Measuring Blood Pressure Accurately

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• The contents this training reference manual are solely the responsibility of the authors and do not necessarily represent the official views of CDC.
About CHCANYS

• CHCANYS, a 37 year-old organization, is New York’s Primary Care Association and the statewide association of community health centers
• CHCANYS works to ensure that all New Yorkers and particularly those living in underserved communities, have access to high quality community based health care services
• CHCANYS’ mission is focused on retaining and expanding primary care capacity; investing in primary care health information technology (HIT); implementing primary care home standards; reforming the primary care payment system; and developing the primary care workforce
About Hudson River HealthCare, Inc.

- Hudson River HealthCare, Inc. is a network of 16 Community Health Centers in 6 counties located in the Lower Hudson Valley and Long Island in New York State.
- Hudson River HealthCare, Inc. is a Federally Qualified Health Center (FQHC) and is Joint Commission accredited for primary care and behavioral health.
- Their mission is to increase access to comprehensive primary and preventive health care and to improve the health status of our community, especially for the underserved and vulnerable.
- Their practice is based on Care Model (formerly Chronic Care Model).
Objectives

• State common errors noted in performing blood pressure (BP) measurements
• List factors or techniques required for accurate BP measurement
• Discuss organizational strategy that can be implemented for improving BP accuracy
Concern Over Blood Pressure

- BP readings aren’t always trusted
  - Staff trained differently
  - Similar readings at last visit
  - Wrong size cuff connected
  - Use of defective cuffs
- Inaccurate BP measurement creates potential for harm
  - Under treatment
    - Cardiovascular co-morbidities
    - Advancing kidney disease
  - Overtreatment
    - Falls
## Blood Pressure Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>and &lt;80</td>
</tr>
<tr>
<td>Pre-hypertension</td>
<td>120-139</td>
<td>or 80-89</td>
</tr>
<tr>
<td><strong>High Blood Pressure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1 Hypertension</td>
<td>140-159</td>
<td>or 90-99</td>
</tr>
<tr>
<td>Stage 2 Hypertension</td>
<td>160 or &lt;</td>
<td>or 100 or &gt;</td>
</tr>
</tbody>
</table>
Weaknesses in Blood Pressure Procedures

• Errors happen due to a variety factors
• Factors ultimately affect BP readings because they are relational and interdependent
  – Most fallible factor is the observer
• Observer accuracy taken for granted
Weaknesses in Blood Pressure Procedures (cont’d)

• Assumption that all staff has the same level of skill sets and accuracy
  – Creates the lack of continuity from observer to observer

• Role of the equipment underestimated in process
  • BP cuff
  • Sphygmomanometer
  • Stethoscope
Strategies to Assure Accurate Blood Pressure Measurements

• Decision Support
  – Well developed organizational policies and procedures with adherence to policy
  – Organization-wide implementation
  – Administration support
    • Training costs
      – Staff educators’ time
      – Proper equipment
    • Trainings
      – Address gaps in BP control
Strategies to Assure Accurate Blood Pressure Measurements (cont’d)

- Trainings emphasizing accurate BP measurement skills
  - Orientation process
- Reinforcement of training for employees
  - Mandatory and yearly
  - Updating trainings, as needed
- Provider awareness
Staff Training and Competency

• Orientation – starting the process
• Competency checklist
  – Correspond with theory and practice
• Tutorial
  – www.abdn.ac.uk/medical/bhs/index
  – Found to be extremely helpful
  – Key to listening
  – Same standard for all
Implementing the Training

Step 1: Equipment

• Emphasize the role of the equipment as well as staff members’ knowledge
  – BP cuff
  – Sphygmomanometer
  – Stethoscopes
  • Double stethoscopes for evaluation by trainers/managers
Sphygmomanometer

- Defective sphygmomanometers
  - Encourage staff to report defective equipment to Nurse Managers
- Aneroid or digital sphygmomanometers
- Calibration *must* occur per manufacturer’s recommendations
  - *Regardless of the type*
  - Every 6 months
Cuff Size

• Purchase BP cuffs for different sized arms
  – Easy to determine incorrect sizing
  – Infection control issues
    • Easy to wipe clean
• Have available in all (most) exam rooms
## Acceptable Bladder Dimension for Arms of Different Sizes

