

ALIVECOR®



Revolutionizing Personal Heart Health Monitoring

Artificial intelligence based ECG
monitoring



AliveCor and Vieroots Collaborate on Direct-to-Consumer (D2C) Solution



- Direct-to-consumer (D2C) solution for personal health monitoring
- Leverage AliveCor's expertise in ECG devices & remote monitoring services, and Vieroots' D2C network for personalized healthcare
- Provide personalized health insights and recommendations based on the individual's genetic and lifestyle data
- Allow individuals to monitor their heart health from the comfort of their own homes
- Easy to use, affordable, and accessible Health offering for everyone



Company Overviews and Collaboration Outlook

- AliveCor: A medical technology company that produces mobile electrocardiogram (ECG) devices and provides remote heart monitoring services
- Vieroots: A health and wellness company that uses cutting-edge technology to promote personalized and preventive healthcare
- Collaboration represents a significant step forward in personalized and preventive healthcare
- The D2C solution will empower individuals to take control of their heart health and lead healthier, happier lives.
- To combine the expertise of both companies to create innovative services that improve heart health.



ALIVECOR®

 VIERROOTS®



Overview of Heart Disease in India

- Heart disease is a major health problem in India, accounting for a significant number of deaths and disability-adjusted life years (DALYs).
- According to the Global Burden of Disease study, Ischemic heart disease (IHD) is the leading cause of death in India, followed by stroke.
- The burden of heart disease is increasing in India due to changes in lifestyle and dietary habits.
- Prevalence of diabetes in India is increasing. India will have the largest number of people with diabetes by 2030.



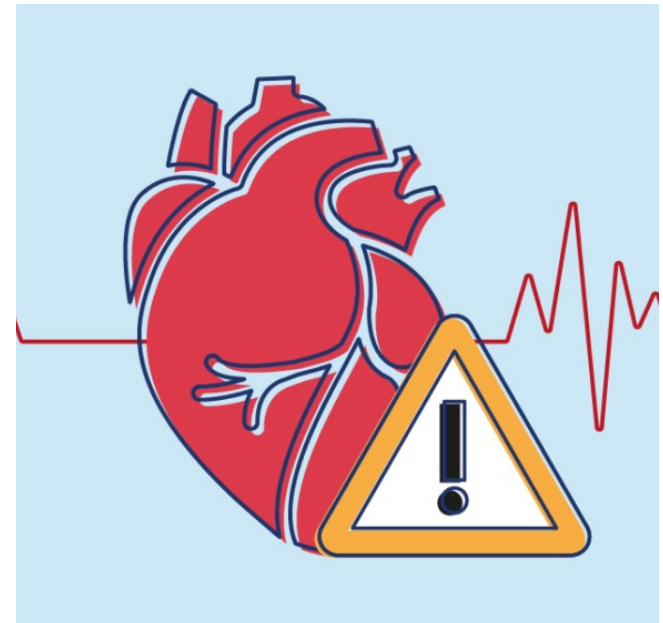
•Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2020.

•Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: current epidemiology and future directions. *Circulation*. 2016;133(16):1605-1620.

•Mohan V, Sandeep S, Deepa R, et al. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res*. 2007;125(3):217-230.

Prevalence of Risk Factors for Heart Disease in India

- Prevalence of risk factors for heart disease is high, including hypertension, diabetes, obesity, smoking, and dyslipidaemia.
- According to an ICMR study, about one-third of the Indian population has hypertension.
- Prevalence of diabetes in India is increasing. India will have the largest number of people with diabetes by 2030.



•Anand K, Shah B, Yadav K, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertens.* 2014;32(6):1170-1177.

•Mohan V, Sandeep S, Deepa R, et al. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res.* 2007;125(3):217-230.

Lack of Awareness and Access to Healthcare

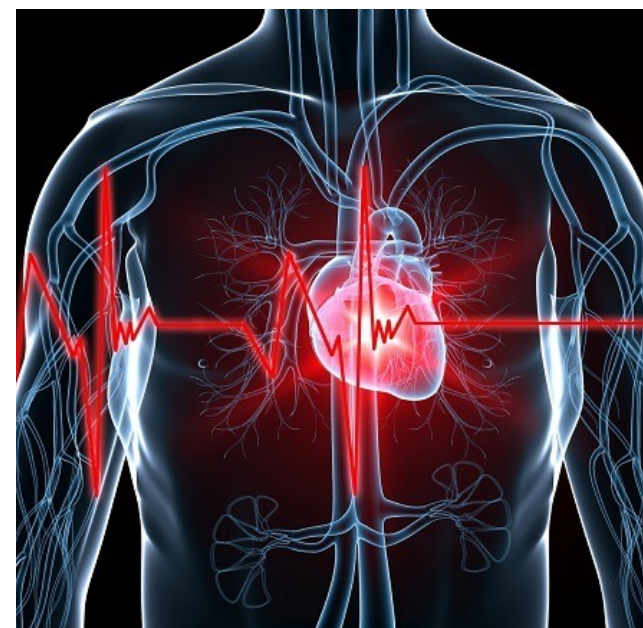
- Lack of awareness about heart disease and its risk factors is a major issue in India.
- Many people in rural areas of India do not have access to healthcare facilities or health education programs.
- The lack of trained healthcare professionals and adequate medical facilities in remote areas also contributes to poor health outcomes.



