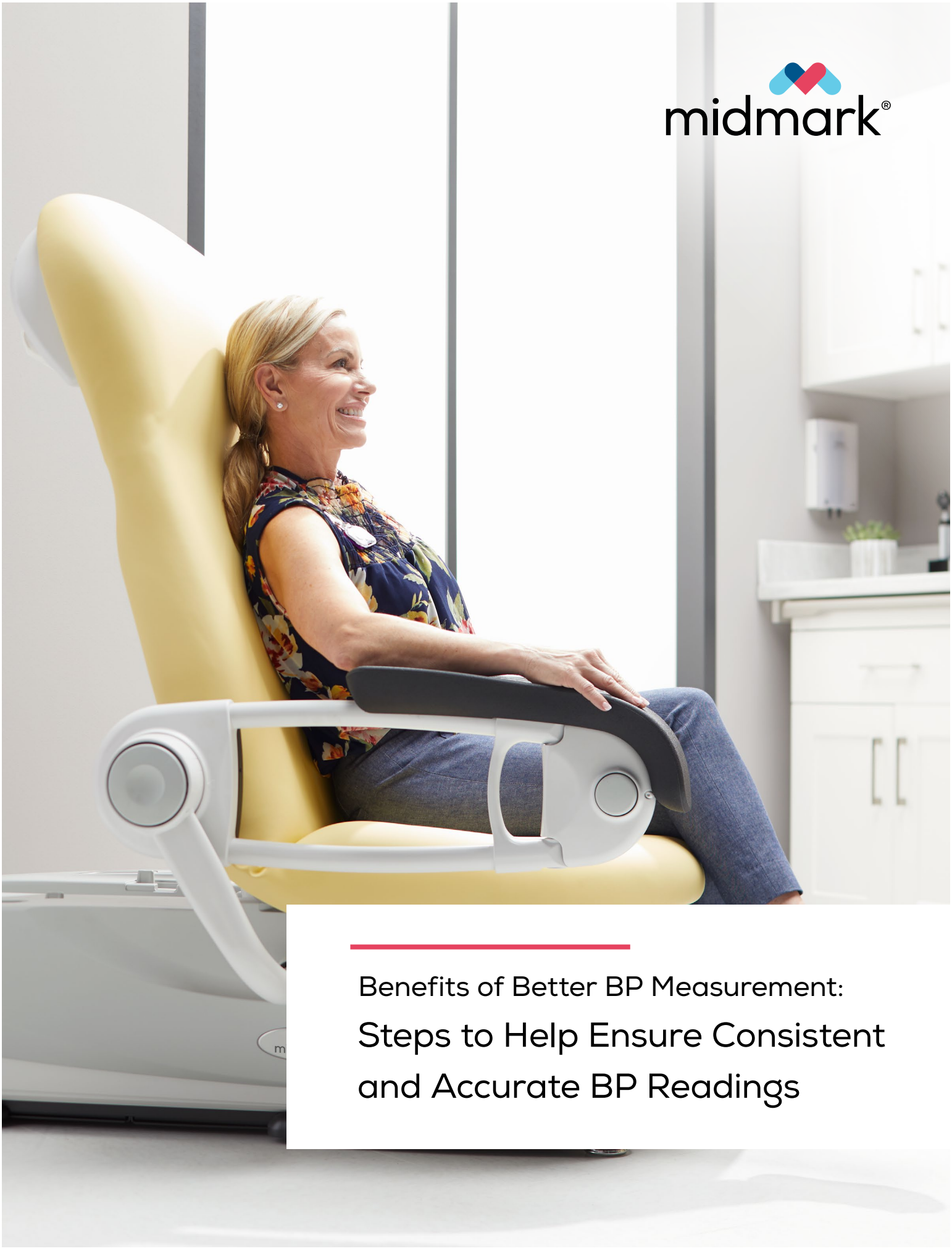

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Benefits of Better BP Measurement:

Steps to Help Ensure Consistent and Accurate BP Readings

Value for Patients, Providers and Healthcare Systems

Blood pressure (BP) measurement has perhaps the most clinically significant connection to point of care diagnosis, patient risk stratification and proper medication dosing. These important factors of care management are essential to proper diagnostic and therapeutic decision-making tied to better outcomes.

This white paper identifies some of the steps providers and healthcare systems can take to help ensure consistent and accurate BP readings, and some of the more important benefits providers and patients may realize.

