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Title: EHR enhancements that increased capture of home blood pressures among geriatric patients during pandemic-era virtual visits.

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Introduction:

Blood pressure (BP) control effectively prevents cardiovascular disease in late life.¹ However, health-system responses to the COVID-19 pandemic disrupted office-based hypertension care² and shifted care delivery to telemedicine via phone or video.³ Despite limited pre-existing evidence for telemedicine-based hypertension management,⁴ the pandemic catapulted its use to the broader population of those aged ≥ 65 years, most of whom have hypertension.⁵ Older patients disproportionately had poorer access to telehealth during the pandemic^{6,7} due to preexisting technological disparities and greater prevalence of sensory impairment.⁸ At a multisite geriatric primary care practice that serves >5,000 older patients, we report our experience with documenting home BPs (HBPs) during the first 18 months of the pandemic across 3 enhancements to the provider interface in the electronic health record (EHR).

Methods:

We studied BP data associated with early-pandemic telehealth visits in March 2020 to October 2021. In the baseline period (Time 1, March-August 2020), healthcare regulations required our physicians to directly visualize the patient or caregiver using the BP cuff on video to enter as the valid video-visit HBP; medical assistants aided with virtual rooming but did not record HBPs. In Time 2 (September 2020-Jan 2021), physicians had access to a dedicated HBP field in the EHR for video visits only. Time 3 (February-October 2021) included two EHR enhancements: the HBP field became available in phone visits; additionally, physicians were allowed to enter any patient-reported HBPs (i.e., direct visualization on video not required) for phone and video visits. Physician providers were educated about each EHR change via email tutorials, department presentations, and disseminating information about these enhancements to medical assistants.

For patients with hypertension (defined by a curated health-system registry) and receiving primary care in our multisite geriatrics practice, we analyzed EHR encounter data for all virtual visits, collecting data on the type (telephone versus video) and correct entry of the encounter BP (present versus absent in the EHR vitals flowsheet). We plotted weekly summary statistics for visual inspection, then used one-way analysis of variance to compare the proportion of correct HBP entry between the 3 time periods. Second, we conducted a structured chart review of a randomized sample of virtual visits in patients with uncontrolled HTN. This more detailed portion of the project investigated: (1) whether providers had documented the patients' recent HBP anywhere within the encounter note even though not entered into the EHR vitals flowsheet; and (2) for patients without an available HBP, whether there was a documented plan for obtaining HBPs after the visit.

This research was reviewed by the University of Michigan Institutional Review Board and deemed not to be regulated human subjects research.

Results:

Our clinic completed 5,675 virtual visits (among 2,426 unique patients) from March 2020-October 2021, of which only 444 visits (7.8%) had properly entered HBPs into the EHR. BP entry significantly improved after the HBP data field was added to video visits (from 1.2% of 1,847 visits in Time 1 to 4.8% of 1,632 visits in Time 2, $p < 0.001$, Fig 1). Allowing entry of HBPs, along with adding the HBP field to telephone visits, led to further improvement (14.5% entry of 2,196 visits in Time 3, $p < 0.001$). The structured chart review consisted of 167 visits; most (146 or 87%) did not have properly entered BPs into the EHR vitals flowsheet, of which only 39 (27%) had HBPs documented within the text of the encounter note. Only 11 (6.6%) included a plan within the note text to obtain further BPs (home or clinic) after the visit.

Discussion:

The COVID-19 pandemic has shifted care delivery from the office to the virtual setting, even though ambulatory care in the office has resumed. Telemedicine continues to benefit geriatric patients for whom in-office visits may be impractical, whether due to limitations on ambulation or transportation, accommodation of caregiver schedules, or complexity of healthcare due to multimorbidity. Our project identified severe gaps in HBP documentation. Providing a dedicated EHR field for HBP and allowing self-reported HBPs were associated with improved HBP entry. Despite these enhancements, HBP documentation rates remain low. Future improvements may include adding clinic-staff workflows requesting HBPs after visits without a HBP, e.g. via phone or portal messages. Additional BPs could be collected by creating an EHR interface for patients to enter their HBPs directly into the EHR. Future efforts will also include whether proper BP entry results in decreased medication prescribing and better follow-up BP control for our clinics' older adults.