<table>
<thead>
<tr>
<th>Cuff</th>
<th>Bladder Width (cm)</th>
<th>Bladder Length (cm)</th>
<th>Arm Circumference Range at Midpoint (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>3</td>
<td>6</td>
<td>&lt;6</td>
</tr>
<tr>
<td>Infant</td>
<td>5</td>
<td>15</td>
<td>6-15+</td>
</tr>
<tr>
<td>Child</td>
<td>8</td>
<td>21</td>
<td>16-21+</td>
</tr>
<tr>
<td>Small Adult</td>
<td>10</td>
<td>24</td>
<td>22-26</td>
</tr>
<tr>
<td>Adult</td>
<td>13</td>
<td>30</td>
<td>27-34</td>
</tr>
<tr>
<td>Large Adult</td>
<td>16</td>
<td>38</td>
<td>35-44</td>
</tr>
<tr>
<td>Adult Thigh</td>
<td>20</td>
<td>42</td>
<td>45-52</td>
</tr>
</tbody>
</table>
Implementing the Training (cont’d)

Step 2: The Staff

• Create a secure environment for learning
  – Account for privacy and confidentiality
• Train observers
  – Implement staff competency
• Understand norms
• Only an observer who is aware of the factors affecting BP should measure BP
  – How else can they correct errors?
Patient Preparation

- Cold exposure: increase 11/8 mmHg
- Full bladder/bowel: increase 27/22 mmHg
- Physical activity: decrease 5-11/4-8 mmHg
- Smoking: increase 10/8 mmHg
- Stimulants: increase 8-10/7-8 mmHg
  - Alcohol, smoking and caffeine
- Talking: increase 17/13 mmHg
Patient Position

• Waiting time before BP is measured
  – ~5 minutes

• Standardization of proper positioning
  – Room design
  – Chairs
    • Back supported, feet support and uncrossed

• If not in the chair…
  – Waiting time before BP is measured
  – About 5 minutes
Limb Selection

• Organizational policy
  – Both arms at first visit unless contraindicated
  – Mastectomy, AV fistula or shunt, disease or injury
• Right or left arm preference or limitations
• Arm positioning
  – Supported, heart level, palm up
• Joint Commission states 2 readings 2 minutes apart
Cuff and Stethoscope Placement

• Placement of Cuff
  – Center of bladder ~1 inch above brachial artery

• Clothing
  – Removed or not constricting
  – “Bare arms” preferred

• Placement of stethoscope over brachial artery

• Deflate at 2 mmHg/second
What do you notice in this picture?
How High Do You Pump the Blood Pressure Cuff?

• Discourage universal pumping to 180 or 200 mmHg to start off…

• Two methodologies accepted
  1. Review last BP and add 30 mmHg
  2. Determine palpatory systolic pressure
     • Encourage learning palpatory systolic in class
     • Palpate brachial; pump 30 mmHg above when no longer feel pulse, release valve @ 2-3 mmHg/sec, record when feel pulse again = palpatory systolic
Oops!!! I didn’t hear it!

- Listening skills need reinforcement
- Do not pump up in middle of reading
  - Deflate and start over at least 30 seconds
  - Preferably 1-2 minutes later
Observer/Staff Issues

• Prejudice
  – Not wanting high reading for patients

• Digit preference
  – 0 or 5

• Observer haste
  – Interruptions

• Which Korotkoff sound?
  – Hudson River HealthCare, Inc. uses 5th
Observer/Staff Issues (cont’d)

• Hearing
  – Tutorial extremely helpful to teach this
  – BP measurement relies on accurate transmission of the Korotkoff sound that can vary from/with different stethoscopes
    • Stethoscopes purchased
    • Bell or diaphragm
  – Staff ability to hear
    • Audiology referral
Staff Training and Competency

• Not just teaching and training…but developing and educating

• Multiple methodologies to increase knowledge
  – Theory
  – Tutorial session
  – Training arm for simulated BP measurements
  – Return demonstrations
    • Dual stethoscope
Staff Training and Competency (cont’d)

• Competency
  – Objective standards of practice
  – Met or not met

• Remediation

• Job performance
  – Documentation
  – HR policy
References


