Abbreviations: FTE, full time equivalent; OR, odds ratio.

organizationalsupport.1

warranted to identify the need for additional individual and
between Cleveland Clinic and other major health systems,
explorespracticeefficiencies,andbuildscommunityinaway
programming that comprehensively supports physicians,
6physicians,toimplementoutreach,clinicalenhancements,
They then established a Staff Experience team including
recognizedburnoutasapressingissueandrespondedbyor-
provephysicianwell-being.Followingoursurvey,leadership
prise-wide mobilization and coordination of efforts to im-
retentionandhealthcaredeliverythataveresultedinenter-
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Table 2. Correlates and Outcomes of Burnout, Multivariable Regression Models Using Backward Variable Selection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlates of Burnout</td>
<td></td>
</tr>
<tr>
<td>Overall Burnout, OR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Nonwhite (vs white)</td>
<td>0.54 (0.36-0.82)</td>
</tr>
<tr>
<td>Clinical FTE, %</td>
<td>2.88 (1.58-5.28)</td>
</tr>
<tr>
<td>Age</td>
<td>0.98 (0.97-0.99)</td>
</tr>
<tr>
<td>Emotional Exhaustion subscale, OR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Nonwhite (vs white)</td>
<td>0.46 (0.28-0.73)</td>
</tr>
<tr>
<td>Clinical FTE, %</td>
<td>3.05 (1.56-5.97)</td>
</tr>
<tr>
<td>&gt;20 y in practice (vs &lt;10 y)</td>
<td>0.64 (0.44-0.92)</td>
</tr>
<tr>
<td>Depersonalization subscale, OR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Male sex (vs female sex)</td>
<td>1.71 (1.16-2.53)</td>
</tr>
<tr>
<td>Age</td>
<td>0.97 (0.95-0.99)</td>
</tr>
<tr>
<td>Outcomes of Burnout</td>
<td></td>
</tr>
<tr>
<td>Emotional Exhaustion subscale</td>
<td></td>
</tr>
<tr>
<td>Leaving the organization, OR (95% CI)</td>
<td>2.19 (1.14-4.18)</td>
</tr>
<tr>
<td>Satisfaction with primary care physician</td>
<td></td>
</tr>
<tr>
<td>communication, B (95% CI)</td>
<td>11.5 (2.32-20.8)</td>
</tr>
<tr>
<td>Depersonalization subscale</td>
<td></td>
</tr>
<tr>
<td>Ombudsman complaints, OR (95% CI)</td>
<td>1.72 (1.02-2.89)</td>
</tr>
</tbody>
</table>

Abbreviations: FTE, full time equivalent; OR, odds ratio.

Our findings have important implications for physician retention and health care delivery that have resulted in enterprise-wide mobilization and coordination of efforts to improve physician well-being. Following our survey, leadership recognized burnout as a pressing issue and responded by organizing departmental town halls to identify specific needs. They then established a Staff Experience team including 6 physicians, to implement outreach, clinical enhancements, professionalism, and well-being and professional growth programming that comprehensively supports physicians, explores practice efficiencies, and builds community in a way that reflects our group practice culture. Given similarities between Cleveland Clinic and other major health systems, routine assessment of burnout by health care organizations is warranted to identify the need for additional individual and organizational support.1

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Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Windover, Martinez.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Windover, Martinez.

Administrative, technical, or material support: Windover, Mercer, Neuendorf. Study supervision: Neuendorf, Boissy, Rothberg.

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Association of Repeated Measurements With Blood Pressure Control in Primary Care

Hypertension (HTN) is an important clinical problem affecting nearly 80 million people in the United States.1 Despite the recognized importance of blood pressure (BP) control for those with HTN, only 54% of patients with HTN seen in primary care have their BP controlled (defined as systolic BP <140 mm Hg and diastolic BP <90 mm Hg).1 Blood pressure measurement error (including inappropriate cuff size, talking during measurement, terminal digit preference, and incorrect arm and body positioning) is a major cause of poor BP control2 and reducing measurement error has the potential to avoid overtreatment. The American Heart Association recommends repeating a BP measurement at the same clinic visit with at least 1 minute separating BP readings,2 yet in busy primary care practices BP is measured only once. We evaluated the effect of a second BP measurement on the rate of BP control among more than 38 000 patients with diagnosed HTN and followed in primary care.

