Strategies to Prevent Acute Cardiovascular Events: Focus on Hypertension Control

Hilary K. Wall, MPH
Senior Scientist/Million Hearts Science Lead
Centers for Disease Control and Prevention

Right Care Initiative Webinar
August 9, 2021
Overview

• Burden of CVD in US
• Million Hearts initiative
• Burden of HTN and strategies to address it
• Finding patients with potentially undiagnosed hypertension

The opinions expressed by authors contributing to this project do not necessarily reflect the opinions of the US Department of Health and Human Services, the Public Health Service, the Centers for Disease Control and Prevention, or the authors’ affiliated institutions. Use of trade names is for identification only and does not imply endorsement by any of the groups named below.
Heart Disease and Stroke Burden

- More than **800,000** deaths per year from cardiovascular disease (CVD)\(^1\)
- More than **1.5 million** people in the U.S. suffer from heart attacks and strokes per year\(^1\)
- CVD is the greatest contributor to racial disparities in life expectancy\(^2\)
- CVD costs the U.S. **hundreds of billions** of dollars per year\(^1\)

10 Leading Causes of Death by Sex, 2018

**Males**
- Heart disease: 24.3%
- Cancer: 21.6%
- Unintentional injuries: 7.4%
- Stroke: 5.2%
- Chronic liver disease and cirrhosis: 4.3%
- Diabetes: 3.3%
- Suicide: 2.6%
- Influenza and pneumonia: 2.0%
- Other: 24.9%

**Females**
- Heart disease: 21.8%
- Cancer: 20.5%
- Unintentional injuries: 6.1%
- Stroke: 6.2%
- CLRD: 6.1%
- Alzheimer disease: 5.2%
- Diabetes: 4.3%
- Septicemia: 2.7%
- Kidney disease: 2.2%
- Influenza and pneumonia: 1.8%

NOTES: CLRD is Chronic lower respiratory diseases. Values show percentage of total deaths. Totals may not add to 100 due to rounding.

2018 Causes of Death, Aged 65+

3 out of 10 deaths due to heart disease and stroke

Ages 65 and over

~4 out of 10 deaths due to heart disease and stroke

Ages 85 and over

2018 Causes of Death, Aged 25-64

~1 out of 10 deaths due to heart disease and stroke

~2.5 out of 10 deaths due to heart disease and stroke

Heart Disease and Stroke Mortality Trends 1950-2015

Racial/Ethnic Disparities Persist

Figure 3. Trends in race-sex–stratified age-adjusted mortality rates per 100,000 population attributable to total cardiovascular disease and by leading subtypes, coronary heart disease and cerebrovascular disease, as underlying causes of death in the United States, 1999 to 2018. Declines in total cardiovascular disease, coronary heart disease, and cerebrovascular disease mortality rates between 1999 and 2018. CVD indicates cardiovascular disease, and NH, non-Hispanic.

Greatest Disparity in Hypertension-related Mortality

Supplemental Figure 1. Trends in race-sex stratified age-adjusted mortality rates per 100,000 population attributable to cardiovascular deaths related to heart failure, hypertension, and atrial fibrillation as underlying or contributing causes of death in the United States, 1999-2018.
Rural/Urban Disparities in CVD Mortality


Figure 4. Trends in age-adjusted mortality rates per 100,000 population from total cardiovascular disease for both sexes stratified by urbanization status in the United States, 1999 to 2018. Declines in cardiovascular mortality rate per 100,000 stratified by county-level urbanization between 1999 and 2018.
Alarming Mortality Rate Changes

County-level percent change in heart disease death rates, United States, Ages 35-64, 2010-2017

Percent change in rate (% of counties)
- Decrease of 10.0 or greater (6.2%)
- Decrease of 2.0 to 10.1 (19.0%)
- Decrease of 0.0 to 2.1 (6.3%)
- Increase of 0.1 to 2.0 (7.4%)
- Increase of 2.1 to 10.0 (27.1%)
- Increase of 10.1 or greater (34.1%)

Missed Opportunities

9.0 M not taking aspirin as recommended
40.1 M with uncontrolled HBP (>140/90 mmHg)
39.1 M not using statins when indicated
54.1 M combustible tobacco users
70.9 M who are physically inactive

213.1 M missed opportunities

55% of these opportunities are in adults aged 35–64 years

Million Hearts® 2022

• **Aim:** Prevent 1 million—or more—heart attacks and strokes in the next 5 years