Bhatnagar K, Srivastava S, Deb PK, et al. A review of the healthcare system in India: current challenges and future prospects. *Int J Environ Res Public Health*. 2021;18(4):1979.; Gupta R, Mohan I, Narula J. Trends in coronary heart disease epidemiology in India. *Ann Glob Health*. 2016;82(2):307-315.

Cardiovascular Disease burden & ECG

- Cardiovascular diseases (CVDs) are the leading cause of death globally
- National Essential Diagnostic List **recommends ECG** at Primary, Community, Sub District, and District Health Hospitals for middle-and-low-income families
- Atrial fibrillation is the world's most common cardiac arrhythmia and, if untreated, increases the risk of stroke by upwards of five-fold



•Cardiovascular diseases (CVDs). [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)). Accessed on 08 April 2022

•National Essential Diagnostics List. Indian Council of Medical Research. https://main.icmr.nic.in/sites/default/files/guidelines/NEDL_2019.pdf. accessed on 08 April 2022.

•Atrial Fibrillation. https://www.cdc.gov/heartdisease/atrial_fibrillation.htm. Accessed on 08 April 2022.

KardiaMobile 6L- The Right Remote ECG Monitoring Device: 6X view of the Heart

- Easy to use
- Clinically validated device by research publications
- US FDA Cleared; NICE (NHS-UK) recommended; CE Mark
- 6-lead device: Six leads a more-detailed view of the heart and include: Lead I, Lead II, Lead III, aVF, aVR, and aVL
- The AI of the connected device should detect common arrhythmias and normal sinus rhythm
- Seamless integration with the Kardia app

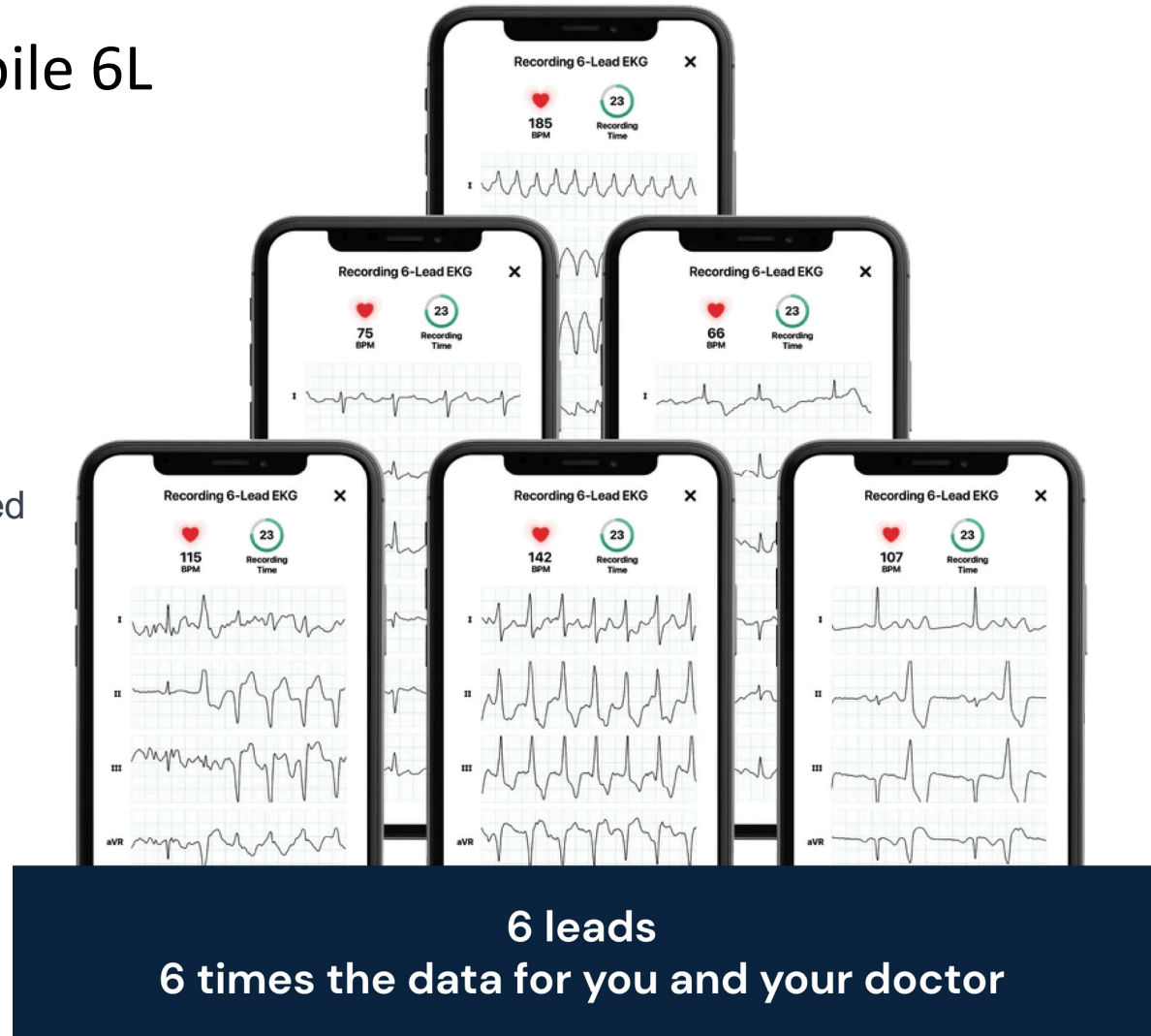
AI Based Determinations:

- Normal Sinus Rhythm
- Possible Atrial Fibrillation
- Bradycardia
- Tachycardia
- Normal Sinus Rhythm with Supraventricular Ectopies
- Sinus Rhythm with Pre-Mature Ventricular Contractions
- Sinus Rhythm with Wide QRS
- Instant QT measurement
- Unclassified



Key Benefits of KardiaMobile 6L

- Early detection of heart conditions.
- Convenient and easy-to-use heart monitoring that empowers patients to take control of their heart health.
- Improved communication between patients and healthcare providers, leading to better and more personalized treatment.



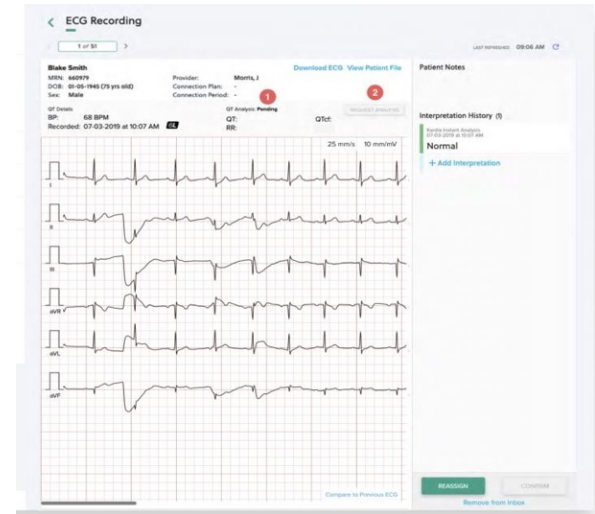
Additional Capabilities for Clinicians/ HCPs



Patient uses their personal ECG monitor on the app



Cloud computing & real-time connectivity



Hospital or Clinic based software solutions for HCPs to make quick treatment decisions remotely and in real-time.

Remote Monitoring



Integrating in-patient and out-patient care

In-Patient & Out-Patient Setup



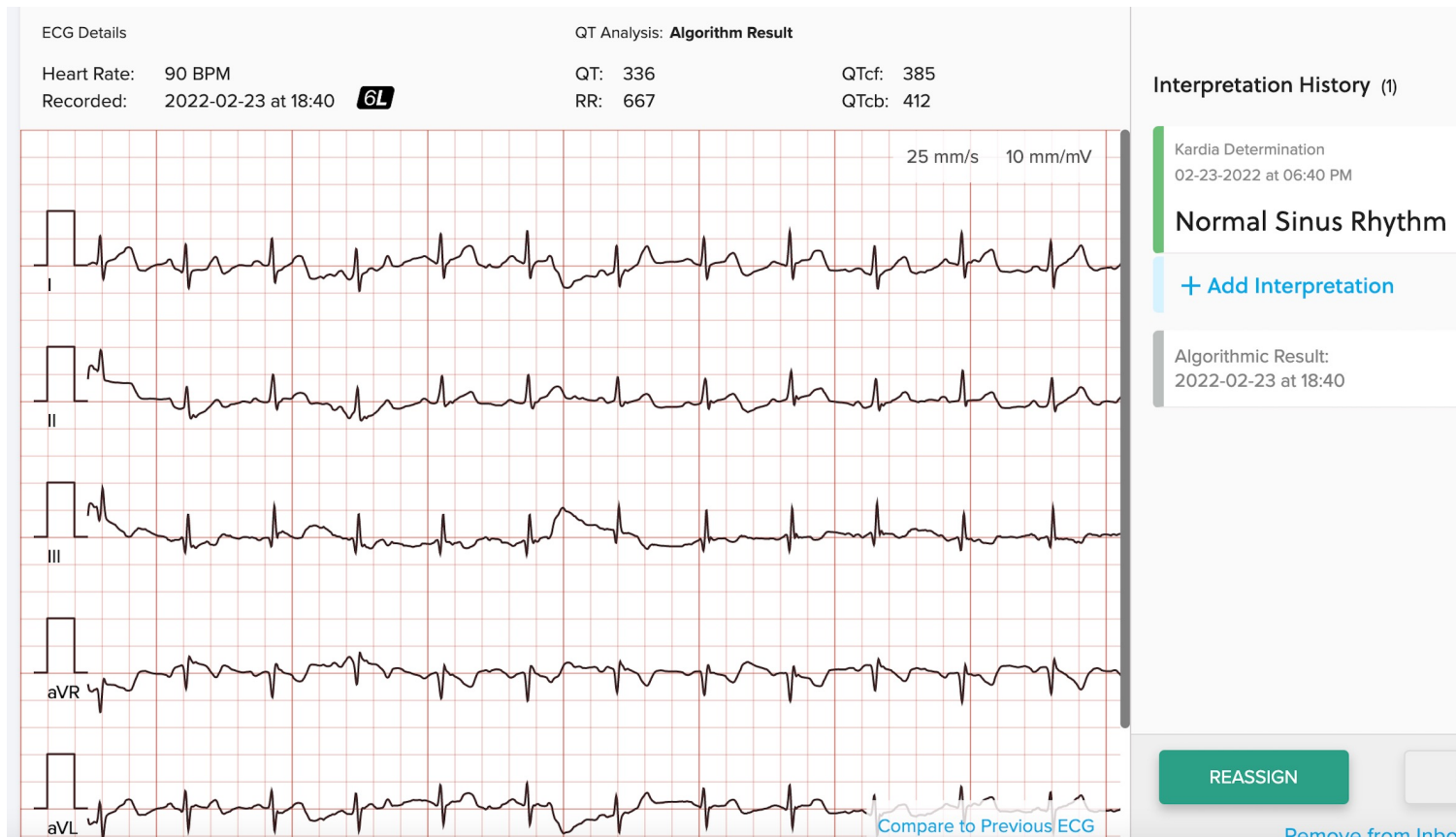
Patient records ECG in-clinic or OPD on the app, also for screening camps