Methods | MetroHealth granted institutional review board approval and waived the requirement for written informed consent. As part of ongoing quality improvement, we introduced an advisory alert into our electronic health record (EHR) to remind staff to remeasure the BP when the initial BP was elevated (≥140/90 mm Hg). To assess the association of
repeated BP measurement with BP control, we queried the EHR to obtain all recorded BP values for patients with a problem list diagnosis of HTN who were seen in a primary care clinic between January 1 and December 31, 2016, at MetroHealth, an urban safety-net system in Cleveland, Ohio. Our primary outcomes were (1) the change in systolic BP (final minus initial reading) among patients with an initially elevated BP (≥140/90 mm Hg) who had a repeated measurement during the same visit and (2) the proportion of patients whose BP was controlled on the final reading overall and stratified by initial systolic BP level. We also assessed the contribution of regression to the mean to the systolic BP change.

Results | During the study period, 38 260 patients with HTN made 80 864 primary care office visits. The mean age was 61 years, 22 623 (59%) were female, 16 301 (43%) were black, and 10 340 (27%) were on Medicaid and 2105 (6%) were uninsured. The initial BP was at least 140/90 mm Hg at 31 531 visits (39%) and an initially elevated BP was remeasured at 26 089 visits (83%). The median change (final minus initial reading) in systolic BP was −8 mm Hg (interquartile range, 2-17 mm Hg). The change in systolic BP was positively associated with the initial BP value; the higher the initial systolic BP, the greater the change in final systolic BP (Figure 1). Among all patients with a repeated BP measurement, 9358 (36%) of final BP readings were lower than 140/90 mm Hg, with those closest to the threshold more likely to be controlled on repeated measurement (Figure 2). Overall, repeated measurement of an initially elevated BP was associated with increased HTN control rate from 61% to 73%. The estimated effect of regression to the mean was 6.1 mm Hg, accounting for nearly 65% of the mean observed decrease in systolic BP.

Discussion | Among a large sample of patients with HTN, repeated measurement of an initially elevated BP was associated with a median of 8 mm Hg improvement in systolic BP. Our result agrees with the 11 mm Hg-decrease recently described in a sample of 73 primary care patients.4 While much of the change in systolic BP may be attributed to regression to the mean, the observed decrease remains clinically important, comparable with that associated with addition of an antihypertensive medication.5 As the health care system moves toward value-based care initiatives, such as accountable care organizations and shared savings programs, implementing routine repeated measurement for an initially elevated BP may contribute to improved decision making around HTN management and should be considered a standard component of programs to improve BP control.

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Acquisition, analysis, or interpretation of data: Einstadter, Bolen, Misak, Bar-Shain.
Drafting of the manuscript: Einstadter, Bolen.
Critical revision of the manuscript for important intellectual content: Einstadter, Bolen, Misak, Bar-Shain.
Statistical analysis: Einstadter.
A randomized clinical trial data supporting treatment of hypertension come from studies that used in-office measurements to define initial treatment blood pressures and final blood pressure outcomes. To allow evidence-based implementation of the clinical trial data to clinical practice, we must dramatically improve how we measure blood pressure in our own offices.

The correct measurement of blood pressure in the office requires careful attention to detail. The 2017 AHA/ACA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults lists 19 distinct features that define correct office blood pressure measurement. Most of these are well known to clinicians. These include the patient sitting in a chair for 5 minutes prior to and during measurement with back supported and feet on the ground; avoidance of caffeine, exercise, and smoking for 30 minutes; no talking by either the patient or observer during measurement; removal of clothing under the cuff; supporting the arm horizontally at the level of the atrium; a correct cuff size; and repeated measurements with the results averaged. Failure to follow this approach, as commonly occurs in medical offices, can lead to substantial increases in blood pressure measurement.

While all features of the best practice checklist are important, the simple act of repeating an initially elevated blood pressure measurement may also have an important benefit on management and control of high blood pressure. In this issue of JAMA Internal Medicine, Einstadter et al report on their retrospective experience in 20 outpatient primary care practices in an urban safety-net system. As part of an institutional review board-approved quality improvement initiative, practice staff were taught the correct methods of blood pressure measurement and instructed to remeasure BP in all patients with an initial blood pressure of at least 140/90 mm Hg. An electronic health record advisory was implemented to remind the medical staff to remeasure and reinforce correct measurement technique. Among those with a repeated measurement, 36% had a second measurement that was below 140/90.

Research grade approaches also provide lower blood pressure measurements than routine measurement. The Systolic Blood Pressure Intervention Trial (SPRINT), for example, obtained measurements after 5 minutes of rest followed by 3 automated measurements without a person in the room. The research grade measurement was 12.7 mm Hg lower than routine measurement.