• National initiative co-led by:
  - Centers for Disease Control and Prevention (CDC)
  - Centers for Medicare & Medicaid Services (CMS)

  ▪ Partners across federal and state agencies and private organizations
**Million Hearts® 2022 Priorities**

**Keeping People Healthy**
- Reduce Sodium Intake
- Decrease Tobacco Use
- Decrease Physical Inactivity

**Optimizing Care**
- Improve ABCS* 80%
- Increase Use of Cardiac Rehab
- Engage Patients in Heart-healthy Behaviors

**Improving Outcomes for Priority Populations**
- Blacks/African Americans with hypertension
- 35- to 64-year-olds
- People who have had a heart attack or stroke
- People with mental illness or substance use disorders who use tobacco

*Aspirin when appropriate, Blood pressure control, Cholesterol management, Smoking cessation
Using ≥130/80 mmHg:

- ~44% prevalence among US adults → ~108M adults
  - 56% among adults 45-64
  - 78% among adults 65+
  - 53% among non-Hispanic blacks

Of the 87M recommended to be on medications and LMIs:

- ~71% are uncontrolled → ~61M adults
Prevalence of HTN (>130/80mmHg) by Sex and Age, U.S., 2017-2018

Prevalence of HTN (>130/80mmHg) by Sex and Race/Ethnicity, U.S., 2017-2018

Hypertensive CVD mortality by age group and race/ethnicity, United States, 2000-2019

CVD deaths with hypertension also listed on the death certificate
County-level Changes in Hypertensive CVD Mortality, Ages 35-64, by race/ethnicity, United States, 2010-2019

Percent change in death rate, 2010-2019

Black populations

White populations

Total percent change

>20% decrease
5.0 to 20.0% decrease
0 to 4.9% decrease
0.1 to 4.9% increase
5.0 to 20.0% increase
>20% increase
Suppressed

Slide courtesy of Adam Vaughan, PhD, Centers for Disease Control and Prevention
Million Hearts Hypertension Control Champions

- Annual recognition program – [https://millionhearts.hhs.gov/partners-progress/champions/list.html](https://millionhearts.hhs.gov/partners-progress/champions/list.html)

- ≥ 80% on BP control (2018 – present)
  - ≥ 70% on BP control (2012-2017)

- 118 champions from 2012-2019
  - 37 states and D.C.
  - Treating 5.1M US adults with HTN aged 18-85

Majority of Champions report using treatment protocols, teams, registries, dashboards, e-prescribing, CDS, testing/treatment reminders, and/or free BP check clinics

California Hypertension Control Champions

- Kaiser Permanente Northern California (2013)
- Family Health Centers of San Diego* (2014)
- Kaiser Permanente Southern California (2014)
- Petaluma Health Center, Petaluma* (2015)
- LifeLong Medical Care Downtown Oakland Health Center, Berkeley (2017)
- Sharp Rees-Stealy Medical Group, San Diego (2017)
- Nhan Hoa Comprehensive Health Care Clinic, Garden Grove* (2018)

* Denotes a health care organization that is or includes a health center funded by HRSA
Table 1. Key Foundations (continued)

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Change Idea</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement a Policy or Process to Address BP for Every Patient with HTN at Every Visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage risk factors for HTN (eg, blood pressure, lipids, smoking, obesity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate all patients with HTN to diagnose and treat appropriately</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Equipping Care Teams

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Change Idea</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt a clinician/staff training policy to train and retain staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide guidance on measuring BP accurately</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Cheshire Medical Center/Dartmouth-Hitchcock — Obtaining Accurate Blood Pressure Measurements in the Ambulatory Setting: How Do You Size a Blood Pressure Cuff (pp. 14-19)
- Target BP — Blood Pressure Measurement: Measure Accurately
- Target BP — 7 Simple Tips to Get an Accurate Blood Pressure Reading
- AHA — The Importance of Measuring Blood Pressure Accurately Webinar (video) [CE credits]
- AMGF — Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control Plan 1: Tool 3: Blood Pressure Champion and CVD Education and Auditing Process for New Staff, HealthPartners
- AMGF — Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control Plan 1: Tool 7: How to Take Blood Pressure Properly [video]
- How to Take Blood Pressure Properly: The Wrong Way, Cornerstone Health Care (now Wake Forest Baptist Health) (video)
- How to Take Blood Pressure Properly: The Right Way, Cornerstone Health Care (now Wake Forest Baptist Health) (video)
- AMGF — Measure Up Pressure Down Provider Toolkit to Improve Hypertension Control Plan 1: Tool 14: Accurate Blood Pressure Measurement, Premier Medical Associates (video)


