



## WELCOME TO THE MONTHLY LEARNING WEBINAR

The presentation will begin shortly

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# General Housekeeping

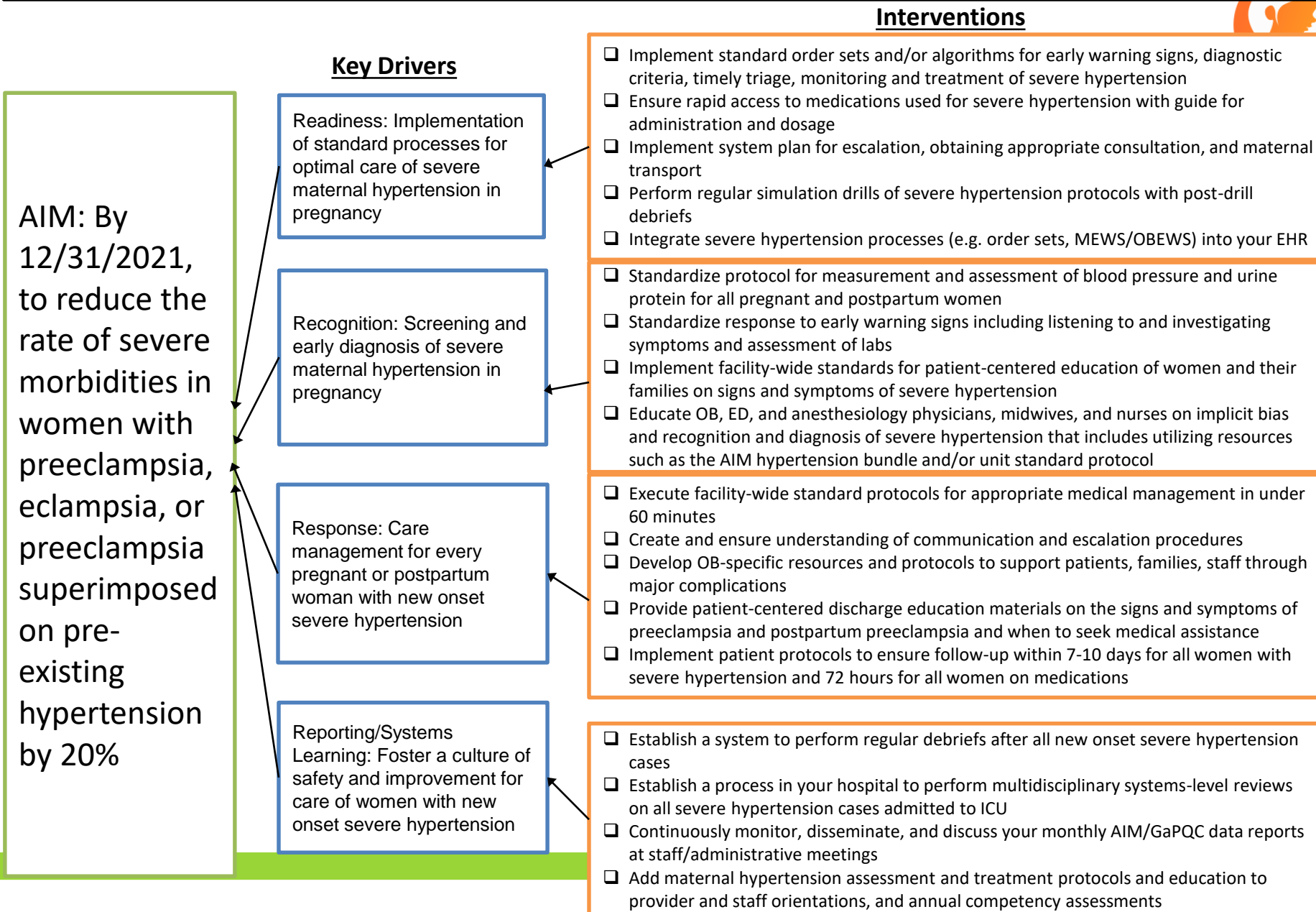


- Use the chat box to register your name, facility represented and all participating team members.
- To prevent distractions, please mute all phones:
  - Please DO NOT put phones on hold to avoid playing background music we are unable to control.
- Use the chat box for questions during the presentation but please hold comments until the end of the session.
- All collaborative members want to learn from your wins and challenges so please share!