Steps to Help Ensure Consistent and Accurate BP Readings

Healthcare providers are fortunate enough to experience BP measurement from both sides: as the ones taking the measurement during patient visits and when they are patients receiving care. This unique perspective allows providers to see the benefits of standardizing BP capture to improve accuracy and consistency from the viewpoint of the patient as well as staff in the form of improved workflow.

The following are steps providers can take to help ensure consistent and accurate BP readings.

1. **Ensure staff are properly educated** on the BP measurement process and follow the AHA guidelines for in-clinic BP measurement to obtain accurate BP readings. They need to understand that even with something as seemingly simple and routine as BP measurement, there is the risk of human errors and inaccuracies occurring when proper protocols are not followed. The avoidable errors are significant enough to impact clinical decision-making and care management.

   When it comes to educating staff on proper BP measurement protocols, there are a variety of resources available. For instance, as part of the Better BP initiative, Midmark offers a course focused on hypertension through its clinical education program. This continuing education course is intended for registered nurses, surgical technologists or other healthcare professionals responsible for obtaining BP measurements. It is also designed for healthcare professionals who want to learn more about hypertension, the importance of accurate and standardized BP measurement, and integrating BP measurement into the clinical workflow.

2. **Partner with patients** to increase their level of engagement in the BP measurement process. Providers can use their unique perspective of the process to help patients understand why accurate BP measurement is important. Share the AHA guidelines and explain the importance of proper positioning, empowering patients to own the process and actively ensure it is accurate.

   This can be especially important for those patients who regularly capture their BP measurement at home or those who need to detect small differences in the readings to appropriately manage a chronic condition such as diabetes.

   At a minimum, during a visit it can be helpful for providers to share a few tips that patients should keep in mind as their BP reading is taken at home or in any other healthcare setting. Help patients understand the seven simple steps they can take to help ensure accurate BP readings.

3. **Revisit the BP measurement process** periodically with clinicians and staff involved in BP measurement to ensure improper habits and inconsistencies do not creep into the process and potentially impact the accuracy of the measurement. This is an ideal time to also revisit the AHA guidelines for in-clinic BP measurement and the SPRINT study standardized protocol for measuring BP.

   It can also provide an opportunity for providers to think about how they might redesign their system's approaches with respect to patient care to find ways to implement these recommendations into the process in a way that is still efficient without negatively impacting patients or workflow.

   Take the opportunity to identify any updates or modifications that need to be made to the process. For instance, one modification providers and health systems can make is to adopt a Lean methodology approach to BP measurement. In many cases, BP acquisition provides an ideal place to start the journey to better clinical outcomes through the use of the Lean methodology.

   (For more information on taking a Lean approach with clinical workflows, such as BP acquisition, read the Midmark white paper "Back to Basics: Using a Lean Approach to Help Create Better Outcomes and Lower Costs.")

4. **Consider the role equipment plays** to help enhance BP measurement consistency and accuracy. Updating exam rooms can be disruptive and leadership teams often have competing operational and budget priorities. However, clinical and operational leaders should strongly consider proper-positioning equipment when designing future ambulatory clinics and environments.

   For instance, the CORRECT BP study authors and designers chose to use the Midmark 626 Barrier-Free® Examination Chair to ensure proper participant positioning following AHA recommendations. The 626 chair is the only exam chair of its kind clinically validated to promote proper patient positioning for a more accurate BP measurement. Its low chair height allowed study participants to place their feet flat on the floor, and powered movement of the back section helped ensure the participant's back was supported. Patient Support Rails+ were used to support a participant's arm with the BP cuff at heart height.

5. **Create a fully connected ecosystem** that combines new technology and connectivity to improve clinical standardization, realize greater efficiencies and ultimately contribute to better clinical outcomes. A fully connected ecosystem helps eliminate human variables that increase the likelihood of errors that can contribute to inaccurate diagnoses by normalizing and automating the BP measurement process.

   It does this by introducing automation that facilitates the repeatable adherence to a health system's clinical guidelines for proper BP measurement techniques to achieve more accurate, consistent and reliable BP readings for all patients. This is especially evident when a connected diagnostic device is used in conjunction with a connected examination chair that can position the patient in accordance with AHA guidelines for proper BP measurement.

