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Opportunities to Improve Hypertension Care Systems

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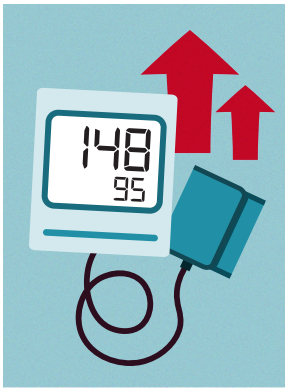
Hypertension is one of the most important modifiable causes of morbidity and mortality, with a U.S. prevalence of 40% to 60%.[1,2]



Eliminating hypertension would have a larger impact on cardiovascular disease mortality than eliminating all other risk factors in females and all other risk factors except for smoking in males.[3] Hypertension also is costly, with average health care expenditures of $55.9 billion annually from 2014 to 2015.[4] Despite hypertension's importance, blood pressure (BP) control rates are low. In 2016, 42.4% of patients had systolic blood pressure (SBP) of 140 mmHg or higher and 68% had SBP of 130 mmHg or higher. Medicaid patients, African Americans, and Hispanics disproportionately contribute to this group.[5]

At the root of this gap between blood pressure goals and outcomes lies hypertension treatment processes that are underutilized. In 2011, Nuckols, et al. noted that patients were receiving only 65% of the recommended elements of hypertension diagnosis, medication adjustment, and BP monitoring.[6] The need for improved hypertension care systems is underscored by recent guidelines that promote more aggressive treatment targets.[1]

Hypertension Care Cost Effectiveness

Meta-analysis of more than 400,000 patients revealed that just a 10 mmHg SBP or a 5 mmHg reduction in diastolic blood pressure (DBP) results in a 22% decrease in coronary heart disease (CHD) events and a 41% reduction in stroke.[7] Net economic benefits occur when, as a result of improved BP, there are fewer episodes of care required to diagnose and treat hypertension and to attend to its complications. Economic benefits also occur when quality is added or suffering is mitigated at a cost that is below an acceptable level.[8]

In an economic analysis, an intervention reaches cost-effectiveness when the cost per quality adjusted life year remains below the "the willingness to pay" threshold. Treating hypertension has met this standard. In fact, even the cost of intensive hypertension management, such as that in the Systolic Blood Pressure Intervention Trial (SPRINT), remains well below the willingness to pay threshold in the U.S. for each quality of life year gained, especially when accounting for reduced health expenditures for hypertension complications in the long run.[9]

Opportunities for Innovation

Recent evidence-based hypertension treatment guidelines emphasize processes that result in greater hypertension control. Implementing these guidelines requires resources for accurate hypertension diagnosis and monitoring; changes in care systems that empower a broader team and utilize technology to expand provider capacity; and standardized, evidence-based office treatment protocols. Each area requires investments of time and money in order to achieve potential returns in better clinical outcomes, efficiency, and improved patient and care team satisfaction.

Accurate Hypertension Diagnosis and Monitoring

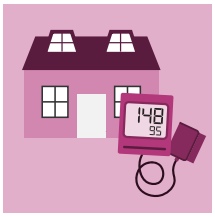
Opportunities to increase accurate hypertension diagnosis and monitoring include standardized BP measurement protocols using automated office blood pressure (AOBP) devices and utilizing BP measurement outside the office to guide diagnosis and treatment decisions.

Standardized Office BP Measurement. Errors in BP measurement are common among both clinicians and support staff, and can result in BP overestimation by 2 to 50 mmHg.[10,11] Standardized, evidence-based protocols, for BP measurement include patient preparation, cuff size selection, and collecting multiple readings. Training clinicians and support staff on proper BP measurement can be enhanced with free online resources that include videos, measurement protocols, and trainee assessment tools.[12]

Accurate office BP measurement requires not only the right technique, but also the right device. Automated office blood pressure, compared with manual BP measurement, is associated with greater accuracy, less inter-operator variability, easier training and quality control, and more efficient operation.[13] Automated office blood pressure has been shown to lessen the "white coat" effect, resulting in readings that more closely approximate average daytime ambulatory blood pressure measurement (ABPM). In one randomized trial, AOBP systolic readings differed from daytime ABPM averages by only 2.3 mmHg, compared to 6.5 mmHg in the control (manual measurement) group.[14] The resources needed for AOBP include the cost of validated AOBP devices and the time and materials to train team members to use them.