# Key Driver Diagram: Maternal Hypertension Initiative

GOAL: To reduce preeclampsia maternal morbidity in Georgia hospitals



# AIM HTN Structure Measures

<b>S1: Patient, Family &amp; Staff Support</b>	Report Completion Date Has your hospital developed OB specific resources and protocols to support patients, family and staff through major OB complications?
<b>S2: Debriefs</b>	Report Completion Date Has your hospital established a system in your hospital to perform regular formal debriefs after cases with major complications?
<b>S3: Multidisciplinary Case Reviews</b>	Report Completion Date Has your hospital established a process to perform multidisciplinary systems-level reviews on all cases of severe maternal morbidity (including women admitted to the ICU, receiving $\geq 4$ units RBC transfusions, or diagnosed with a VTE)?
<b>S4: Unit Policy and Procedure</b>	Report Completion Date Does your hospital have a Severe HTN/Preeclampsia policy and procedure (reviewed and updated in the last 2-3 years) that provides a unit-standard approach to measuring blood pressure, treatment of Severe HTN/Preeclampsia, administration of Magnesium Sulfate, and treatment of Magnesium Sulfate overdose?
<b>S5: EHR Integration</b>	Report Completion Date Were some of the recommended Severe HTN/Preeclampsia bundle processes (i.e. order sets, tracking tools) integrated into your hospital's Electronic Health Record system?

# AIM HTN Process Measures

Process Measures	Description
<b>P1: Unit Drills</b>	<b>Drills</b> The number of OB drills performed on any maternal safety topic?
<b>P2: Provider Education</b>	<b>Provider Education</b> The number of OB MDs and CNMs completing an education program on severe HTN/Preeclampsia? The number who completed education on the severe HTN/Preeclampsia bundle elements and unit standard protocol?
<b>P3: Nursing Education</b>	<b>Nursing Education</b> The number of OB MDs and CNMs completing an education program on severe HTN/Preeclampsia? The number who completed education on the severe HTN/Preeclampsia bundle elements and unit standard protocol?
<b>P4: Treatment of Severe HTN</b>	<b>Treatment</b> The number of women with persistent new onset HTN that were treated within 1 hour with IV Labetalol, IV Hydralazine or PO Nifedipine?
<b>P5: Administration of MgSO4</b>	<b>MgSO4</b> The number of mothers with severe preeclampsia or preeclampsia with severe features that were treated with MgSO4?
<b>P6: Implicit Bias Training</b>	<b>Implicit Bias Training</b> The number of providers, nurses and OB staff who received training on implicit bias?

# GaPQC Hypertension Goals by 12/2021

Measure	Type	Goal
<p><b>Severe Maternal Morbidity</b>            No. of women with severe maternal morbidities (e.g. Acute renal failure, ARDS, Pulmonary Edema, Puerperal CNS Disorder such as Seizure, DIC, Ventilation, Abruption) / No. pregnant &amp; postpartum women with new onset severe range HTN</p>	Outcome	20% reduction
<p><b>Appropriate Medical Management in under 60 minutes</b>            No. of women treated at different time points (30,60,90, &gt;90 min) after elevated BP is confirmed / No. of women with new onset severe range HTN</p>	Process	100%
<p><b>Debriefs on all new onset severe range HTN* cases</b></p>	Process	100%
<p><b>Discharge education and follow-up</b> within 7-10 days for all women with severe range HTN, 72 hours with all women with severe range HTN on medications</p>	Process	100%



# Accurate Blood Pressure Measurement: Strategies for Success

Lauren Nunally  
Perinatal Quality Coordinator  
Georgia Obstetrical and Gynecological Society

# Blood Pressure Basics

BP measurement is one of the most important basic clinical assessments that we do, yet it is often one of the most inaccurately performed assessments, leading to delays in diagnosis and treatment






## Recognition

- Acute onset, severe hypertension that is accurately measured using standard technique and is persistent for 15 minutes or more is considered a *hypertensive emergency.*





