eMurmur

Uncovering the invisible patients with heart valve disease

A case study for proactive heart valve disease detection in community pharmacies using eMurmur Heart AI

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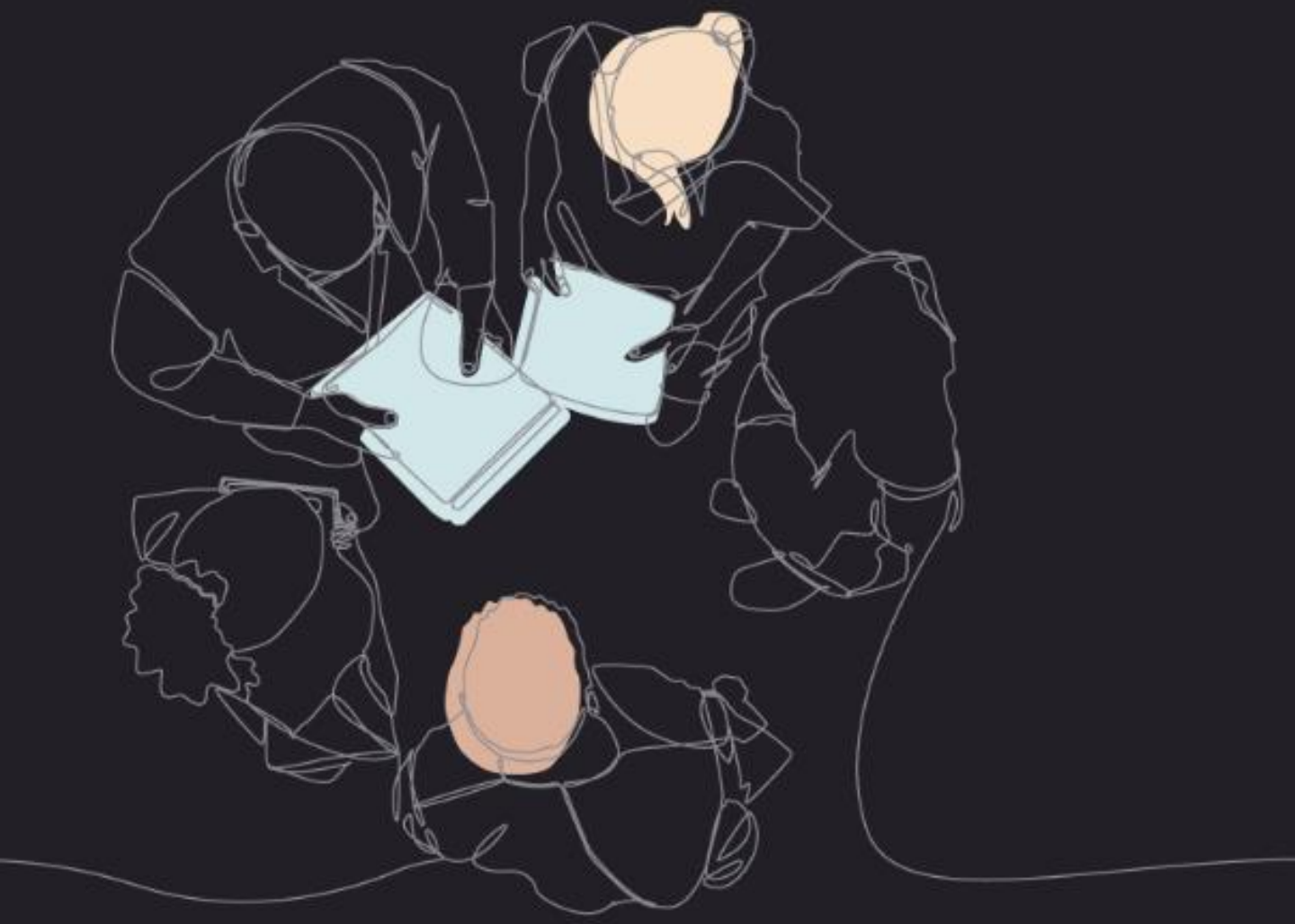

Executive summary

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Heart valve disease (HVD), particularly aortic stenosis, is frequently underdiagnosed despite its severe consequences when untreated. Earlier detection of abnormal heart murmurs is essential to enable timely treatment and reduce pressure on healthcare systems.