Access the Change Package at: https://millionhearts.hhs.gov/tools-protocols/action-guides/htn-change-package/index.html
Focus Areas

- **Key Foundations**
  - Office redesign

- **Equipping Care Teams**
  - Establishing SMBP Programs

- **Population Health Management**
  - IDing potentially undx HTN or CKD
  - Using data to drive improvement

- **Individual Patient Supports**
  - Patient supports for lifestyle modification, SMBP
  - Using order sets

- **Treatment protocols**
- **Accurate BP techniques**
- **Using data to drive improvement**

- **SMBP Programs**
- **IDing potentially undx HTN or CKD**
- **Patient supports for lifestyle modification, SMBP**
Change Package Format

- **Change Concept**: General notions that are useful in the development of more specific ideas for changes that lead to improvement.

- **Change Idea**: Actionable, specific ideas for changing a process.

- **Tools & Resources**: Can be adapted by or adopted in a health care setting.
Use Practice Data to Drive Improvement
Use Practice Data to Drive Improvement

- Determine HTN control and related process metrics for the practice
- Regularly provide a dashboard with BP goals, metrics, and performance
Use Practice Data to Drive Improvement

**Change Concept**

Determine HTN control and related process metrics for the practice

Regularly provide a dashboard with BP goals, metrics, and performance

**Tools & Resources**
Self-Measured Blood Pressure Monitoring (SMBP)

- Self-Measured Blood Pressure monitoring (SMBP) – the measurement of BP by an individual outside of a clinic setting including at home – with a validated automatic upper arm device
- AKA “home blood pressure monitoring”
- SMBP is NOT – BP taken at a pharmacy kiosk, or by a smart phone device, wearable sensor, cuffless BP monitor, or finger cuff
- Evidence-based strategy for lowering BP when combined with clinical support
SMBP with additional clinical support:

- Supported by numerous meta-analyses and systematic reviews
- Included in Task Force Recommendations
  - USPSTF – HTN screening
  - CPSTF – HTN management; cost effective
- Highlighted in the US Surgeon General’s 2020 Call to Action to Control Hypertension
- Included in numerous domestic and international clinical guidelines
  - 2017 ACC/AHA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
Clinician guidance on:
- Selecting a device
- Proper cuff sizing
- Preparation and positioning
- Clinical protocol with frequency and duration
- Method for returning patient-generated values

Source:

Adapted from:
Table 2. Equipping Care Teams (continued)

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Change Idea</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a home BP monitor loaner program</td>
<td>• Target: BP — SMBP Loaner Device Agreement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Open Door Family Medical Centers — Blood Pressure Monitor Loan Agreement (English and Spanish)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Target: BP — Inventory Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Target: BP — SMBP Patient Training Checklist — Loaner Device</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AMA — Cleaning and disinfection procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Kaiser Permanente — PHASE SMBP Community of Practice: SMBP Loaner Pilot Model Design (pp. 15–22)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Individual Patient Supports (continued)

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Change Idea</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Patients in HTN Self-Management During Their Routine Daily Activities (i.e., outside of the clinical encounter)</td>
<td>• Target: BP — SMBP Infographic: How to measure your blood pressure at home</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Target: BP — 7-Day Recording Sheet SMBP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Washington State Department of Health — How to Check Your Blood Pressure — English</td>
<td></td>
</tr>
<tr>
<td></td>
<td>— Spanish: Chinese, Russian, and Vietnamese also available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NYC DOHMH — Blood Pressure Tracking Card &amp; Action Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• New West Physicians — Home BP EMR Entry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Target: BP — SMBP Using a Wrist Cuff to Measure Blood Pressure (Not recommended for most patients)</td>
<td></td>
</tr>
</tbody>
</table>
SMBP Resources

  - An Economic Case for Self-Measured Blood Pressure (SMBP) Monitoring (hhs.gov)
Quarterly webinar to facilitate the exchange of SMBP best practices, tools, and resources

Registration instructions:
2. Select the meeting(s) you want to attend in 2021 and click ‘Register’
3. Complete the registration questions
4. Look for the calendar invite(s) from WebEx (be sure to check your spam folder!!)