# Steps for Obtaining Accurate Blood Pressure Measurements

Step 1: Prepare equipment	<ul style="list-style-type: none"> <li>a. Mercury sphygmomanometer is gold standard, can use validated equivalent automated equipment</li> <li>b. Check cuff for any defaults</li> <li>c. Obtain correct size cuff: width of bladder 40% of circumference and encircle 80% of arm (See Figure 1)</li> </ul>
Step 2: Prepare the patient: 	<ul style="list-style-type: none"> <li>a. Use a sitting or semi-reclining position with back supported and arm at heart level</li> <li>b. Patient to sit quietly for 5 minutes prior to measurement</li> <li>c. Bare upper arm of any restrictive clothing</li> <li>d. Patients feet should be flat, not dangling from examination table or bed, and her legs uncrossed</li> <li>e. Assess any recent (within previous 30 minutes) consumption of caffeine or nicotine. If blood pressures are at the level that requires treatment, consumption of nicotine or caffeine should not lead to delays in instituting appropriate anti-hypertensive therapies</li> </ul>
Step 3: Take measurement	<ul style="list-style-type: none"> <li>a. Support patients arm at heart level, seated in semi-fowlers position</li> <li>b. For auscultatory measurement: use first audible sound (Kortokoff I) as systolic pressure and use disappearance of sound (Kortokoff V) as diastolic pressure</li> <li>c. Read to the nearest 2 mm Hg</li> <li>d. Instruct the patient not to talk</li> <li>e. At least one additional readings should be taken within 15 minutes</li> <li>f. Use the highest reading</li> <li>g. If greater than or equal to 140/90, repeat within 15 minutes and if still elevated, further evaluation for preeclampsia is warranted.</li> </ul> <p><b>Do not reposition patient to either side to obtain a lower BP. This will give you a false reading.</b></p>
Step 4: Record Measurement	Document BP, patient position, and arm in which taken

Adapted from Peters RM (2008) High blood pressure in pregnancy. Nursing for Women's Health, Oct/Nov, pp. 410-422. Photo courtesy of and printed with permission by Kristi Gabel, RNC-OB, C-EFM, MSN, CNS, Sutter Roseville Medical Center 2013.

## Prepare Equipment

- Auscultatory (Manual)

- Mercury Sphygmomanometer

- Gold Standard

- Aneroid (clock face)

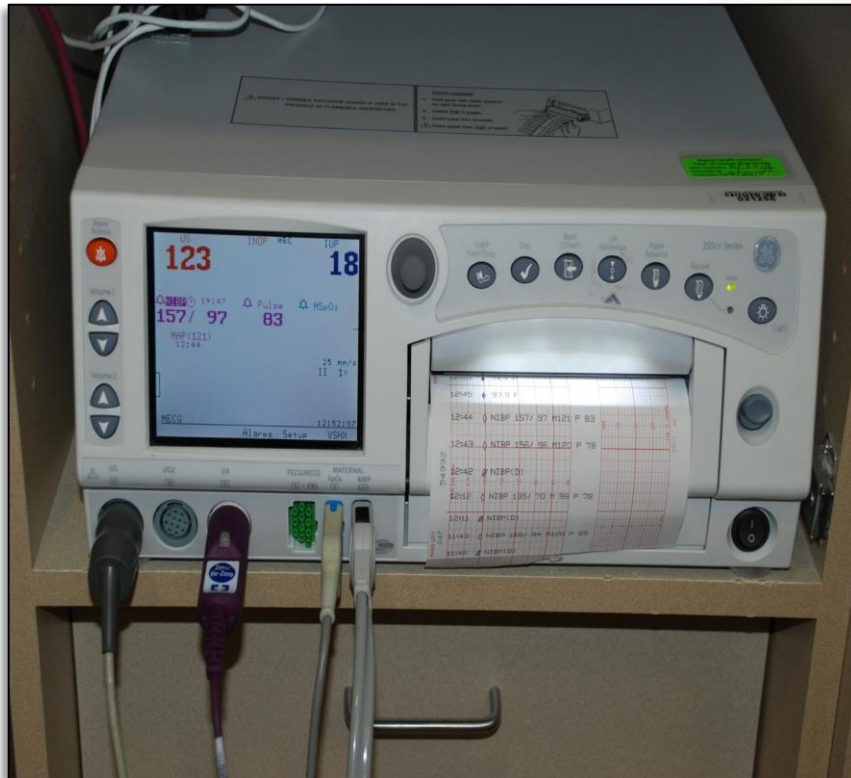
- Needs to be calibrated with a mercury sphygmomanometer every 6 months



- Oscillometric (automated devices)

- AHA recommends that these devices be validated with mercury sphygmomanometer readings with every patient

# Automated BP Measurements



## What variance is clinically acceptable?

- The International Standards Organization ISO 81060-2:2009 is used by manufacturers of noninvasive blood pressure devices to test against mercury sphygmomanometers.
- This standard calls for a difference of  $\pm 5$  mm Hg with a standard deviation of no more than 8 mm Hg.