   A connected point of care ecosystem also protects the quality of the BP data by virtually eliminating the risk of human errors occurring at the keyboard. A connected diagnostic device, such as Midmark IQvitals® Zone™ with the SPRINT BP Protocol, directly transfers patient data to electronic medical records (EMR), eliminating transcription errors and providing greater confidence in data accuracy. Studies have shown that manual transcription of vital signs data produces a 17% rate of error on average. Assuming you take six vital sign measurements on 20 patients a day, that equates to approximately 20 errors each day—and that's just relating to vital signs capture.[1]

By following these five steps, providers and healthcare systems can make noticeable improvements to the accuracy and consistency of BP readings at the point of care. These improvements can also result in a number of benefits for patients, providers and healthcare systems.

1 Fieler, V. K., Jaglowski, T., & Richards, K. (2013). Eliminating errors in vital signs documentation. Comput Inform Nurs, 31(9), 422-427; quiz 428-429. doi:10.1097/01.NCN.0000432125.61526.27 PMID:24080751

Benefits of Consistent and Accurate BP Measurement

When it comes to BP readings, slight variations in technique, measurement and documentation can have a big impact. For this reason, it's logical to presume that consistent and accurate BP measurements can provide benefits to patients, providers and healthcare systems.

Patients

BP readings are perhaps the single most important physiologic metric to understanding a patient's individual risk for the development of some of the most common, costly and functional-impacting chronic diseases. If BP disorders are not correctly identified and properly managed, the impact can be extensive and far-reaching across numerous significant metrics of disease care performance.

For instance, in order to properly diagnose and treat hypertension—a modifiable risk factor for coronary heart disease, stroke and renal failure—providers need accurate BP information that includes both current BP measurements and trending data. It is also becoming increasingly important to detect small differences in BP readings to effectively treat patients with diabetes and renal diseases for optimal clinical outcomes.

If a diagnosis is made, in part, on improperly acquired higher BP readings, it could result in misclassifying a patient as having hypertension when they do not. Accurate BP measurement can help reduce instances where a patient might be overmedicated, which can increase the risk of side effects that can lead to additional illness or injury.

The observed benefit of proper positioning is sufficient to change the classification of BP disorders for millions of patients from hypertensive to normal. The results of the CORRECT BP study support estimates that as many as 30 million or more Americans may be incorrectly classified as having hypertension.

And then there is the matter of trust. It is essential that patients have confidence in their care team as well as diagnostic and treatment conclusions. A misdiagnosis based on inaccurate BP readings could negatively impact that trust.

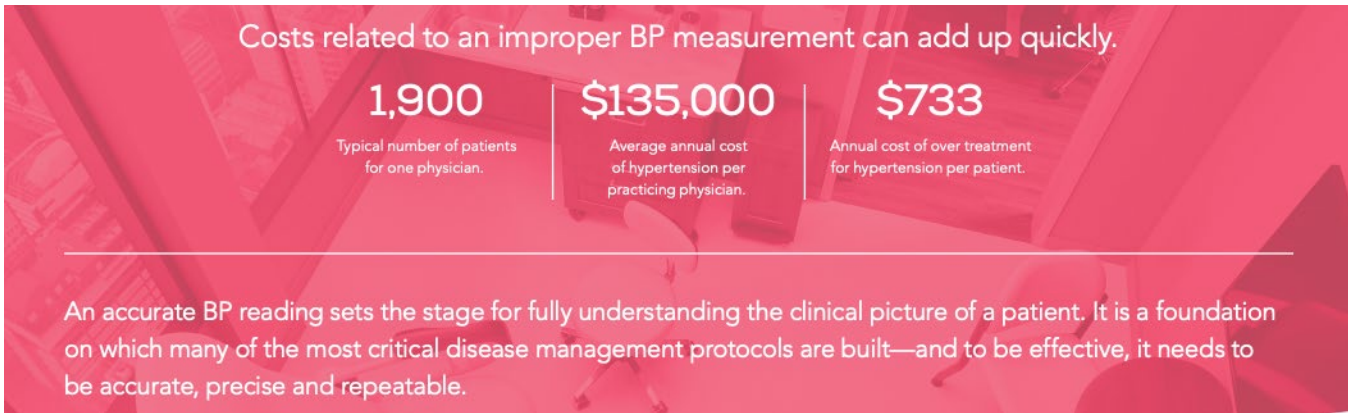
A meta-analysis that looked at trust and health outcomes found a small to moderate correlation between the two. From a clinical perspective, patients reported more beneficial health behaviors, less symptoms and a higher quality of life and were more satisfied with treatment when they had higher trust in their healthcare professional.