Unfortunately, only 1 in 5 automated devices are validated for accuracy.[15] One can invest wisely by referencing validated devices listed online, including the newly released U.S. Blood Pressure Validated Device Listing.[16–18] Investment in AOBP will yield potential savings, including decreases in measurement time, and resources used to diagnose, treat, and monitor patients with falsely elevated blood pressure. Automated office blood pressure requires less active involvement of the staff member and therefore, possibly less time to perform per reading than manual measurement. In an analysis of one medical practice with 6,656 visits per year, AOBP would save 31 hours of staff time annually.[19]

One concern regarding AOBP is whether BP must be measured unattended in order to optimize accuracy, potentially adding office space costs. However, analysis of data from the Systolic Blood Pressure Intervention Trial (SPRINT), which utilized both attended and unattended measurement, revealed similar BP readings and cardiovascular outcomes with either method.[20] Additionally, the increased accuracy of AOBP further mitigates cost by reducing the chance of misdiagnosing patients with hypertension or uncontrolled hypertension. For example, Jones, et al. noted that systematically overestimating BP by 5 mmHg would misclassify 27 million patients as hypertensive based on the diagnostic criteria at that time.[21]



Out-of-Office BP Measurement. In addition to more accurate office BP measurement, out-of-office BP measurement also is recommended. Out-of-office BP measurements are now recommended to confirm hypertension diagnosis based on office blood pressure, rule out masked hypertension (higher out-of-office BP) in those with persistently elevated blood pressure, and titrate BP lowering medications to reach BP targets.[1] Out-of-office BP measurement includes ABPM and home blood pressure monitoring (HBPM).

Ambulatory blood pressure monitoring utilizes an upper arm cuff connected to a device similar to a Holter monitor that measures and records BP at regular daytime and nighttime intervals.[22] Some advantages of ABPM include BP measurement under a variety of conditions and both daytime and nighttime readings. Ambulatory blood pressure monitoring is recognized by the U.S. Preventive Services Task Force as the preferred method to confirm the diagnosis of hypertension.[23] However, potential barriers of ABPM include insufficient provider and staff time, cost, and device accessibility.[24] The Centers for Medicare and Medicaid Services recently expanded coverage for ABPM in the following circumstances:

1. **For beneficiaries with suspected white coat hypertension.** This is defined as an average office blood pressure of SBP greater than 130 mmHg but less than 160 mmHg or DBP greater than 80 mmHg but less than 100 mmHg on two separate clinic/office visits with at least two separate measurements made at each visit, and with at least two BP measurements taken outside the office which are less than 130/80 mmHg.
2. **For beneficiaries with suspected masked hypertension.** This is defined as an average office BP between 120 and 129 mmHg for SBP or between 75 and 79 mmHg for DBP on two separate clinic/office visits, with at least two separate measurements made at each visit and with at least two BP measurements taken outside the office that are greater than or equal to 130/80 mmHg.[25]

For those who wish to purchase their own ABPM device, costs range from $1,995 to $2,517 for the device and up to an additional $850 for an individual computer software license.[22]

Home blood pressure monitoring has several advantages over ABPM, including wider availability, better patient acceptance, greater suitability for repeat measurements, and potential for improved anti-hypertensive medication adherence.[22] Also, a recent systematic review concluded that the published data were not able to establish ABPM as superior to HBPM for predicting cardiovascular risk, though ABPM was more effective than HBPM in detecting masked hypertension.[26]

Implementing HBPM requires care team preparation; a validated, upper arm BP device; clinical support systems that allow the care team to respond to HBPM data; and patient empowerment. These items are outlined on page 7.

Clinical support activities as outlined above are required to make HBPM useful. Additional support can occur in many different forms, including one-on-one counseling, telemedicine using web-based or telephone communication, or nurse-led educational classes in response to poor BP control.

