

## Hypertension Management: Ripe for Disruption

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In 1994, Jeff Bezos began to sell books online. With the virtual bookstore that would eventually become Amazon.com, he engaged customers more often than brick-and-mortar bookstores and delivered books to the customers' destinations of choice, commonly the customers' homes. Books were chosen as the initial offering in the delivery of this virtual service in part because of the large number of book titles available. By bringing the store virtually to the customers wherever they were, Amazon.com both disrupted and revolutionized the retail industry.

Hypertension is similarly common and is present in 1 in 3 US adults.<sup>1</sup> Treatment reduces the risk of cardiovascular sequelae, including stroke, myocardial infarction, and kidney disease. Unfortunately, satisfactory blood pressure control is achieved for only half of US adult hypertensive patients.<sup>1</sup> This gap in care persists despite the availability of effective and low-cost therapeutic options. Underlying reasons include inadequate rates of antihypertensive medication initiation and intensification and inconsistent patient adherence to recommended lifestyle changes and antihypertensive medications.

The current analysis<sup>2</sup> by Mr. Lin Mu and Dr. Kenneth Mukamal explored medication initiation and intensification. Using a combination of 2 nationally representative databases capturing ambulatory care visits spanning 2005 to 2012, the authors sought to characterize current US practice patterns in hypertension management. They found that antihypertensive medication initiation and medication addition occurred during only 7 million of 42 million (16.8%) primary care clinical encounters with patients with documented systolic/diastolic

blood pressure  $\geq 140/90$  mm Hg. The proportion decreased over time from  $\sim 19.3\%$  in 2007 to 12.3% in 2012 and was driven principally by a fall in antihypertensive medication initiation among patients not on prior hypertensive medication. The authors queried whether the observed low and declining rates were consequences of limited in-office time for primary care providers and patients who may have a myriad of other medical issues to address.

The current analysis has several strengths and limitations. On the one hand, the databases used are nationally representative, richly detailed, and yielded a robust sample size. The authors performed appropriately nuanced analyses of the available data by exploring treatment intensification patterns according to several clinical and demographic subgroups and blood pressure levels. On the other hand, data on dose adjustments of existing medications were lacking, and only a single blood pressure measurement from each office visit was recorded. The former shortcoming allowed for the possibility of underestimation of treatment intensification, whereas the latter introduced an element of greater uncertainty to blood pressure measurement, which is already inherently variable over time. Limitations notwithstanding, the overall message is clear: Low rates of in-office antihypertensive medication initiation and intensification constitute an important opportunity to improve the quality of care and outcomes for US hypertensive outpatients.

How can we achieve better population-level hypertension control? As the findings of the current analysis suggest, greater attention to in-office treatment is needed. Nevertheless, optimizing clinic visits is but one piece of the puzzle. Change is needed not only in clinics but also in health care systems. Integrated health care systems such as the US Department of Veterans Affairs and Kaiser Permanente Northern California have reported hypertension control rates  $>80\%$ . These results have been achieved through a variety of programs and include the use of monitoring and feedback,<sup>3</sup> pay-for-performance incentives,<sup>4</sup> and team-based approaches emphasizing the roles of nurses and pharmacists.<sup>5</sup> Broader dissemination of such strategies will require tailoring to local environments.

Engaging patients where they are most of the time—out of the office—is also required. Several public health initiatives have made demonstrable progress in this regard. Broad-based

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efforts such as the Million Hearts initiative have shown growth by cultivating self-measured blood pressure measurements. Community-based outreach programs centered on cultural focal points such as barbershops have demonstrated a significant increase in blood pressure control among black men,<sup>6</sup> and those centered on faith-based organizations may similarly reduce important blood pressure-related health care disparities.

Ideally, technology would be an integral part of any population-based approach to hypertension control. By bypassing traditional retail, the online juggernaut that has become Amazon.com found its initial success by offering a common product and engaging customers where they were. Brick-and-mortar bookstores persist to the present day but play a different and more circumscribed role in the global marketplace. Similarly, hypertension is common, and effective treatment does not necessarily require an in-person outpatient clinic visit. Mobile health technology, including online applications, personal wearable devices, and virtual clinic visits, continue to evolve and may be harnessed for purposes of monitoring and managing hypertension. Blood pressure measurement, adherence assessment, and medication titration can also take place largely outside of the traditional clinic environment; in-person clinic visits can occur for situations in which blood pressure remains difficult to control despite multiple antihypertensive medications or occurrence of adverse effects related to medications. By leveraging technology, providers and health systems can engage patients in their hypertension care and where patients are most commonly, in their homes. In addition, these tools can provide hypertension care and feedback more frequently than traditional in-person office visits.

To achieve this population-based strategy for hypertension control, health care finances will need to be aligned with a shift from a predominantly office-based strategy for hypertension management. Health care reimbursement is currently undergoing a major overhaul, and compensation changes

from volume- to value-based health care will further support the continued development and adoption of effective, sustainable, and scalable strategies to improve hypertension control. With the increasing evidence of successful population-based hypertension management programs, the growth of mobile health technologies, and the changes in reimbursement based on quality rather than quantity, it would seem that the current paradigm of in-office hypertension management is ripe for disruption.

## Disclosures

None.

## References

1. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, Das SR, de Ferranti S, Despres JP, Fullerton HJ, Howard VJ, Huffman MD, Isasi CR, Jimenez MC, Judd SE, Kissela BM, Lichtman JH, Lisabeth LD, Liu S, Mackey RH, Magid DJ, McGuire DK, Mohler ER III, Moy CS, Muntner P, Mussolino ME, Nasir K, Neumar RW, Nichol G, Palaniappan L, Pandey DK, Reeves MJ, Rodriguez CJ, Rosamond W, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Woo D, Yeh RW, Turner MB; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2016 update: a report from the American Heart Association. *Circulation*. 2016;133:e38–e360.
2. Mu L, Mukamal KJ. Treatment intensification for hypertension in US ambulatory medical care. *J Am Heart Assoc*. 2016;5:e004188 doi: 10.1161/JAHA.116.004188.
3. Kerr EA, Fleming B. Making performance indicators work: experiences of US Veterans Health Administration. *BMJ*. 2007;335:971–973.
4. Van Herck P, De Smedt D, Annemans L, Remmen R, Rosenthal MB, Sermeus W. Systematic review: effects, design choices, and context of pay-for-performance in health care. *BMC Health Serv Res*. 2010;10:247.
5. Glynn LG, Murphy AW, Smith SM, Schroeder K, Fahey T. Self-monitoring and other non-pharmacological interventions to improve the management of hypertension in primary care: a systematic review. *Br J Gen Pract*. 2010;60:e476–e488.
6. Victor RG, Ravenell JE, Freeman A, Leonard D, Bhat DG, Shafiq M, Knowles P, Storm JS, Adhikari E, Bibbins-Domingo K, Coxson PG, Pletcher MJ, Hannan P, Haley RW. Effectiveness of a barber-based intervention for improving hypertension control in black men: the BARBER-1 study: a cluster randomized trial. *Arch Intern Med*. 2011;171:342–350.

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