This case study demonstrates the potential of community pharmacies to identify previously undiagnosed HVD using **eMurmur Heart AI**, which enables pharmacists to detect abnormal heart sounds and support referral decisions. By equipping non-specialist healthcare professionals with AI-assisted auscultation, pharmacies were able to identify patients who might otherwise have remained undiagnosed. During the pilot, two critical cases requiring immediate treatment were detected that had previously been missed.

Among 86 participants, referrals guided by eMurmur Heart AI outperformed GP referrals. Overall referrals decreased by 17%, unnecessary referrals for normal or trivial HVD fell by 57%, and the system identified 40% more patients with mild or moderate/severe HVD (14 vs. 10). These results highlight the potential of eMurmur Heart AI–enabled pharmacy screening to improve detection and referral of heart valve disease.

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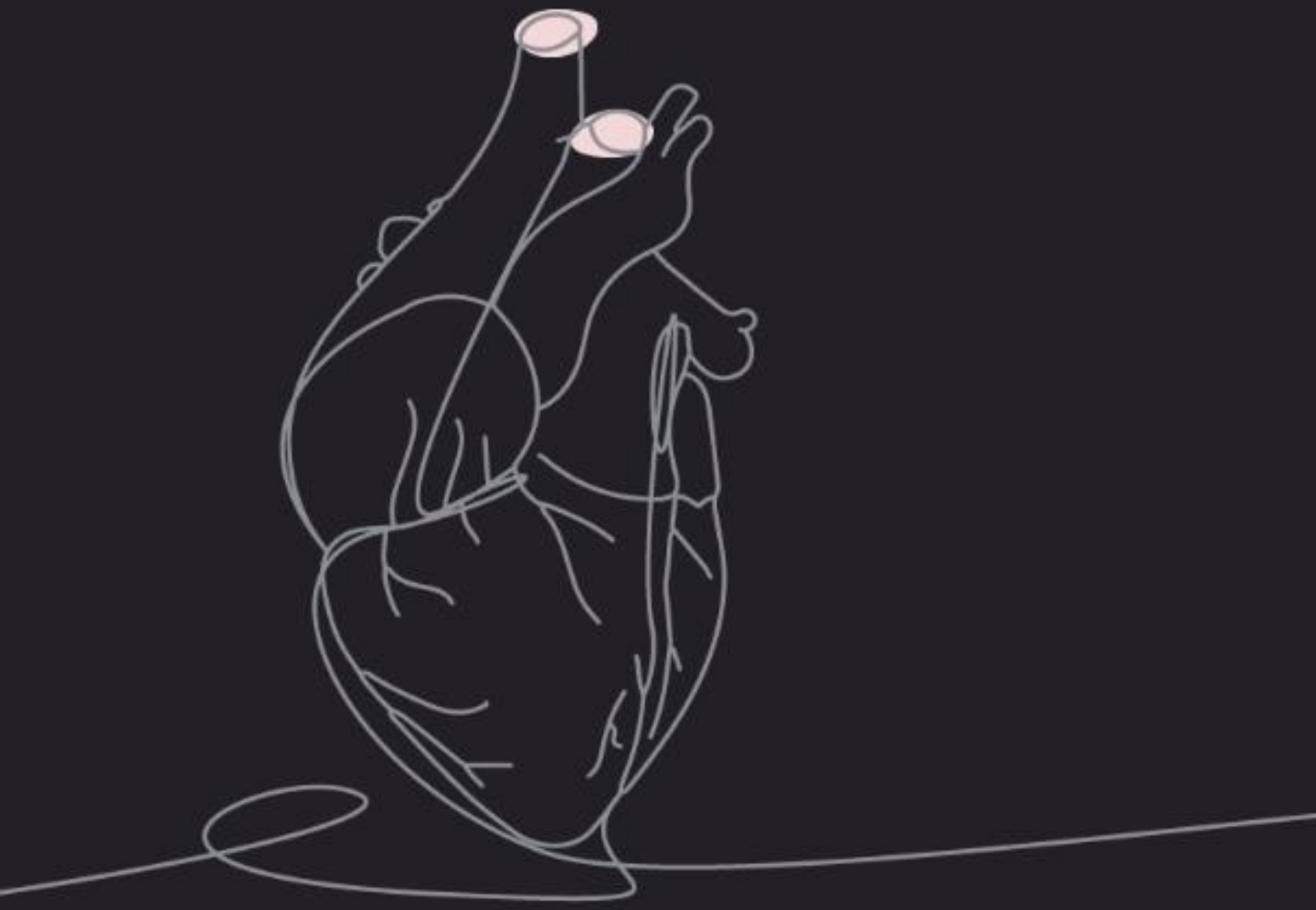