# Appropriately Sized BP Cuff



# Cuff size and placement

- Correct cuff size (width of bladder 40% of circumference and encircle 80% of arm).
- Measure at the midpoint of the upper arm.
- Place cuff directly on skin with bladder over brachial artery and lower end of cuff 2-3 cm above the antecubital fossa

Arm Circumference (cm)	Cuff Size
22-26	"Small Adult": 12x22 cm
27-34	"Adult": 16x30 cm
35-44	"Large Adult": 16x36 cm
45-52	"Adult Thigh": 16x42 cm



# Consequences of Mis-Cuffing

<b>Overestimation of BP</b>	<b>Underestimation of BP</b>
Cuff too small (Systolic ↑ by as much as 15 mm Hg)	Cuff too large
Cuff not placed over brachial artery	Brachial artery above heart level
Cuff applied over clothing or too loose	
Arm positioned below heart level and not supported	
Deflation of cuff too slow	Deflation of cuff too fast



# Patient Preparation & Positioning

- Use a sitting or semi-reclining position with arm at heart level, legs uncrossed and feet flat, not dangling.
- The back should be supported.
- Patient should sit quietly for five minutes before BP is taken.
- Assess any recent (within 30 min) consumption of caffeine or nicotine.
- Background noise and talking can all affect BP accuracy.

# Consequences of Improper Positioning

- If back is unsupported: Diastolic may be higher by 6 mmHg (Pickering TG et al; Circulation 2005)
- If the legs are crossed: Systolic may be higher by 2-8 mmHg (Pickering TG et al; Circulation 2005)
- If the arm is allowed to hang down, unsupported: the BP will be elevated by 10-12 mm Hg (O'Brien E. J Hypertension, 2003)
- If patient is talking: BP may increase by 8-15 mm HG

# Take Blood Pressure Measurement

- Support patients arm at level
- For auscultatory measurement: use first audible sound (Kortokoff I) as systolic pressure and use disappearance of sound (Kortokoff V) as diastolic pressure
- Deflate cuff slowly, 2-3 mm Hg per heartbeat
- Read to the nearest 2 mm Hg



# Take Blood Pressure Measurement

- Retake in other arm, use the highest reading
- If  $\geq 140/90$ , repeat within 15 minutes
- Auto BP cuffs overestimate systolic by 4-6 mmHg and underestimate diastolic by up to 10 mmHg
- DO NOT reposition patient to either side to obtain a lower BP

# Record Measurement

- Document blood pressure
- Patient position
- Location BP taken (Arm, forearm, right or left)
- Cuff size

# Key Points

- Be Consistent
  - Same arm
  - Same position
  - Same cuff size
- Evaluate BP trends vs. isolated values
- If using automatic BP monitors, do not “auto-cycle”. Be present to confirm appropriate BP technique criteria have been met

# Arm Position Matters!

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- Upper arm = lower BP
- Lower arm = higher BP