Past SMBP Forum recordings/materials can be accessed at
[https://confluence.nachc.org/display/SMBP/Quarterly+Meeting+Materials](https://confluence.nachc.org/display/SMBP/Quarterly+Meeting+Materials)

Questions can be sent to [MillionHeartsSMBP@nachc.org](mailto:MillionHeartsSMBP@nachc.org)
Finding Potentially Undiagnosed Hypertensives

“Hiding in Plain Sight” (HIPS)
Hypertension Prevalence

≥140/90 mmHg
• 31% prevalence among US adults
  ▪ 40% among adults 45-64
  ▪ 67% among adults 65+
  ▪ 39% among non-Hispanic blacks
• ~78M adults have HTN

≥130/80 mmHg
• 44% prevalence among US adults
  ▪ 56% among adults 45-64
  ▪ 78% among adults 65+
  ▪ 53% among non-Hispanic blacks
• ~108M adults have HTN

Uncontrolled HTN (≥ 140/90)

34.6M US Adults with uncontrolled HTN

- 16.1M Aware and treated
- 11.5M Aware and untreated
- 7.0M "Unaware"

Source: 2013-2014 National Health and Nutrition Examination Survey
80.9% have health insurance
82.7% report having a usual source of care
63.3% have received care two or more times in the past year

Source: 2011-2014 National Health and Nutrition Examination Survey
Controlling High Blood Pressure Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure Definition</th>
<th>ICD-10-CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NQF 0018 CMS165</td>
<td>The percentage of patients 18-85 years of age who had a diagnosis of HTN and whose BP was adequately controlled (&lt;140/90) during the measurement year.</td>
<td>I10 (Essential HTN)</td>
</tr>
</tbody>
</table>

NQF – National Quality Forum; CMS165 – numbering convention for the CMS e-specified measures
Assessing Hypertension Control

100 patients with diagnosed hypertension

70 patients with blood pressure < 140/90

\[(70/100) \times 100 = 70\% \text{ control}\]
150 patients with hypertension?

100 patients with diagnosed hypertension

50 patients with abnormal BP values

70 patients with blood pressure < 140/90

\[(70/150) \times 100 = 47\% \text{ control}\]
4-Step Process

1. **Search EHR data for patients that meet clinical criteria**
2. **Implement a plan for addressing the identified population**
3. **Establish clinical criteria for potential undiagnosed HTN**
4. **Compare to local, state, or national prevalence data**

**FINDING PATIENTS WITH UNDIAGNOSED HTN**

Are patients with hypertension being missed?

• Calculate practice prevalence

\[
\text{Prevalence} = \frac{\text{# of adult patients with a diagnosis of HTN (e.g. ICD-10 I10)}}{\text{# of adult patients (18-85, not pregnant, no ESRD)}} \times 100
\]

• Compare to 31% (140/90 mmHg) or 44% (130/80 mmHg)

OR

• Use the Million Hearts Hypertension Prevalence Estimator Tool
  o [https://nccd.cdc.gov/MillionHearts/Estimator/](https://nccd.cdc.gov/MillionHearts/Estimator/)
Clinical Criteria for Undiagnosed Hypertension

• Use guidelines supported by the practice
• Consider:
  o Stages of hypertension
  o # of abnormal values
  o Time period
• Adults 18-85
• Standard exclusion criteria
  → Patients who have died
Use Electronic Health Record Data

- Population health management software solutions
- EHR registry functionality
- Embed automated algorithms into EHR
  - Requires informatics staff
- Customized reports from EHR vendor

Search EHR data for patients that meet clinical criteria
Plan for Confirmation and Treatment

- 24-hour Ambulatory BP monitoring (ABPM)
- Self-measured BP monitoring (SMBP)
- Automated Office BP machines (AOBP)
- Confirmatory office measures

Implement a plan for addressing the identified population

- USPSTF HTN screening recommendation
- 2017 ACC/AHA HTN Guideline
What to do with patients confirmed to not have hypertension?

• ICD-10-CM – R03.0 – Elevated blood-pressure reading, without diagnosis of hypertension
  • “This category is to be used to record an episode of elevated blood pressure in a patient in whom no formal diagnosis of hypertension has been made, or as an isolated incidental finding.”
  • [http://www.icd10data.com/ICD10CM/Codes/R00-R99/R00-R09/R03-/R03.0](http://www.icd10data.com/ICD10CM/Codes/R00-R99/R00-R09/R03-/R03.0)
Clinical Criteria – Sample Stepped Approach