Invisible heart valve disease patients

Invisible heart valve disease patients

Cardiovascular diseases (CVD), along with cancer, are the largest causes of morbidity and mortality worldwide. While most know that heart attacks or strokes are immediately life threatening, there is much less awareness of heart valve disease (HVD) and chronic cardiac conditions such as aortic stenosis (the most common form of HVD), which, when severe and untreated, has a prognosis worse than most cancers. For instance, up to 50% of people with severe aortic stenosis who do not receive effective or appropriate treatment do not survive two years. Its prevalence increases with age and its associated symptoms, such as fatigue and breathlessness, are often attributed to advancing years, so patients tend to be identified much later when the disease is advanced.

People with moderate-to-severe HVD are commonly left undiagnosed and untreated; in England, for example, up to 53% of patients with severe AS remain untreated each year. These invisible patients cannot access life-saving treatment options to replace or repair their heart valves. Untreated HVD is not only a disaster for patient health and wellbeing, it also places an unsustainable burden on the healthcare system. Heart valve disease outcomes are improved by preventative measures and earlier detection and diagnosis of abnormal heart murmurs.

The challenge

The challenge

With such a large number of people with undiagnosed and untreated HVD, how could the problem be addressed?

For this case study, a service evaluation was developed to test whether digital auscultation using eMurmur Heart AI by a community pharmacist could be an effective gateway to the diagnosis and treatment HVD. It was designed to assess whether a meaningful number of abnormal heart murmurs could be detected, and whether this would translate to a meaningful number of HVD diagnoses.

The traditional entry point for HVD identification is primary care, where a patient presents to their GP with symptoms of HVD or during a chronic disease management visit with a nurse practitioner. In our case study, patients presented to a pharmacist in a community pharmacy. Community pharmacists are highly accessible healthcare professionals who are generally well trusted by patients. They could increase the detection of undiagnosed HVD in the community with the aid of electronic stethoscope technology and eMurmur Heart AI (artificial intelligence) software that provides abnormal murmur detection.

The solution

The solution

Community pharmacy as an entry point to HVD detection

The pharmacist was trained to use the eMurmur Heart AI software which provides automated abnormal heart murmur detection. Heart sounds were recorded using an electronic stethoscope. All patients over a certain age were eligible, as well as any patient with: hypertension, type 2 diabetes, ischemic heart disease, or atrial fibrillation. It was also decided that walk-ins with symptoms suggestive of HVD would be accepted. At the point of dispensing, eligible patients were given a leaflet about the service, accompanied by face-to-face engagement or a follow-up telephone call.

Where an abnormal murmur was detected by eMurmur Heart AI during the auscultation appointment, a digital copy of the eMurmur Auscultation Report was sent to the community echocardiography service and copied to their GP. The echocardiography service assessed and categorized the patients into significant murmurs (needing follow-up or immediate management) or insignificant murmurs (could be returned to their GP with no follow-up). Where no murmur was detected during auscultation, GPs were notified that the patient had undergone the test.

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Clinical outcomes

Clinical outcomes

A total of 86 participants were enrolled. Following echocardiography, patients were classified into one of three categories: as normal or with trivial HVD, mild HVD, or moderate/severe HVD. For every category, community pharmacy referrals based on the latest eMurmur Heart AI algorithm significantly outperformed GP referrals:

- Overall referrals based on eMurmur Heart AI output decreased by 17%.
- eMurmur Heart AI based **referrals of patients with normal or trivial HVD decreased by 57%**. GPs referred 58% (14/24) vs 30% (6/20) by community pharmacy / eMurmur Heart AI.
- For patients with mild HVD, GPs referred 33% (8/24) vs 45% (9/20) by community pharmacy / eMurmur Heart AI.
- **eMurmur Heart AI found 40% more patients with mild or moderate/severe HVD** than GPs (14 vs 10 patients). GPs referred 42% (10/24) vs 70% (14/20) by community pharmacy / eMurmur Heart AI.