According to another study, "lack of patient trust is associated with less doctor-patient interaction, poor clinical relationships that exhibit less continuity, reduced adherence to recommendations, worse self-reported health, and reduced utilization of health care services." When patients lose trust in their medical provider, they are less likely to visit a physician and, if they do visit one, they are less likely to comply with medical advice. They are also less likely to engage in maintaining their own health.

Providers and Healthcare Systems

It is important to note that the CORRECT BP study was intentionally focused exclusively on the impact of patient positioning on BP accuracy. With the results being clinically significant, the authors of the study suggest that clinicians would also see improvement in their point of care BP accuracy that could positively impact clinical performance and outcomes for patients.

That said, it is easy to see how costs related to an improper BP measurement (monetary and reputational) could quickly add up for providers and healthcare systems. For instance, it is estimated that 9.8% of the US population is affected by overestimation of high BP errors[2] When you consider the typical number of patients for one physician is 1,900[3] and the annual cost of overtreatment per patient is estimated at $733,[4] that can translate into an average annual cost of $135,000[5] for hypertension per practicing physician.



There is also the cost associated with repeating a diagnostic test to affirm the accuracy of the reading, which can be disruptive and impact the office in many ways. This can manifest in workflow interruptions from scheduling the repeat tests and rescheduling other appointments. It could also mean reallocating resources, such as rooms and staff, which can increase overall workload and decrease productivity.

Additionally, BP as a population health measure is only topped by patient experience as a mainstay in contract negotiations for payers when health systems and providers seek higher reimbursement for fee for service payments. Payors are more willing to pay providers that demonstrate excellence in BP management as they fully understand better BP control means lower overall costs of patient care.

A resulting misdiagnosis from potential inaccurate BP readings could lead to unnecessary tests and treatments, and necessary intensive medical interventions once the error is discovered, all of which increase healthcare costs. It is estimated that misdiagnosis-related harms cost the US healthcare system more than $100 billion per year.

2 9.8% is percentage of population affected by overestimation of high blood pressure errors, calculated by 30,000,000 affected by overestimation* / 307,000,000 the 2009 US population count**. Data from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2911816/ and **Census.gov

3 Panel size sourced from Journal of the American Board of Family Medicine July - Aug 2016; Vol. 29, No. 4

4 Cost data from Agency for Healthcare Research and Quality (AHRQ). Article: "Expenditures for Hypertension among adults aged 18 and Older, 2010: Estimates for the U.S. Civilian Noninstitutionalized Population"

5 $733 x (9.8% of 1,900) = ~$135,000, where 1) $733 = cost of overtreatment per patient. Cost data from Agency for Healthcare Research and Quality (AHRQ). Article: "Expenditures for Hypertension Among Adults Aged 18 and Older, 2010: Estimates for the U.S. Civilian Noninstitutionalized Population". Includes cost of ambulatory visit and prescription (payer is either the patient, insurance company or ACO), 2) 9.8% = percentage of population affected by overestimation of high blood pressure errors, calculated by 30,000,000 affected by overestimation* / 307,000,000 the 2009 US population count**. Data from *https://www. ncbi.nlm.nih.gov/ pmc/articles/ PMC2911816/ and **Census.gov, and 3) 1,900 = typical patient panel size per physician. Panel size sourced from Journal of the American Board of Family Medicine, July-August 2016; Vol. 29, No. 4.

The loss of trust can have further consequences than just a decrease in patient engagement. It can also result in lower patient satisfaction. One study looked at patients' perceived mistakes in their diagnostic and treatment care in the ambulatory setting. The study found that these perceptions had a concrete impact on the patient-physician relationship, often leading patients to seek another healthcare provider.

For some communities, once that trust has been broken, that patient-provider relationship can be permanently damaged, according to a study that examined trust in healthcare among individuals who identify as Black, Asian, Hispanic and Native American. Four out of five study participants said that after an experience where they lost trust, there was nothing the provider/health system could do to make them return to the same provider or health system.

As evident by these key examples, inconsistent and inaccurate BP measurements can result in direct and indirect consequences. While BP measurement continues to be the point of care test that is most inconsistently performed in the clinical environment, there are steps that providers can take to help ensure consistent and accurate BP readings that can provide benefits to patients, providers and healthcare systems.

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