Hypertension Assessment and Management: Role for Digital Medicine

To the Editor:

Current control rates are far below the Healthy People goal of 50%, which was originally set as the year 2000 goal and has since been extended.[1] Treatment has generated a benefit-to-cost ratio of at least 6:1, but much more can be achieved. More effective use of antihypertensive medication would have an impact on mortality akin to eliminating all deaths from medical errors or accidents.[2]

Poor adherence to antihypertensive therapy is a major cause of lack of blood pressure control. At the core of clinical decisions for individual management is a need for ready identification of individuals who remain uncontrolled, or appear to require a considerable pharmaceutical burden to achieve control, and whether nonadherence or pharmacologic unresponsiveness is the root cause.

We wish to describe the first use of a commercially available digital health feedback system (Helius; Proteus Digital Health, Inc, Redwood City, CA) to assess hypertension therapy. It consists of a poppy-sized ingestible sensor made of foodstuff, and a wearable sensor (also called "Patch") that may be utilized for 7-day wear during all activities including exercising and bathing. The patch automatically logs and stores the dates and times of ingestible sensor ingestion and activities of daily living. The Patch is capable of automatically transmitting its stored data to a compatible computerized device for display, or having its stored data downloaded after completion of its use.

We invited 8 of our patients who were taking chronic antihypertensive treatment to utilize the system for a 2-week period. Patients wore the wearable sensor continuously, with replacement after 1 week, and ingested the ingestible sensor daily whenever they took their prescribed antihypertensive drugs. Ingestible sensor use was downloaded from each Patch after its use for correlation with blood pressure determinations that were made at the time of clinic visits before, during, and at the end of system use. Our patients included 5 men, aged 49 to 62 years, with essential hypertension. All patients were prescribed long-term antihypertensive treatment.

After 2 weeks of product use, taking adherence (ie, number of ingestible sensors detected divided by the total number prescribed) ranged from 70% to 100%, and timing adherence (ie, number of ingestible sensors detected within ±2 hours of the average time of all detections for the dosing period) ranged from 67% to 100%. Timing adherence in the mornings was 54% to 100% and evening timing adherence was 85% to 100%. The range of missed doses was 0% to 33% in the mornings and 0% to 13% in the evenings. Blood pressure decreased in all patients (−7/+6 mm Hg to −54/−24 mm Hg). The system provided support for clinical decision and management by helping to discriminate between inadequate medication utilization and pharmacologic unresponsiveness. After using the system, 3 patients had increases and 1 patient had a decrease in therapy, and 3 patients underwent adherence counseling.

The system provided useful information for individualized treatment decisions regarding dose adjustment, the addition or discontinuation of medications, or medications use review (including adherence counseling) to improve blood pressure. It may provide a rational basis for the prescription of extended-release medications for situations where adherence by an individual is high at a particular period of each day but unsatisfactory at other times of the day.

We found this system to be informative and easy to use in a general practice setting. Based on informal questioning, overall patient and physician satisfaction with the system was positive. Plans are in progress to replicate these observations formally in larger and more diverse populations.

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References

1. Centers for Disease Control. Healthy People 2010. http–www.cdc.gov-nchs-data-hpdata2010-hp2010_final_review.pdf. Accessed July 24, 2014.
2. Cutler DM, Long G, Berndt ER, et al. The value of antihypertensive drugs: a perspective on medical innovation. *Health Aff*. 2007;26:97–110.

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