ECG lands on the Clinician's desk computer with

- AI enabled determinations
- Instant QT analysis

Nurse/ attendant helps the patient record an ECG

Typical ECG Report in the Hospital or Clinic based software solution



- With clear ECG graphs
- Instant QT measurements
- Ability to reassign or refer
- Add interpretations manually by going through the ECG

Indications Of Remote ECG Monitoring

Individuals who want to take control of their health and wellness

- People with a family history of heart disease or other health conditions
- Who want to monitor their health proactively

People with heart conditions like hypertension, heart rhythm issues, etc.

- Who find it difficult to manage their health effectively
- Investigation of palpitation, chest pain and syncope

Healthcare providers & institutions looking for a reliable and convenient heart monitoring device

- Evaluation of Arrhythmia treatment
- Screening of patients with risk for structural heart disease or cryptogenic stroke
- Recommendation for home use

Wellness Use Cases

- KardiaMobile 6L as a tool for personal monitoring and preventive wellness, especially if cardiac monitoring is recommended as a part of 'EPLIMO' assessment
- Use in tracking heart health and identifying early warning signs
- Use in wellness programs and corporate health initiatives
- Benefits for employee health and reducing healthcare costs
- For Preventive healthcare in Residential Housing Societies (RWAs)
- For health screening camps to evaluate cardiac health