Arm above the heart:  
Even lower BP



BP recording without a  
patient



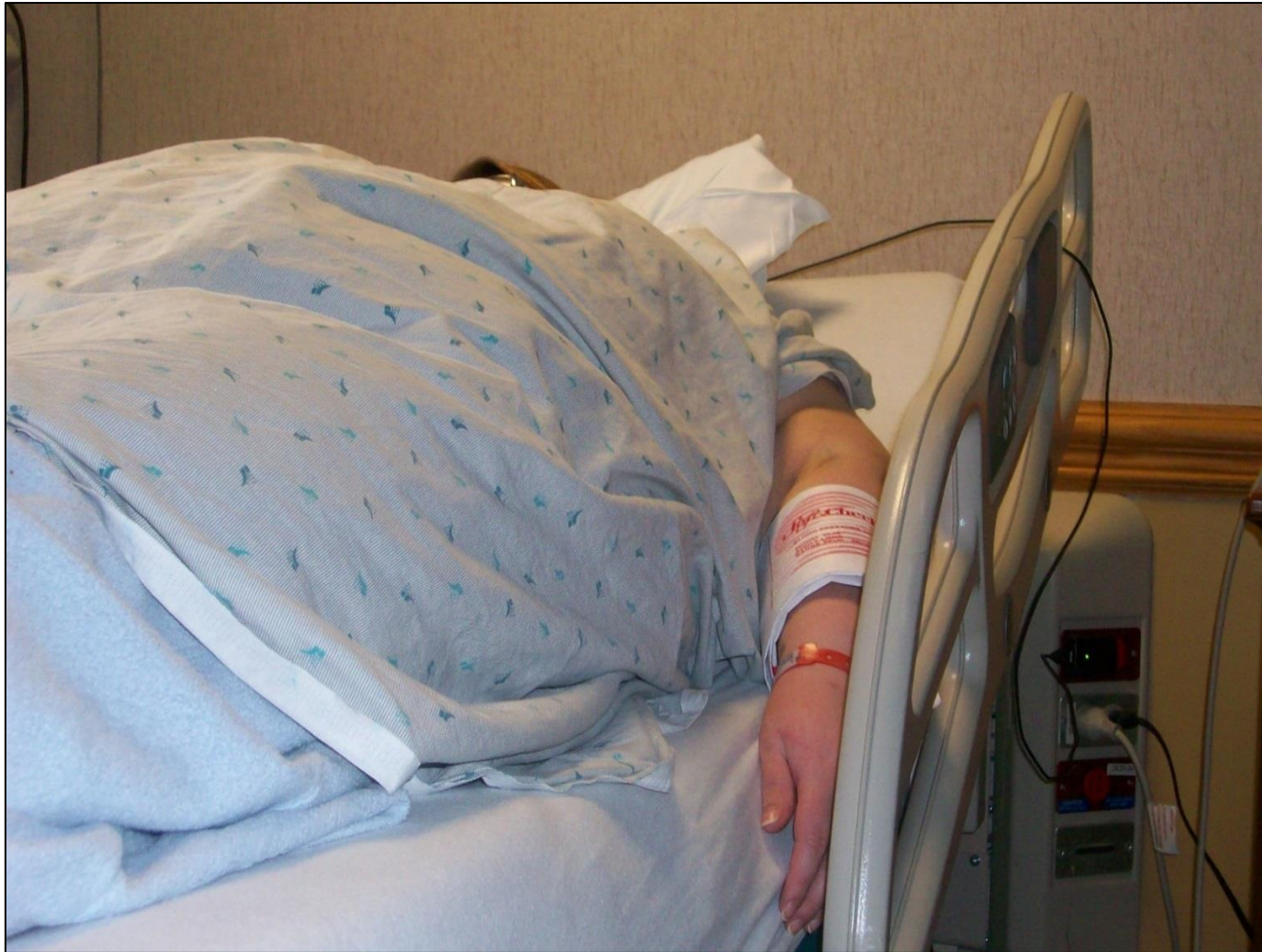


# Automated BP measurements irrespective of:

- Position
  - Maternal
  - Cuff
- Contractions
- Epidural
- Pushing



What if the BMI = 70 kg/m<sup>2</sup> ?



# Challenges in BP Measurement in Obese Women

- Size of arm
- Shape of arm
- Length of arm
- Cuff sizes and shapes



## For Example

- When the arm circumference near the shoulder is much  $>$  the arm circumference near the elbow=poor cuff fit=inaccurate BP
- A large arm circumference + a short humeral length = an inaccurate BP utilizing a cylindrical thigh cuff due to cuff extension past the elbow



# Mis-cuffing in an Obese Patient

- Using a cuff that is too small can overestimate blood pressure by up to 30 mm Hg whereas using a cuff that is too large can underestimate blood pressure by 10-30 mm Hg

- Palatini P, Parati G. Blood pressure measurement in very obese patients: a challenging problem. Journal of Hypertension 2011, 29 (3) 425-429.

## Rectangular cuffs may overestimate blood pressure in individuals with large conical arms

Paolo Palatini, Elisabetta Benetti, Claudio Fania, Giacomo Malipiero, and Francesca Saladini  
Journal of Hypertension 2012, 30:530-536

**Objectives:** Although the upper arm has the shape of a truncated cone, cylindrical cuffs and bladders are currently used for blood pressure (BP) measurement. The aim of this study was to ascertain whether cylindrical and tronco-conical cuffs provide different readings according to arm size and shape.

near the elbow, a cylindrical (rectangular) cuff will expand irregularly over the lower part of the upper arm, making it difficult to perform a reliable measurement. Cone-shaped arms can be frequently encountered in obese patients, and may be an important source of inaccurate BP measurement [1-3]. Recent anthropometric data document an increased prevalence of obesity among adults [4], resulting in a

**Conclusion:** In obese people, the upper arm may have a pronounced tronco-conical shape and cylindrical cuffs may overestimate BP. Troco-conical cuffs should be used for BP measurement in individuals with large arms

**Conclusion:** Use of cylindrical cuff in combination with an oscillometric automatic device, overestimated SBP in patient with arm circumference > 30 cm, but when a conical cuff was used, the device provided accurate readings



Hypertension Research (2010) 33, 1186-1191  
© 2010 The Japanese Society of Hypertension All rights reserved 0916-9636/10 \$32.00  
www.nature.com/hr

### ORIGINAL ARTICLE

## Accuracy of a single rigid conical cuff with standard-size bladder coupled to an automatic oscillometric device over a wide range of arm circumferences

Elisa Bonso, Francesca Saladini, Ada Zanier, Elisabetta Benetti, Francesca Dorigatti and Paolo Palatini

# AHA BP Measurement Recommendations

- If upper-arm circumference is more than 34 cm, large adult cuffs or thigh cuffs can be used.
- For upper-arm measurements greater than 50cm, the AHA recommends using a cuff on the forearm and feeling for the appearance of the radial pulse at the wrist to estimate systolic BP. The accuracy however is not as reliable.

