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LETTER TO THE EDITOR

Correspondence to the European Heart Journal—digital health in response to the paper by Attia *et al.* 2022

Nishil Patel [1,*], **Salaheldin Agamy** [2], **and Mahmood Ahmad** [3]

[1]North Middlesex University Hospital, Sterling Way, London N18 1QX, United Kingdom; [2]Royal Free Hospital, London, United Kingdom; and [3]Royal Free Hospital, London, United Kingdom

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We were interested to read the paper by Attia *et al.*[1] which demonstrated the value of electrocardiogram enabled stethoscopes (ECG-Scope). Their findings show potential in the utilization of artificial intelligence (AI) algorithms in conjunction with a single lead ECG-Scope to identify left ventricular dysfunction (LVSD). A clinical pathway such as this may speed up diagnosis and potentially improve patient outcomes.

Bachtiger *et al.*[2] utilized ECG-Scope differently to Attia *et al.*, choosing to auscultate at standard valvular landmarks rather than modified ECG electrode positions. Bachtiger *et al.* achieved best results over the pulmonary position, while Attia *et al.* indicated a V2 position when supine was best. Interestingly, they both achieved consistently strong results with their handheld variants, and this involved patients touching electrodes on the ECG-Scope with their fingers/thumbs. For both, handheld was shown to be second best, and for Attia *et al.,* the area under curve (AUC) remained above 0.84 in detecting reduced ejection fraction (EF), irrespective of patient position.

One of the limitations of ECG-Scope going forward is the cost of widespread implementation of new technology to make an impact in non-specialist services. With the demand for smart wearables continuing to escalate, the results from Kwon *et al.*[3] provide an interesting alternative. Making use of already available smartwatches from Apple and Samsung, they were able to generate a 12-lead ECG from a smartwatch ECG (Lead I and II). This AI model was able to demonstrate potential for use as a screening tool (AUC 0.925–0.946).

Han *et al.*[4] also made use of multiple lead-based AI enabled ECG algorithms on smartwatch ECG data. Data showed that model performance improved as the number of leads increased, with 12-lead being the best (AUC 0.880). Making use of consumer wearables can reduce the burden of technological upgrade costs needed to make this model of diagnosis work. It also indicates that all AI algorithms should be made to generate 12-lead ECGs, including with ECG-Scopes.

In conclusion, AI algorithms on ECGs obtained from non-conventional sources have shown potential in being able to diagnose earlier and potentially improve patient outcomes in LVSD. Utilizing consumer wearables in conjunction with existing stethoscopes may help to realize real-world benefits sooner, especially in a primary care setting, compared with investment in new clinician tools. Work should be done to ensure algorithms aim for 12 leads to improve model performance.

Data Availability

No new data has been utilised in this letter. Results are taken from references and indicated with citation.

References

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* Corresponding author. Tel: +44 20 8887 2000, Email: nishil.patel4@nhs.net