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Session 1390 - Spotlight on Special Topics: Spotlight on Special Topics: Innovation, Digital Health, and Technology 6

1390-036 / 036 - BINARY HYPERTENSION CLASSIFICATION USING CALIBRATION-FREE OPTICAL BLOOD PRESSURE MEASUREMENT TECHNIQUE AT HOME

March 4, 2023, 2:45 PM - 3:30 PM

Poster Hall_Hall F

Disclosure

<https://disclosures.acc.org/Public/AnnualMeetingAppConsonol?pid=14211>

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Abstract

Background: Undiagnosed hypertension remains a leading cause of premature death worldwide. Automated office blood pressure measurement (AOBP) using inflatable cuff-based technology is associated with convenience limitations and inaccuracies, including white coat hypertension with normal ambulatory or home blood pressures (BP). We aimed to identify the presence or absence of elevated BP among participants using a smartphone-based cuffless BP measurement technique at home.

Methods: Using an FDA-approved BodyTrace BP monitor and compatible Android smartphones, 14 individuals performed daily "clusters" of consecutive readings within 30 minutes: 3 readings using their BP monitor, and 3 readings using OptiBP, a cuffless pulse wave analysis algorithm for smartphone-derived photo-plethysmography (PPG) signals. Using BP monitor readings, each cluster was dichotomously labeled as "True" if mean systolic BP \geq 130 mmHg or mean diastolic BP \geq 80 mmHg, and "False" otherwise. OptiBP readings for each cluster were converted (without calibration or reference to BP monitor values) into continuous prediction scores (0 to 1) indicating the likelihood of those specific mmHg thresholds being reached. A receiver operating curve (ROC) was computed (binary labels vs. prediction scores) and used to create confusion matrix metrics (binary labels vs binary predictions).

Results: After excluding clusters with insufficient readings in BP monitor values, 86 clusters across 14 unique individuals were retained. The ROC revealed an area under the curve of 0.85. Binarizing model-derived prediction scores at the value that minimized the distance between the ROC curve and the top left corner of the ROC plot (= 0.45) yielded a corresponding sensitivity of 0.83, specificity of 0.80, and precision of 0.80.

Conclusion: Smartphone-based cuffless blood pressure measurements could be part of a strategy to improve hypertension screening and identify individuals at risk of high-blood pressure or in-office inaccuracies.