The common theme in effective support strategies studies is the presence of health care clinicians with specific training to deliver interventions in response to the patient's home readings. These interventions vary in cost per year per patient from just over $100 to nearly $1,000. Costs tend to rise if there is increased reliance on physicians for adjustments in therapy and if the response to HBPM results in increased utilization, including medication and office visit costs. Given these data, health care payors have the opportunity to improve BP control in a cost-effective manner by reimbursing out-of-office interventions provided by non-physician team members.[27]

Changes in Care Systems

Opportunities that empower a broader team and utilize technology to expand provider capacity represent important innovations to models of care delivery.

Team-Based Care. The recommended interventions for hypertension care, such as HBPM, require a team. Team-based care has been defined as:

> *The provision of health services to individuals, families, and/or their communities by at least two health clinicians who work collaboratively with patients and their caregivers – to the extent preferred by each patient – to accomplish shared goals within and across settings to achieve coordinated, high quality care.*[28]

The need for team-based care lies in both the limited capacity of clinicians working alone and the gaps in care quality that result from traditional care systems. It is estimated that the acute, chronic, and preventative care of a 2,500 patient panel demands 18.7 hours of daily work, which does not account for documentation, phone calls, paperwork, and other administrative tasks.[29] Electronic health record interaction alone adds an estimated six hours of work per day for the average provider.[30] These capacity limits may explain the lack of consistent improvement in outpatient quality care gaps that was observed between 2003 and 2013.[31] McGlynn and others observed that quality-directed payment reform and measurement during this decade, although necessary, were not enough to improve quality without actual changes in workflow that produces the outcomes.[32] Team-based care is one such change.

A hypertension care team consists of new staff or existing staff with expanded roles who work together to accomplish processes that lower hypertensive patients' BP. Team members have specific skills, training, and roles, and include providers, medical assistants, nurses, clinical pharmacists, dietitians, social workers, community health workers, and even community organizations. This team carries out evidence-based medication management, self-management support, adherence promotion, and timely follow up.[33] In a systematic review, team-based care lowered SBP by an average of 5.4 mmHg.[34] A recent prospective study of 665 patients showed a 15.6 mmHg SBP reduction in the team-based care intervention compared to 9.9 mmHg with usual care. The study also showed a statistically significant improvement in SBP (15 vs 7.3 mmHg) even when excluding patients with any medication changes.[33]

Team-based care also may improve team member satisfaction as well as patient outcomes. A survey of high-functioning primary care practices revealed practice innovations that improve the experience of team members. Many of these innovations are tenets of team-based care, including pre-visit planning, sharing clinical care with an expanded team using standardized protocols, sharing clerical tasks with non-provider members, and improving team function through team meetings and workflow mapping.[35]

Although health care teams may be diverse in their members and processes, the Institute of Medicine outlines five core principles that characterize these groups: shared goals, clear roles, mutual trust, effective communication, and measurable processes and outcomes.[36]

One opportunity to begin team-based care is to expand the medical assistant's (MA) role. Traditional MA roles include escorting patients to the exam room, measuring vital signs, and responding to provider orders at the end of a visit. Some organizations have utilized higher MA to provider ratios along with expanded MA training and roles to assist clinicians with chronic and preventative care, EHR documentation, care coordination, and patient education. These endeavors have resulted in increased productivity, improved access for patients, and better clinical outcomes.

Areas for investment and leadership needed for such a transformation include MA recruitment, training and retention, practice coaching, and effective communication from committed providers. Additionally, a phased approach to task delegation and increased patient volume may be needed in order to allow time for MA recruitment and training, and effective workflow establishment.[37] Potential returns on investment include higher productivity and lower cost utilization that come from team-based care. Such a model could be supported further by changes in reimbursement to support potential MA tasks that currently are not billable.[38]

Pharmacists and nurses also are valuable members of the hypertension team. This effectiveness depends on how directly team members influence medication management. For example, team outcomes are best when pharmacists can make changes to drug therapy independently or with physician approval rather than simply providing adherence support and education.[34]

Leveraging Technology. Like team-based care, technology can be leveraged to improve provider capacity and hypertension outcomes. New technologies in hypertension care primarily enhance hypertension self-monitoring and self-management. This includes digital devices (such as a smartphone) and programs that transmit data from Bluetooth-enabled BP devices directly to the electronic health record (EHR) and telehealth systems that connect patients with care teams.[39] These tools have enhanced patient engagement in areas such as medication adherence, vegetable and fruit consumption, exercise, and even self-titration of medication.[40,41]