# So What Can We Do to Improve BP Measurement Accuracy?





# Education Strategies

- Ensure proper training of staff:
  - Incorporate accurate BP measurements in annual “skills day”
  - Develop a facility specific module
  - NEJM BP Training:  
<http://www.nejm.org/doi/full/10.1056/NEJMvc0800157>
  - Poster Boards
  - Laminate “Steps to Obtain Accurate Blood Pressure” and post on units

# Accurate Blood pressure monitoring

**7 SIMPLE TIPS TO GET AN ACCURATE BLOOD PRESSURE READING**

- USE CORRECT CUFF SIZE**  
Cuff too small adds 2-10 mm Hg
- DON'T HAVE A CONVERSATION**  
Talking or active listening adds 10 mm Hg
- EMPTY BLADDER FIRST**  
Full bladder adds 10 mm Hg
- PUT CUFF ON BARE ARM**  
Cuff over clothing adds 5-50 mm Hg
- SUPPORT ARM AT HEART LEVEL**  
Unsupported arm adds 10 mm Hg
- SUPPORT BACK/FEET**  
Unsupported back and feet adds 6 mm Hg
- KEEP LEGS UNCROSSED**  
Crossed legs add 2-8 mm Hg

The common positioning errors can result in inaccurate blood pressure measurement. Figures shown are estimates of how improper positioning can potentially impact blood pressure readings.

Sources:

1. Pickering, et al. Recommendations for Blood Pressure Measurement in Humans and Experimental Animals Part 1: Blood Pressure Measurement in Humans. *Circulation*. 2005;111: 697-716.
2. Handler J. The importance of accurate blood pressure measurement. *The Permanente Journal*/Summer 2009/Volume 13 No. 3 51

This 7 simple tips to get an accurate blood pressure reading was adapted with permission of the American Medical Association and The Johns Hopkins University. The original copyrighted content can be found at <https://www.ama-assn.org/ama-jh-hopkins-blood-pressure-resources>.

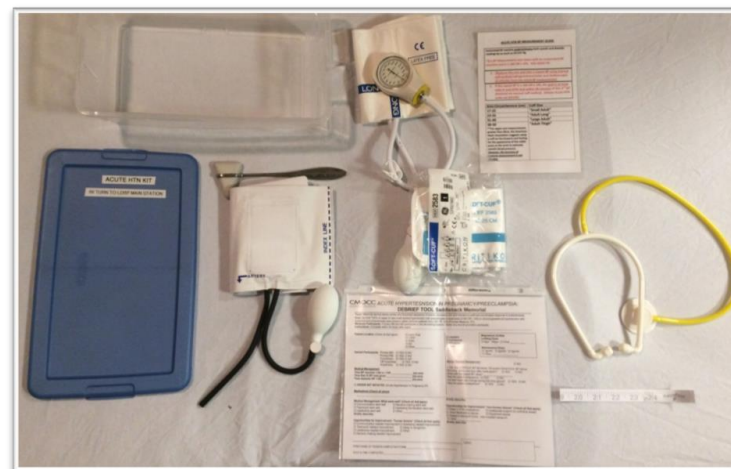
Updated December 2019  
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TARGET: **BP** |

# BP Kit



- Selection of cuff sizes
- Sphygmomanometer
- Measuring tape
- Stethoscope
- Laminated instructions for cuff measurements and key actions
- Optional: Reflex hammer, debrief tool



## Strategies for Implementation of Accurate BP Measurements

- Create your “Burning Platform”
- Inventory your equipment to and make sure that it is regularly inspected, calibrated and validated
- Ensure that all staff are trained in standardized BP measurement technique
- Update protocol to reflect current recommendations and guidelines

# QUESTIONS



# Case Identification

- 2 BP recordings 160/110 15 minutes apart in same position, seated or while in semi-fowler's position with appropriate size and placed cuff
- Identify patients with severe features of preeclampsia for Magnesium Sulfate administration
- Options for data collection
  - Electronic record reports
  - Manual tracking system for elevated blood pressures