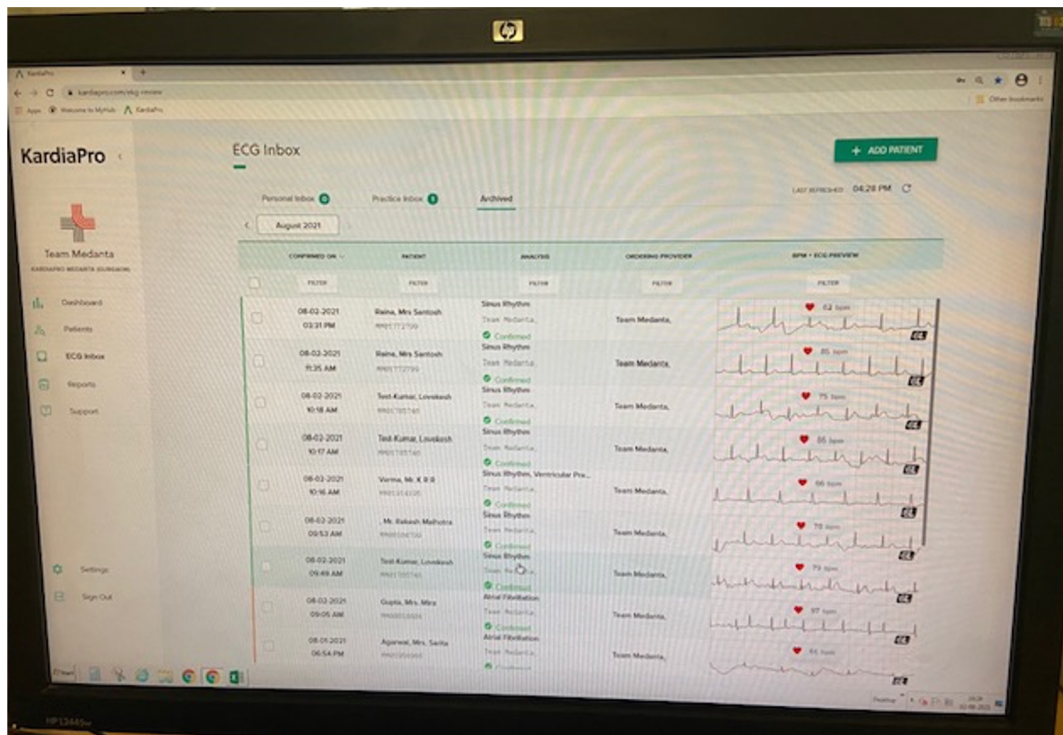


Implementation at Medanta

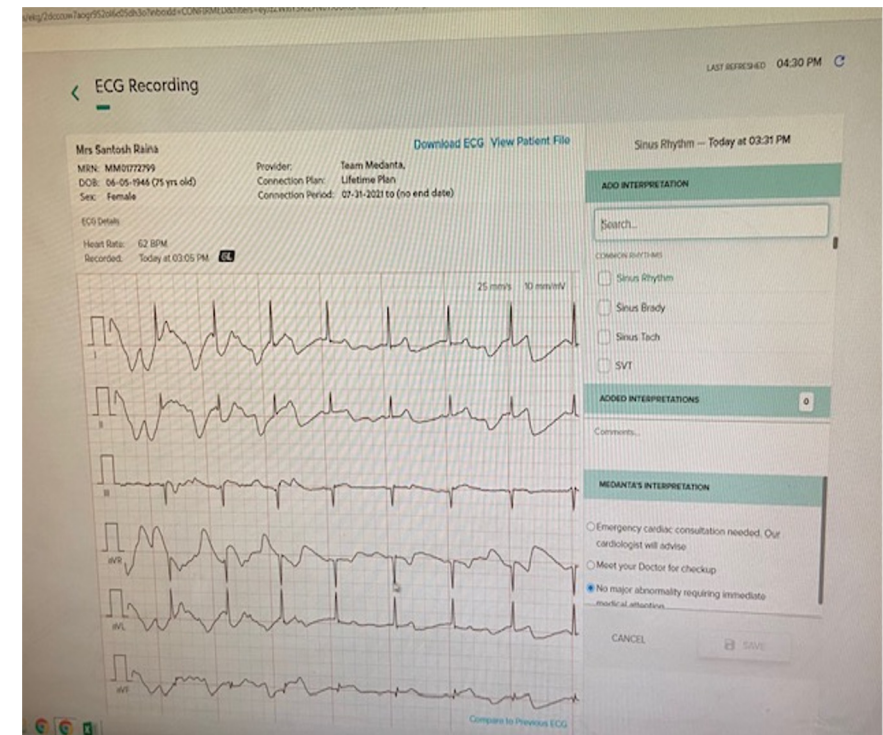
AliveCor Success Story

AliveCor Desk in Heart Command Center, Medanta the Medicity



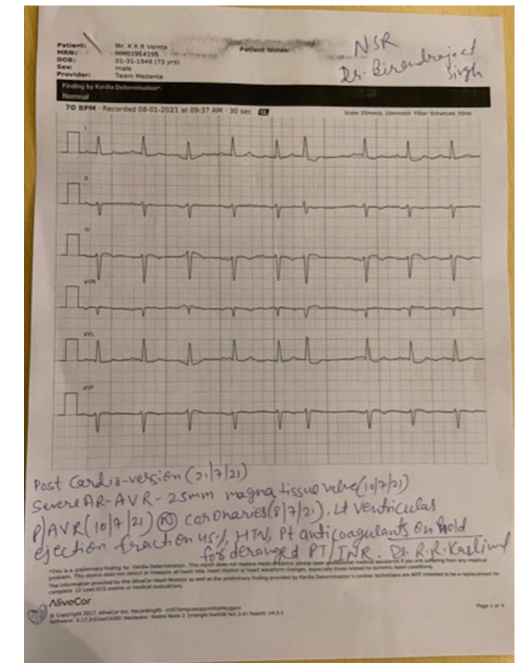
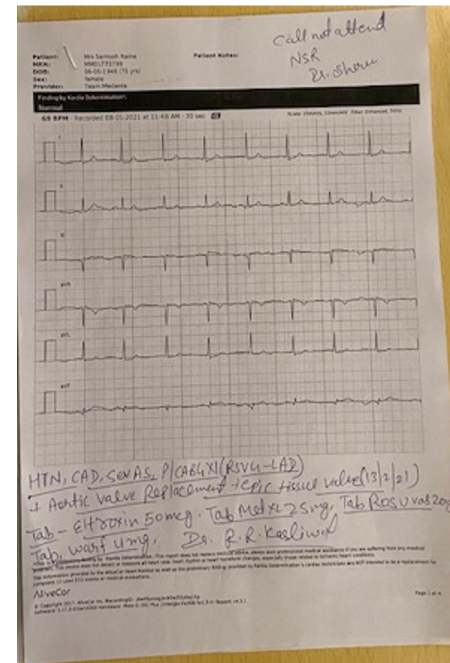
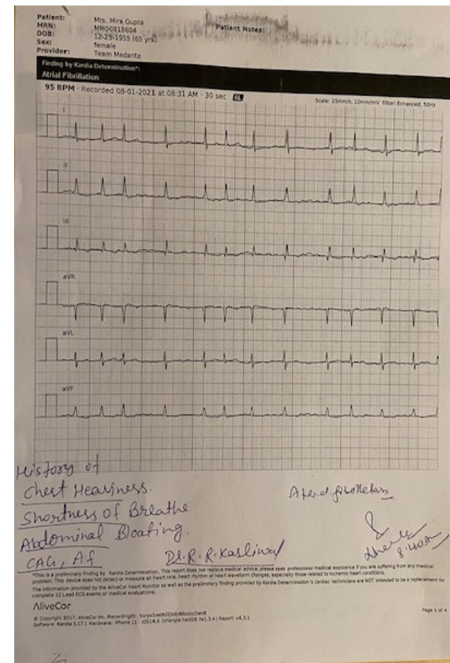
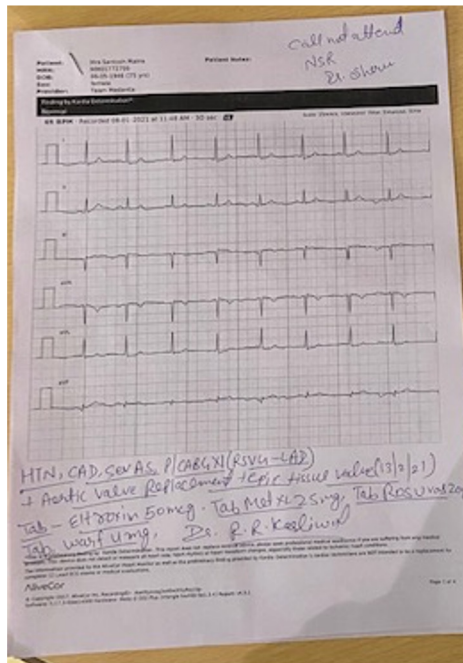