Limitations:

Concurrent factors outside of EHR enhancements may have contributed to improved HBP documentation. These include patient education on BP self-management, as well as additional health-system efforts to improve hypertension care, such as panel management and incentive programs.

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Conflicts of Interest:

The authors report no conflicts of interest.

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Author Contributions:

Andrew E. Russell, MD, MPH: Conception and design of the work; acquisition of data, analysis, manuscript draft, revision, and submission.

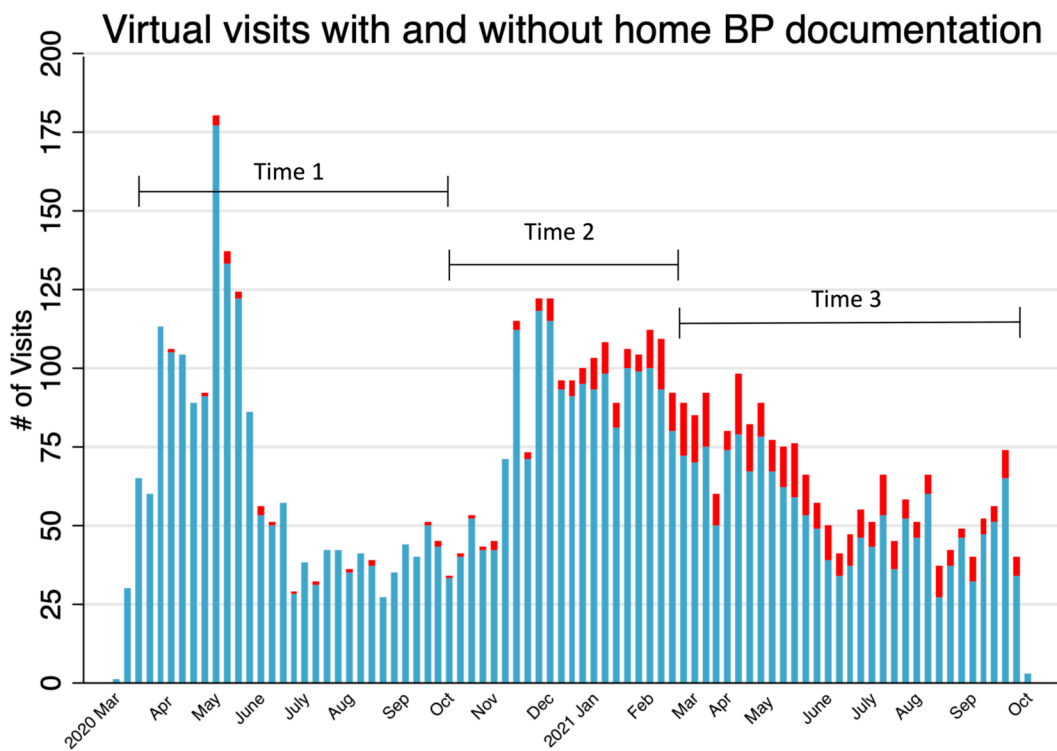
Lillian Min, MD, MSHS: Conception and design of the work; acquisition of data, analysis, manuscript draft, revision, and approval.

Nadia Khosrodad, MD: acquisition of data, revision, and final approval.

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Figure 1

Number of virtual visits by week from Mar 2020-Feb 2021, divided into visits with properly entered home blood pressures (HBP, red) versus those without properly entered BPs (blue). Time 1 (Mar-Aug 2020): providers were required to directly visualize the BP meter to enter a valid visit BP. Time 2 (Sep 2020-Jan 2021): the HBP field was added to the EHR for video visits. Time 3 (Feb-Oct 2021): the HBP field was added for phone visits as well; additionally, providers were allowed to enter recent self-reported BPs.



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