Study of this approach reveals improved outcomes relative to usual care (office-only treatment). For example, Milani, et. al.[42] showed a 71% BP control rate at 90 days after appointment in digital-medicine patients (compared to 31% of usual care patients). Although this technology requires investment in equipment as well as care team member salary and training, it is cost-effective.[43]

Standardized Evidence-Based Treatment Protocols

Many organizations have provided guidance for hypertension diagnosis, treatment, and monitoring.[44] Recently, this guidance has come from the American Heart Association and American College of Cardiology in the 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. This guideline provides tools to assist patients and health care teams with successful implementation. In order to fully take advantage of these tools, health care teams will need to agree on details necessary to apply the guideline to their population, which may differ due to factors such as race, age, and socioeconomic status. As teams establish their treatment protocols, self-management support and effective pharmacotherapy become important areas for planning and investment.

Self-Management Support. Self-management includes patient activities such as lifestyle modification and adherence to prescribed treatment that are integral to effective chronic disease management. In the hypertensive patient, these activities include dietary regulation of sodium, potassium, calories, and alcohol; weight loss; increased physical activity; and adherence to anti-hypertensive medications.[45]

Activities that support self-management vary in intensity and frequency, which can affect both costs and return on investment. For example, in the PREMIER trial, intensive behavioral interventions with regular follow up were compared with a one-time, 30 minute "advice only" intervention. The more intensive interventions led to an additional BP reduction of 4.3 mmHg compared to the advice only group.[46]

Although cost-effective analyses of self-management support are less available than those of other interventions such as pharmacotherapy, helping patients assist in their own care appears to be a wise investment. The return on investment for self-management support may lie in decreased utilization costs. For example, one self-management support study of 1,170 participants revealed decreased hospitalization and emergency room utilization that resulted in a net savings of $364 per participant.[47]

Evidence-Based Treatment Algorithms. Studies of patients with uncontrolled hypertension reveal room for improvement in evidence-based treatment algorithms. For example, in an analysis of 468,877 patients with uncontrolled hypertension, only 1 in 7 patients were on a regimen of three or more optimally dosed medications. In addition, in those with apparent resistant hypertension (on >3 drugs), only 50% of patients received optimally dosed medications (at least 50% of maximum dose).[48] A similar pattern of drug use has been found in a cohort of Ohio Medicaid patients with uncontrolled BP.

Greater use of longer acting and more potent agents such as chlorthalidone (as opposed to hydrochlorothiazide [HCTZ]), amlodipine, and spironolactone (in uncontrolled hypertension) are also recommended. Potential savings from pharmacotherapy will not only come from improved BP control and clinical outcomes, but also reduced specialty referral of those with apparent but not truly resistant hypertension.

Home Blood Pressure Monitoring Requirements

Care Team Preparation

- Delegate tasks congruent with scope of practice regulations
- Follow evidence-based hypertension treatment protocols to manage elevated readings
- Train patient educators on HBPM device selection and use

Resources

- Cardi-OH - Home Blood Pressure Monitoring: Supporting Evidence
- Target BP Tools and Downloads[49]
- Cardi-OH - Implementing Home Blood Pressure Monitoring Pearls for Clinicians

Clinical Support Systems

- Have staff available to respond to HBPM data
- Utilize health information technology (HIT) to facilitate efficient flow of information from patient to team
- Budget to support changes in care teams and HIT
- Process for efficiently entering HBPM data into EHR

Resources

- Evidence-Based Treatment Algorithms
- Million Hearts - Self-Measured Blood Pressure Monitoring: Action Steps for Clinicians[50]

Patient Education and Support

- Communicate HBPM's importance
- Assist in selecting a validated, upper arm HBPM device
- Instruct patient in proper HBPM technique
- Provide methods to record HBPM data and share it with the health care team
- Subsidize the cost of the cuff

Resources

- Cardi-OH - Guide to Accurate Home Blood Pressure Monitoring
- Target BP - Patient-Measured BP
- Million Hearts - Self-Measured Blood Pressure Monitoring: Action Steps for Public Health Practitioners

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