Remote ECGs received on the patient data management system- Kardiapro



Each 6 lead ECG report is over-read by a cardiologist on real time basis

ECGs received , seen and interpreted by the cardiologist in HCC



Patient is instructed whether he/she needs immediate attention and should rush to an ER or can wait to F/U in OPD later.
Immediate actionable diagnosis.

Medanta Study on Remote ECG Monitoring

Primary objective: To assess the utility of smartphone-based event recorder (AliveCor KardiaMobile 6L) in detection of intermittent cardiac arrhythmias in patients presenting to the Cardiology department with symptoms suggestive of cardiac disease with no obvious cause evident at initial consultation.

Primary end-point: Symptomatic rhythm detection rate

Study Design:

Study Type: Observational, Interventional

Intervention: A hand-held ECG device is provided to patients with intermittent cardiac symptoms over and above standard of care. Patients are instructed to record an ECG when they experience symptoms. The device transmits 6 lead ECG in real time to the cardiac team in HCC. Cardiac abnormalities are reported to the clinical team who then assess the abnormality and intervene as clinically necessary.

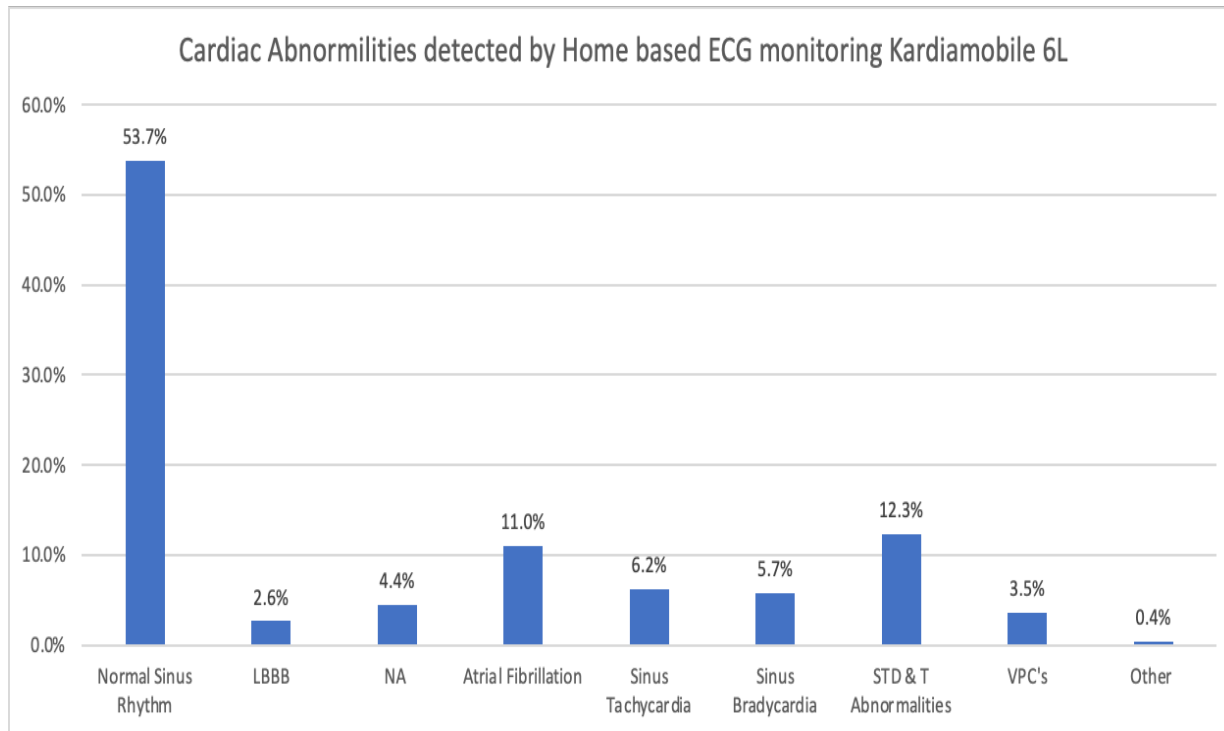
Study duration: April 2021- Feb 2023

Study population: Adult patients willing to participate who fulfil the inclusion criteria

Patient Profile			
Variables		Number	Percentage
Patient Number		227	
Mean Age		60 Years	
Intervention	CABG	31	14%
	PTCA	25	11%
	Both	13	6%
Clinical Mororbidites	DM	32	14%
	HTN	39	17%
	CKD	24	11%
	CVA	21	9%
	CAD	42	19%
LVEF	<40%	59	26%
	>40%	75	33%
	>50%	93	41%

Patients were classified in terms of intervention, comorbidities and LVEF

Over 40% patients did not report a Normal Sinus Rhythm



Cardiac Abnormalities detected by Home based ECG monitoring Kardiamobile 6L		
Cardiac Abnormalities	Count	Percentage
Normal Sinus Rhythm	122	53.7%
LBBB	6	2.6%
NA	10	4.4%
Atrial Fibrillation	25	11.0%
Sinus Tachycardia	14	6.2%
Sinus Bradycardia	13	5.7%
STD & T Abnormalities	28	12.3%
VPC's	8	3.5%
Other	1	0.4%
TOTAL Patients	227	100.0%

Success Stories- Vie Roots

Pricing and Incentives

Why KardiaMobile 6L?