More liberal criteria, lower PPV

More conservative criteria, higher PPV

2+ values ≥ 140/90

2+ values ≥ 150/90

1 value ≥ 160/110

1 value ≥ 180/120

PPV = Positive Predictive Value

More resources for HTN confirmation

Fewer resources for HTN confirmation
### Table 3. Population Health Management

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Change Idea</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify Patients with Potentially Undiagnosed HTN</td>
<td>Compare practice HTN prevalence to national or local estimates to understand if you might be missing patients with undiagnosed HTN</td>
<td>Million Hearts® — <a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">Hypertension Prevalence Estimator Tool</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMGA — <a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">Hypertension Prevalence — AMGA Results Using Dx Code, Problem List, and Elevated Blood Pressure Readings</a></td>
</tr>
<tr>
<td></td>
<td>Establish clinical criteria to define potentially undiagnosed HTN</td>
<td><a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">Table 1. Number of At-Risk Patients Identified by Each Hypertension Screening Algorithm</a>: A Technology-Based Quality Innovation to Identify Undiagnosed Hypertension among Active Primary Care Patients. Rakotz MK, et al., 2014.</td>
</tr>
<tr>
<td></td>
<td>Search EHR data for patients who meet the established clinical criteria</td>
<td><a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">NACHC — Million Hearts® Hiding In Plain Sight Consolidated Change Package: Appendix M: Potentially Undiagnosed Hypertension Algorithm used to Generate Registries and Reports - i2i Tracks, Golden Valley Health Centers and Tulare Community Health Clinic (now Altura Centers for Health)</a></td>
</tr>
<tr>
<td>Implement a plan to confirm HTN status and treat those with HTN</td>
<td></td>
<td>NACHC — Million Hearts® Hiding In Plain Sight Consolidated Change Package: <a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">Appendix I: Million Hearts® HIPS Recall Report, Golden Valley Health Centers</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NACHC — Million Hearts® Hiding In Plain Sight Consolidated Change Package: <a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">Appendix K: HIPS Recall List – i2i Tracks, La Maestra Community Health Centers</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NACHC — Million Hearts® Hiding In Plain Sight Consolidated Change Package: <a href="https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf">Appendix N: Patient Status and Opportunities Alert – eClinicalWorks, Neighborhood Healthcare</a></td>
</tr>
</tbody>
</table>
Hypertension Control Change Package

Identify Patients with Potentially Undiagnosed HTN
For additional resources, please see the NACHC Million Hearts® Hiding In Plain Sight Consolidated Change Package: NYC DOHMH and HealthyHearts NYC — ABCS Toolkit for the Practice Facilitator: Task 4: Respond quickly to control elevated BP by targeting undiagnosed hypertension (HTN)

Search EHR data for patients that meet clinical criteria

Implement a plan for addressing the identified population

Table 3. Population Health Management

<table>
<thead>
<tr>
<th>Change Concept</th>
<th>Change Idea</th>
<th>Tools and Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare to local, state, or national prevalence data</td>
<td>• Million Hearts® — Hypertension Prevalence Estimator Tool</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vermont Department of Health and the New England QIN-QIO — From 70 to 80 Percent: The Hypertension Management Toolkit: Task 2: How Does Your Practice Compare to Local and National Benchmarks?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AMGA — Hypertension Prevalence — AMGA Results Using Dx Code, Problem List, and Elevated Blood Pressure Readings</td>
<td></td>
</tr>
<tr>
<td>Establish clinical criteria for potential undx HTN</td>
<td>• Table 1. Number of At-Risk Patients Identified by Each Hypertension Screening Algorithm: A Technology-Based Quality Innovation to Identify Undiagnosed Hypertension among Active Primary Care Patients. Rakotz MK, et al., 2014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NACHC — Million Hearts® Hiding In Plain Sight Consolidated Change Package: Appendix L: Undiagnosed Hypertension Algorithms and Clinical Criteria Decision Points, HIPS Project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Patients with Undiagnosed Hypertension: Hiding in Plain Sight. Wall HK, et al., 2014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NACHC — Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix M: Potentially Undiagnosed Hypertension Algorithm used to Generate Registries and Reports — 12i Tracks, Golden Valley Health Centers and Tulare Community Health Clinic (now Altura Centers for Health)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Identifying Patients with Hypertension: A Case for Auditing Electronic Health Record Data. Baus A, et al., 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Plymouth Family Physicians — Patient-Level Report</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NACHC — Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix J: Million Hearts® HIPS Recall Report, Golden Valley Health Centers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NACHC — Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix K: HIPS Recall List – 12i Tracks, La Maestra Community Health Centers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NACHC — Million Hearts® Hiding in Plain Sight Consolidated Change Package: Appendix N: Patient Status and Opportunities Alert – eClinicalWorks, Neighborhood Healthcare</td>
<td></td>
</tr>
</tbody>
</table>
HIPS In Practice
Hypertension Phenotype in EHRs