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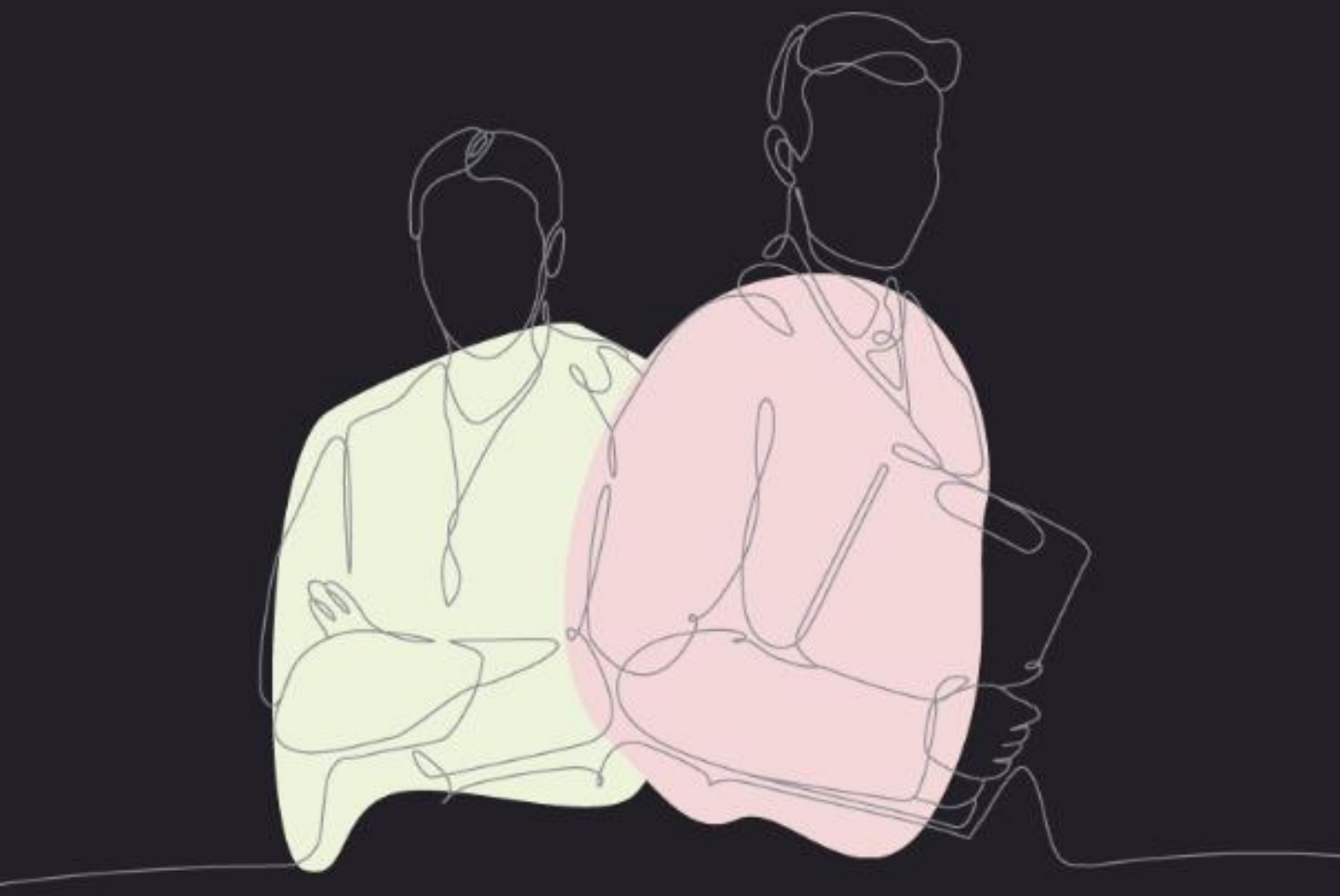

Impact

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This case study highlights that community pharmacists could play an important role in proactive detection of HVD, by identifying and referring patients who would not otherwise have been found. Crucially, the eMurmur Heart AI technology can support healthcare professionals to make potentially lifesaving referral decisions, by enabling rapid detection and data sharing with specialist colleagues. This was powerfully illustrated during the pilot project in two critical cases requiring immediate treatment, which had previously been missed by clinicians unfamiliar with specialist auscultation.

The case study shows that community pharmacy referrals, made outside the usual GP/hospital route, could result in successful diagnoses of otherwise undetected serious disease, and the accessibility of this community service could be a powerful asset to the HVD pathway. Further it showed that diagnostics can be undertaken effectively by non-specialists (pharmacists), with interpretative assistance from an AI algorithm. It demonstrated an excellent service, endorsed by pharmacists who used it, and the benefits of utilizing the full capabilities of community pharmacists when equipped with innovative technology like eMurmur Heart AI.