# Reporting Requirements



Process Measures (P)	Description	Reporting time period (QUARTERLY): July 1, 2019 - September 30, 2019	COMMENTS (NOT REQUIRED)
P1: Unit Drills	<b>Report # of Drills and the drill topics</b>  <b>P1a:</b> In this quarter, how many OB drills (In Situ and/or Sim Lab) were performed on your unit for any maternal safety topic?  <b>P1b:</b> In this quarter, what topics were covered in the OB drills? (Note: add more numbers for additional topics covered, as needed)	<b>P1a:</b>  <b>P1b:</b> 1. 2. 3.	
	<b>P2a:</b> At the end of this quarter, how many <b>OB physicians and midwives</b> (numerator) have completed (within the last 2 years) an education program on <b>Severe HTN/ Preeclampsia</b> ? How many OB physicians and midwives does your hospital have (denominator)?  <b>P2b:</b> At the end of this quarter, how many <b>OB physicians and midwives</b> (numerator) have completed (within the last 2 years) an education program on the <b>Severe HTN/ Preeclampsia bundle elements and the unit-standard protocol</b> ? How many OB physicians and midwives does your hospital have (denominator)?	<b>P2a:</b> Numerator: Denominator:  <b>P2b:</b> Numerator: Denominator:	
P3: Nursing Education	<b>P3a:</b> At the end of this quarter, how many <b>OB nurses</b> (numerator) have completed (within the last 2 years) an education program on <b>Severe HTN/ Preeclampsia</b> ? How many OB nurses does your hospital have (denominator)?  <b>P3b:</b> At the end of this quarter, how many <b>OB nurses</b> (numerator) have completed (within the last 2 years) an education program on the <b>Severe HTN/ Preeclampsia bundle elements and the unit-standard protocol</b> ? How many OB nurses does your hospital have (denominator)?	<b>P3a:</b> Numerator: Denominator:  <b>P3b:</b> Numerator: Denominator:	
	<b>P4a:</b> In this quarter, how many mothers did you have this quarter with a persistent (twice within 15 minutes) new-onset Severe HTN (Systolic: $\geq 160$ or Diastolic: $\geq 110$ ), excludes women with an exacerbation of chronic HTN?  <b>P4b:</b> Among the mothers listed above (P4a), how many were treated within 1 hour with IV Labetalol, IV Hydralazine, or PO Nifedipine (numerator)?	<b>P4a:</b>  <b>P4b:</b>	
P5	<b>P5a:</b> In this quarter, how many mothers did you have with severe preeclampsia or preeclampsia with severe features that were treated with magnesium sulfate appropriately (numerator)? How many mothers did you have with severe preeclampsia or preeclampsia with severe features (denominator)?	<b>P5:</b> Numerator: Denominator:	
P6	<b>P6:</b> In this quarter, how many OB providers, nurses and unit staff (numerator) have completed (within the last 2 years) an education program on implicit bias? How many OB providers, nurses and unit staff does your hospital have (denominator)?	<b>P6:</b> Numerator: Denominator:	

# Reporting Requirements



Structure Measures (S)	Description		Report only ONCE	COMMENTS (NOT REQUIRED)
<b>S1: Patient, Family &amp; Staff Support</b>	<b>S1:</b> Has your hospital developed OB specific resources and protocols to support patients, family and staff through major OB complications?	<b>S1:</b>	<b>Date of Completion:</b>	
<b>S2: Debriefs</b>	<b>S2:</b> Has your hospital established a system in your hospital to perform regular formal debriefs after cases with major complications?	<b>S2:</b>	<b>Date of Completion:</b>	
<b>S3: Multidisciplinary Case Reviews</b>	<b>S3:</b> Has your hospital established a process to perform multidisciplinary systems-level reviews on all cases of severe maternal morbidity (including women admitted to the ICU, receiving ≥4 units RBC transfusions, or diagnosed with a VTE)?	<b>S3:</b>	<b>Date of Completion:</b>	
<b>S5: Unit Policy and Procedure</b>	<b>S5:</b> Does your hospital have a Severe HTN/ Preeclampsia policy and procedure (reviewed and updated in the last 2-3 years) that provides a unit-standard approach to measuring blood pressure, treatment of Severe HTN/ Preeclampsia, administration of Magnesium Sulfate, and treatment of Magnesium Sulfate overdose?	<b>S5:</b>	<b>Date of Completion:</b>	
<b>S6: EHR Integration</b>	<b>S6:</b> Were some of the recommended Severe HTN/ Preeclampsia bundle processes (i.e. order sets, tracking tools) integrated into your hospital's Electronic Health Record system?	<b>S6:</b>	<b>Date of Completion:</b>	







## SEVERE HYPERTENSION DATA FORM: CHART ABSTRACT

Header -Section 2-

ice team review and document sequence of events, successes with and barriers to swift and coordinated psia with severe features.