Despite the clinical trial emphasis on office-based measurements, most new practice guidelines now also recommend out-of-office measurement to confirm office-based high blood pressure and for ongoing management of hypertension. Unfortunately, this practice is neither standardized nor fully evidence based.

Ambulatory blood pressure monitoring (ABPM) is generally thought to be the best approach to out-of-office measurement. Measurement several times per hour is conducted while individuals go through normal daily, and often night time, activities. ABPM results are typically lower than office measurements, but the exact relationship is unsettled. Multiple studies suggest that ABPM measurements better predict cardiovascular risk than office blood pressures. ABPM is particularly effective at detecting “white coat hypertension” in which office blood pressure is high but ABPM is normal. Individuals with white coat hypertension...
have little excess cardiovascular risk and do not typically require medication. ABPM can also be used to monitor the effectiveness of drug treatment and to detect the occasional patient with normal office blood pressures but elevated blood pressures out of the office (“masked hypertension”). Despite the availability of ambulatory monitors, policies that support reimbursement and current recommendations to use it routinely the use of ABPM in the United States remain quite low.

Self-monitoring of blood pressure, however, has become quite common, and many clinicians and patients see it as a more practical approach to out-of-office monitoring than ABPM. Unfortunately, the practice of home blood pressure monitoring (HBPM) is even less standardized and less supported by evidence than ABPM. Correct HBPM requires patient training, correct equipment, and correct interpretation of results. The techniques that define best practice office measurement are also relevant at home but are rarely followed. HBPMs are also typically lower than office measurements but the relationship is not uniformly predictable. The exact timing of measurement is also important. Current guidelines suggest measurement in the morning before medications and before supper, but this is not uniform practice. The ability of HBPM to predict cardiovascular risk is less than ABPM, and the correlation of HBPM with ABPM to diagnose white coat hypertension is only 60% to 70%. Moreover, clinical trials of home monitoring alone to improve blood pressure control have shown little effect on BP at 6-month and 1-year follow-ups.

What, then, is a reasonable approach to blood pressure measurement in 2018? Primary care practices should develop a clear strategy for best practice office measurement. Revisions of staff training, work flow, and physical settings may be needed. Blood pressure measurement should comply with the best practice check list. Practices may want to also consider implementing systems more similar to those used in clinical trials, in which unobserved automatic measurement is used. If an initial blood pressure measurement is high, a repeated measurement is indicated. Although this can be done by medical assistants, patients appreciate the primary care clinicians who retake the blood pressure measurement themselves. This may be the most important part of that day’s physical examination. Practices also need to decide which measurement should be recorded in the medical record. Although most clinical trials and practice guidelines suggest averaging blood pressure measurements, quality improvement guidelines commonly use the final blood pressure recording.

Home blood pressure monitoring can be a useful adjunct to care for some patients, but it, too, must be used carefully. It may identify white coat hypertension and may help adherence and control for individual patients. Multiple measurements over the course of an occasional single day (akin to ABPM) may be preferable to daily measurements at the same time of each day. This is especially true given the diurnal and other variations of blood pressure that most patients experience.

ABPM should be used more than it currently is. It is not clear that it is needed in every patient (as suggested by current guidelines), but it certainly can be useful in a larger number of patients. Finding even a few patients in each primary care practice who do not need medications is well worth it. This may be especially true in patients with lower cardiovascular risk. Conversely, ABPM may be useful to confirm good control throughout the day in high-risk patients, especially those with existing cardiovascular disease.

As we continue to debate the thresholds and goals of high blood pressure treatment, we will need to better explain to patients the benefits and harms of each approach and solicit their preferences. The least we can do is better define their risk with better measurement of blood pressure.

Robert B. Baron, MD, MS

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Association of Pharmaceutical Industry Marketing of Opioid Products to Physicians With Subsequent Opioid Prescribing

Despite the increasing contribution of heroin and illicitly manufactured fentanyl to opioid-related overdose deaths in the United States, 40% of deaths involve prescription opioids.1 Prescription opioids are commonly the first opioid encountered in a trajectory toward illicit consumption.2 Although opioid prescribing has declined nationally, rates in 2015 were triple those in 1999 and remain elevated in regions of the country with higher numbers of overdoses.3 Pharmaceutical industry marketing to physicians is widespread, but it is unclear whether marketing of opioids influences prescribing.4 We studied the extent to which pharmaceutical industry marketing of opioid products to physicians during 2014 was associated with opioid prescribing during 2015.

References


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