May include:
- Diagnosis of hypertension (e.g. ICD-10 I10)
- Patterns of abnormal blood pressure readings
- Antihypertensive medication prescription(s)
- Free text notes
### Table 1. Number of At-Risk Patients Identified by Each Hypertension Screening Algorithm

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Number Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All patients whose 3 most recent encounters yielded a mean SBP &gt;140 mm Hg or a mean DBP &gt;90 mm. Encounters used were within 12 months before their most recent encounter</td>
<td>720</td>
</tr>
<tr>
<td>2. All patients who had 3 encounters with a SBP &gt;140 or DBP &gt;90 mm Hg within 12 months before their most recent encounter</td>
<td>968</td>
</tr>
<tr>
<td>3. Patients who had a single encounter with a SBP &gt;180 or a DBP &gt;100 mm Hg within 12 months before their most recent encounter</td>
<td>527</td>
</tr>
<tr>
<td>Unique patients identified by algorithms 1, 2, or 3</td>
<td>1,586</td>
</tr>
</tbody>
</table>

SBP = systolic blood pressure; DBP = diastolic blood pressure.

Note: All data were obtained from outpatient encounters with a primary care physician or specialist.
• 250,000 adult patients (active 2006 - 2008)
• For patients with ≥ 2 BP readings of 140/90 or higher, an antihypertensive medication prescription, or both, 37.1% did not have an ICD-9-CM code
• HTN prevalence went from 18.0% (ICD code only) to 28.7%
• Much more likely to be on an antihypertensive with a HTN diagnosis
  o 92.6% diagnosed vs 15.8% undiagnosed, P < .001

Palo Alto Medical Foundation

• 11 primary care centers in West Virginia
• Chronic Disease Electronic Management System (CDEMS)
• Query found 14,893 patients with:
  o ICD-9-CM code 401
  o 2 or more blood pressure readings of 140/90 or higher (n = 1076)
  o A diagnosis of essential hypertension based on free-text entries (n = 898)
• 13.3% potentially hypertensive patients overall
  o Varied across the sites from 3.6% to 47.9%
• 14,970 patients (2008-2011)
• Clinical criteria:
  o Excluded patients with a diagnosis code or current antihypertensive Rx
  o ≥ 3 outpatient BPs from 3 separate dates, at least 30 days apart, within a 2-year period (≥140 or ≥ 90)
  o ≥ 2 elevated BPs (≥ 160 or ≥ 100), at least 30 days apart, but within a 2-year period
• After 4 years, 18–31-year-olds had a 33% slower rate of receiving a diagnosis compared to those 60+
• 100,000K patients from 10 FQHCs from 4 Health Center Controlled Networks – CA, KY, MO

• Clinical criteria:
  o ≥ 2 elevated BP (≥140 SBP or ≥ 90 DBP), past 12 months
  o 1 Stage 2 (≥ 160 SBP or ≥ 100 DBP), past 12 months

• NACHC HIPS Change Package –
  http://mylearning.nachc.com/diweb/fs/file/id/229350
65.2% had a follow up visit

31.9% were dx w/HTN
Finding People Who Could Benefit from Additional Cholesterol Management

Clinical ASCVD (e.g. hx of MI, stroke, TIA, PAD...)

- Statin?
  - NO
  - YES

Severe Hypercholesterolemia (LDL-C ≥190 mg/dL; dx FH)

- Statin?
  - NO
  - YES

Patients with diabetes, 40-75 years (LDL-C 70-189 mg/dL)

- Statin?
  - NO
  - YES
Finding People Who Could Benefit from Additional Cholesterol Management

- **Clinical ASCVD** (e.g. hx of MI, stroke, TIA, PAD...)
  - Statin?
    - NO
    - YES
      - High intensity?
        - NO
        - YES

- **Severe Hypercholesterolemia** (LDL-C ≥190 mg/dL; dx FH)
  - Statin?
    - NO
    - YES
      - High intensity?
        - NO
        - YES

- **Patients with diabetes, 40-75 years** (LDL-C 70-189 mg/dL)
  - Statin?
    - NO
    - YES
      - At least moderate intensity?
        - NO
        - YES
Questions?

Hilary Wall – hwall@cdc.gov