- Only personal ECG device with six-lead capabilities, providing 6X more detailed heart data and better accuracy.
- Compact and portable design sets it apart from traditional ECG machines- which are often bulky and require a visit to a healthcare facility.
- Game-changing device for heart health monitoring, providing patients and healthcare providers with detailed and accurate heart data from anywhere, at any time.



Thank You

Atrial fibrillation increases mortality and morbidity in the post-operative period

A-Fib Incidence

5-40% patients after CABG

Asher CR et al Am JCardiol. 1998

37-50% after valve surgery

64% undergoing MVR+CABG

49% undergoing AVR+CABG

Creswell LL, et al Ann Thorac Surg. 1993;56:539-49

12% after cardiac transplantation

Pavri BB et al J Am Coll Cardiol. 1995;25:1673-80

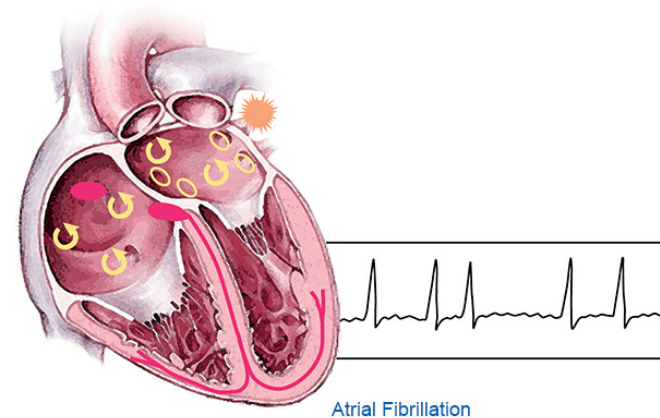
CABG: Coronary artery bypass graft

MVR: Mitral valve repair

AVR: Aortic valve repair

AF: Atrial Fibrillation

In over 50 studies, AF detection rates ranged from 0% with 24-hour Holter to >30% with ≥ 30 -day remote monitoring. Meta-analysis showed that single time point screening (for 30-60 seconds) has an approx. 1% AF detection rate, which can be increased to around 5% with multiple recordings.



Rationale for Remote ECG in AF

- AF is the most common cause of stroke in elderly population.
- Stroke recurrence rate of is as high as 30%, mostly during the first year, and carries higher mortality rates
- Almost 30% of all strokes remain without an identifiable cause after extensive workup and are thus referred to as “cryptogenic”.
- Occult paroxysmal AF seems to be one of the culprits of “cryptogenic” stroke
- Since asymptomatic AF is 12 times more frequent than symptomatic AF, detecting the arrhythmia in these patients is crucial.
- AF detection depends not only on monitoring duration, but also on the moment of the monitoring from the time of the stroke.

Arrhythmia Management

Challenges

Lack of an effective screening strategy for Atrial fibrillation



Challenges in Diagnosis, risk stratification & pinpointing the underlying causes



Challenges in establishing cost-effectiveness of various interventions



Evolution

Remote management and real time connectivity are being sought after by both patients and caregivers



This has helped bring down hospital and clinic visits for the patients yet maintaining the same standard of care



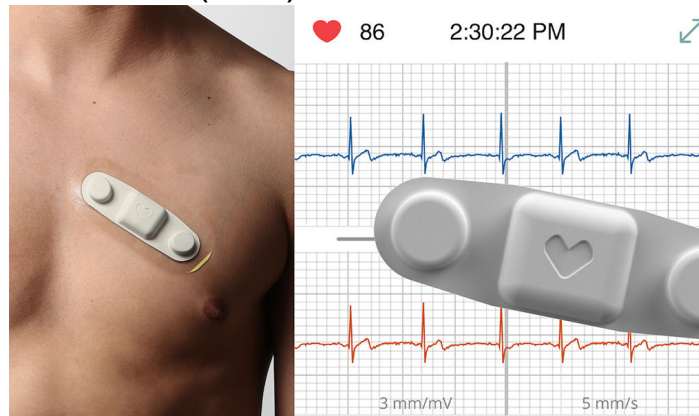
- Freedman, Ben, et al. *Circulation* 135.19 (2017): 1851-1867
- Nattel, Stanley, Mario Talajic, and Jean-Claude Tardif. *Canadian Journal of Cardiology* 30.12 (2014): S399-S400.
- Liu, Kui, et al. *Chinese medical journal* 133.09 (2020): 1025-1031

Available Monitoring Techniques

Holter Monitoring



Patch ECG monitors & External loop recorders (ELR)



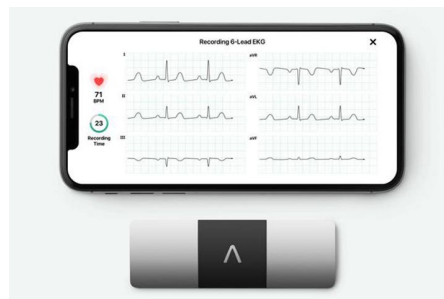
Implantable loop recorder (ILR)



Multilead mobile cardiac telemetry (MCT)



AI based event monitors



Accuracy & Performance of KardiaMobile 6L

- KardiaMobile 6L had a sensitivity of 98.5% and a specificity of 97.7% for detecting atrial fibrillation (AF) when compared to a traditional 12-lead ECG.