**Goal:** Reduce time to treatment (< 60 minutes) for new onset severe hypertension ( $\geq 160$  systolic OR  $> 110$  diastolic) with preeclampsia or eclampsia or chronic/gestational hypertension with superimposed preeclampsia (include patients from triage, L&D, Antepartum, PP, ED) in order to reduce preeclampsia morbidity in Illinois.

**Instructions:** Complete within 24 hrs. ~~after~~ all cases of new onset severe hypertension ( $> 160$  systolic or  $> 110$  diastolic) event in pregnancy up to 6 wks postpartum. Debrief should include primary RN and primary MD to identify opportunities for improvement in identification and time to treatment of HTN.

GA at Delivery (weeks & days): \_\_\_\_\_

### OB COMPLICATIONS (check all that apply)

#### Adverse Maternal Outcome:

Date: \_\_\_\_\_

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> OB Hemorrhage with transfusion of $\geq 4$ units of blood products | <input type="checkbox"/> Pulmonary Edema | <input type="checkbox"/> Oliguria            |
| <input type="checkbox"/> Intracranial Hemorrhage or Ischemic event                          | <input type="checkbox"/> HELLP Syndrome  | <input type="checkbox"/> Renal failure       |
| <input type="checkbox"/> ICU admission  | <input type="checkbox"/> DIC             | <input type="checkbox"/> Placental Abruption |
| <input type="checkbox"/> Eclampsia  | <input type="checkbox"/> Ventilation     |  |
| <input type="checkbox"/> Liver failure  | <input type="checkbox"/> None            |  |
| <input type="checkbox"/> Other _____  |  |  |

#### Adverse Neonatal Outcome:

Date: \_\_\_\_\_

- |   |                               |                                      |                               |
|---|-------------------------------|--------------------------------------|-------------------------------|
| <input type="checkbox"/> NICU admission | <input type="checkbox"/> IUFD | <input type="checkbox"/> Other _____ | <input type="checkbox"/> None |
|---|-------------------------------|--------------------------------------|-------------------------------|

#### Maternal Race/Ethnicity (check all that apply):

- |                                |                                |                                   |                                |                                |
|--------------------------------|--------------------------------|-----------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> White | <input type="checkbox"/> Black | <input type="checkbox"/> Hispanic | <input type="checkbox"/> Asian | <input type="checkbox"/> Other |
|--------------------------------|--------------------------------|-----------------------------------|--------------------------------|--------------------------------|

#### Maternal Transport:

Transport In?  YES  NO Date: \_\_\_\_\_

Transport Out?  YES  NO Date: \_\_\_\_\_

### PROCESS MEASURE (P2) Discharge Management

#### A. Discharge Education: Education materials about preeclampsia given?

- YES  NO

#### B. Discharge Management: Follow-up appointment scheduled within 10 days

(for all women with any severe range hypertension/preeclampsia)

- YES  NO

Was patient discharged on meds?

- YES  NO

**If YES:** Was follow up appointment scheduled in <72 hours?

- YES  NO

COMMENTS about Medical Management, Monitoring, Discharge:



# Education Plan for HTN Teams



- November 5, 2019: Educating Patients  
Rebecca Britt, Preeclampsia Foundation
- December 3, 2019: Implementing Drills and Debriefs
- January 7, 2020: Complications, Special Circumstances (HELLP, PRES, Atypical Preeclampsia)



# Additional Resources



- [www.georgiapcq.org](http://www.georgiapcq.org)
  - All webinars are archived under “more” and “events-Maternal”
- The Alliance for Innovation in Maternal Health (AIM)
  - E-modules [www.safehealthcareforeverywoman.org/aim-emodules/](http://www.safehealthcareforeverywoman.org/aim-emodules/)
  - Implementing QI Projects [https://safehealthcareforeverywoman.org/wp-content/uploads/2017/12/Implementing-Quality-Improvement-Projects-Toolkit\\_V1-May-2016.pdf](https://safehealthcareforeverywoman.org/wp-content/uploads/2017/12/Implementing-Quality-Improvement-Projects-Toolkit_V1-May-2016.pdf)
  - AIM-In-Situ OB-Drill Resource List
- National PQC Webinar Series
- ILPQC <http://ilpqc.org/>
- CPQCC <https://www.cpqcc.org/>



Questions?

