinic within a month

Does the blood pressure remain elevated?

No

Continue patient’s care

Yes

Obtain blood pressure, preferably in right arm, with the correct sized blood pressure cuff at heart level

Is blood pressure greater than 95th percentile + 30 mm Hg specific to age and gender?

Does patient have any hypertensive crisis symptoms and/or test findings?

Yes

Consult Renal Service

No

Obtain four extremity blood pressure and notify patient’s physician*

Yes

Consult Cardiology

Consider ECHO

Evaluate:

- Review medication list for HTN associated drug
- Assess plotted BMI
- Assess for Obstructive Sleep Apnea
- Assess for Renal/Abdominal bruits
- Assess for femoral pulses

Obtain labs:

- Electrolytes, creatinine, serum calcium
- Plasma Renin Activity
- Urinalysis
- Free T4

Are labs or radiology indicative of renal abnormalities?

Yes

Consult Renal Service

No

Prescribe antihypertensive(s) and/or lifestyle modifications

*Ensure patient is comfortable and pain free

*When comfort measures do not result in a quiet and calm patient and BP remains high or is not obtainable, please notify patient’s physician

**Encephalopathy

Seizures

Facial palsy

Retinopathy

Intracerebral hemorrhage

Acute kidney injury

Heart Failure

Cardiac arrhythmias

Cushing’s Triad

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No
**Definition:** Hypertension is defined as average SBP and/or diastolic BP (DBP) that is ≥95th percentile for gender, age, and height on ≥3 occasions. In children ≥13 years of age, hypertension is defined as a SBP and/or DBP this is ≥130/80 mmHg (Flynn et al., 2017)

**Objective of Care Process Model:** Update clinicians on initial diagnostic measures and therapy prior to consulting with the Nephrology sub-specialty. This update will improve health outcomes in children found to have undiagnosed hypertension by establishing a diagnosis, initiation of treatment and proper follow up with the appropriate subspecialty service at discharge

**Target Users:** Providers and staff nurses caring for medical inpatients who have been found to be hypertensive after more than, or equal to, three occasions.

**Guideline Inclusion Criteria:**
- ≥1 year of age
- Has not been previously diagnosed with hypertension
- Medical patient

**Guideline Exclusion Criteria:**
- <1 year of age
- Surgical, emergency, or critical care patient

**Practice Recommendations:** The team accepted the blood pressure parameters that were reported in Clinical Practice Guidelines for Screening and Management of High Blood Pressure in Children and Adolescents (Flynn et al., 2017).

**Outcome Measures (based on primary diagnosis of hypertension):**
1. Failure to recognize hypertension (if blood pressure is greater than the 99 percentile, was another blood pressure obtained within 60 minutes?)
2. Time initial hypertensive episode until time physician called?
3. Use of Hypertension Workup power plan
4. Number of renal consults that have hypertension as reason
5. Count of amLODIPine ordered
6. Count of other anti-hypertensive medications ordered.
7. Did the patient receive a follow up appointment in the Renal Clinic prior to discharge?
8. Once the patient is established to have a diagnosis of hypertension suspected to be of renal etiology, did the patient attend their appointment in the Renal Clinic?
9. Adverse drug reaction documented on amLODIPine within three months of drug initiation.

**Potential Cost Implications:**
- Patient savings related to a decrease in renal consults
- Early recognition and management of hypertension
Potential Organizational Barriers:
- Inability to obtain correctly sized blood pressure equipment
- Inability to perform a blood pressure using a sphygmonanometer

Supporting tools:
- Power plan
  - Hypertension Workup
    - Vital Signs/Monitoring
      - Blood Pressure
        - T, N, q4hr
    - Nursing
      - Review medication list for drugs associated with HTN
      - Review documentation for lifestyle/diet changes when necessary
    - Consults/Therapy
      - Consult to Nephrology
        - Routine Reason for Consult: Hypertension
      - Consult to Nutrition (Dietitian only)
        - Select an order sentence
      - Consult to Cardiology - Complete
        - Reason for echo: Obtain Use Order/Comments tab, Nurse to contact Cardiology to schedule
  - Laboratory
    - Basic Metabolic Panel
      - Blood
    - Renal Function
      - Blood
    - Urinalysis (Urine Culture & Microscopic if UA pos (No Culture)
    - Free T4
      - Blood
  - Radiology
    - US Renal/Renal Doppler (Renal/Renal Doppler US)
      - Routine, Reason: Hypertension
  - Medications
    - amlodipine
      - 0.1 mg/kg PO qDay
  - Miscellaneous
    - Clinic Referral
      - Kidney Center - Hypertension
    - Clinic Referral
      - HTN Mgmt/Obesity
- Mosby’s Skill
  - Heart Rate and Blood Pressure Measurement (Pediatric)
- Educational tools
  - Home Monitoring of Blood Pressure
Care Process Preparation: This care process was prepared by The Office of Evidence Based Practice (EBP) in collaboration with content experts at Children’s Mercy Hospitals and Clinics. Development of this care process supports the Department of Clinical Effectiveness’s initiative to promote care standardization that builds a culture of quality and safety that is evidenced by measured outcomes. If a conflict of interest is identified the conflict will be disclosed next to the team members name.

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Approval Process: Care processes are reviewed and approved by Content Expert Team, the Office of EBP, and other appropriate hospital committees as deemed suitable for the guidelines intended use. Care processes are reviewed and updated as necessary every 3 years within the Office of EBP at CMH&C. Content expert teams will be involved with every review and update.

Disclaimer:
The content experts and the Office of EBP are aware of the controversies surrounding care process models. When evidence is lacking or inconclusive, options in care are provided in the document and the power plans that accompany the guideline.

These guidelines do not establish a standard of care to be followed in every case. It is recognized that each case is different and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time.

It is impossible to anticipate all possible situations that may exist and to prepare guidelines for each. Accordingly these guidelines should guide care with the understanding that departures from them may be required at times.
References
