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## Increasing detection of heart valve disease in Farnborough Primary Care Network using auscultation artificial intelligence in the community pharmacy setting

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**Introduction:** Cardiovascular disease causes a quarter of all deaths in the UK, making it a top NHS priority<sup>1</sup>. One such cardiovascular disease, heart valve disease (HVD), is serious with worse outcomes than many cancers<sup>2</sup>. Yet diagnosed early, before a patient deteriorates, HVD can be treated effectively with valve replacement or repair. A large proportion of patients however are estimated to be undiagnosed or untreated each year in England ( $\leq 53\%$  with severe symptomatic aortic stenosis,  $\leq 41\%$  with moderate/severe mitral valve regurgitation,  $\leq 81\%$  with moderate or greater tricuspid valve regurgitation)<sup>3</sup>. HVD is often detected when GPs identify a heart murmur upon cardiac auscultation. Patients are referred to echocardiography to confirm diagnosis and severity. By using digital stethoscope to perform auscultation, community pharmacists have the potential to assist with and increase the detection of HVD. **Aim:** To determine if community pharmacists can identify undiagnosed HVD using digital auscultation with eMurmur® stethoscope artificial intelligence (AI), and compare subsequent echocardiography referrals against those from GPs.

**Methods:** A community echocardiography service and pharmacy within a single PCN were identified based on interest, capacity, and infrastructure to undergo the service evaluation (SE). Pharmacy patients aged  $>75$  years, or with type 2 diabetes, angina/myocardial infarction, atrial fibrillation or high blood pressure, were invited for HVD assessment by the pharmacist. Patients with known HVD or who had an echocardiogram in the past 10 years were excluded. The pharmacist carried out digital stethoscope auscultation and where systolic murmur was detected, patients were referred to a community clinic for full compensation echocardiography. Patient demographic, comorbidity, auscultation, and echocardiography results were collected. Clinic referrals from the community pharmacy were contrasted with referrals from GP practices to compare the number of appropriate referrals over the same period.

**Results:** Community pharmacy detected murmur in 39/86 (45%) patients, who were then referred to community echocardiography (mean age 77.8 years). Echocardiography identified: 8 (21%) moderate/severe HVD, 9 (23%) mild HVD, 22 (56%) 'normal' or 'trivial' HVD. During the SE, 24 referrals were received from GP practices (mean age 65 years): 2 (8%) moderate/severe HVD, 8 (33%) mild HVD, 14 (58%) 'normal' or 'trivial' HVD. Pharmacy referred 70% more patients with non-trivial HVD than GP practices (17 vs 10 patients).

**Discussion/Conclusion:** This SE demonstrates that community pharmacists can identify undiagnosed HVD, in this case referring more patients with non-trivial HVD to echocardiography than GPs. The rapid data sharing enabled by this technology supports quick decision-making for patients with critical disease requiring immediate treatment. Pharmacists can therefore play an important role as a gateway to accessing potentially lifesaving treatment.

Patients appeared comfortable attending a digital auscultation service in a community pharmacy setting. Such a proactive service may help reduce the number of people with severe HVD who go undiagnosed and untreated. Limitations of this SE include the small sample size, rendering statistical analysis inappropriate. Additionally, the analysis indicated the number of GP referrals for echocardiography but not how many patients underwent auscultation overall. Therefore we were unable to compare efficiency of murmur detection.

**Keywords:** Cardiovascular; pharmacy; artificial intelligence

## References

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3. Data modelled by Wilmington Healthcare based on: Secondary care data is taken from the English Hospital Episode Statistics (HES) database produced by NHS Digital, the new trading name for the Health and Social Care Information Centre (HSCIC) Copyright © 2023, the Health and Social Care Information Centre. Re-used with the permission of the Health and Social Care Information Centre. All rights reserved.