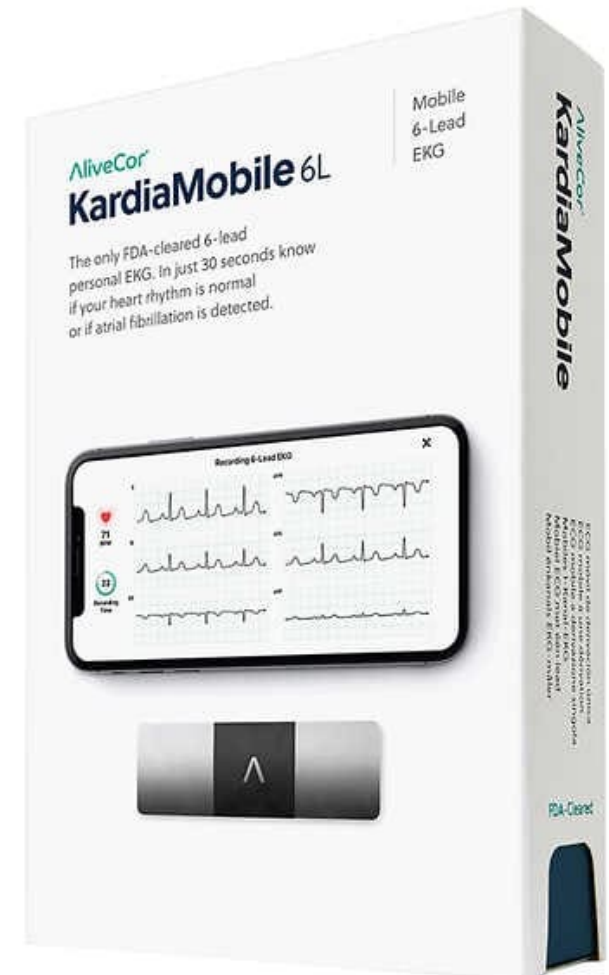
Turakhia et al. (2019)

- KardiaMobile 6L was found to have a high diagnostic yield for AF, with 8.9% of participants receiving a new diagnosis of AF.
- Easy to use with a high patient satisfaction rate.

Lowres et al. (2019)

- A study compared the diagnostic accuracy of KardiaMobile 6L to two other portable ECG devices. KardiaMobile 6L had a higher sensitivity and specificity for detecting AF compared to the other devices.

Desteghe et al. (2020)



Accuracy & Performance of KardiaMobile 6L

- Diagnostic accuracy of KardiaMobile 6L compared to a 12-lead ECG in 1,000 patients.
 - KardiaMobile 6L had a sensitivity of 95% and a specificity of 96% in detecting atrial fibrillation.
- KardiaMobile 6L had a sensitivity of 87.9% and a specificity of 97.5% in detecting premature ventricular contractions, another common arrhythmia.
- Diagnostic yield of KardiaMobile 6L compared to a 12-lead ECG in 100 patients with palpitations.
 - KardiaMobile 6L identified more arrhythmias than the 12-lead ECG (56% vs. 13%).
- KardiaMobile 6L had a higher diagnostic accuracy than traditional Holter monitoring in detecting atrial fibrillation (94% vs. 70%).

- Steinhubl SR, Waalen J, Edwards AM, et al. Effectiveness of a smartphone application for arrhythmia detection in a low-resource setting: a randomized clinical trial. *JAMA Cardiol.* 2018;3(8):729-736.
- Bumgarner JM, Lambert CT, Hussein AA, et al. Smartwatch algorithm for automated detection of atrial fibrillation. *J Am Coll Cardiol.* 2018;71(21):2381-2388.
- Turakhia MP, Desai M, Hedlin H, et al. Rationale and design of a large-scale, app-based study to identify cardiac arrhythmias using a smartwatch: The Apple Heart Study. *Am Heart J.* 2019;207:66-75.
- Tison GH, Sanchez JM, Ballinger B, et al. Passive detection of atrial fibrillation using a commercially available smartwatch. *JAMA Cardiol.* 2018;3(5):409-416.
- Marzec LN, Wang J, Shah ND, Chan PS, Ting HH, Gosch KL, Hsu JC, Maddox TM. Influence of direct oral anticoagulants on rates of oral anticoagulation for atrial fibrillation. *J Am Coll Cardiol.* 2017; 69:2475-2484.



More Evidence compared to Standard of Care

- Portable AI ECG & 12-lead ECG median beats were very similar. Pearson correlation coefficient for all leads across all patients was 0.991. The six individual lead-specific correlation coefficients ranged from 0.993 (lead II) to 0.980 (aVR) ($p < 0.0001$).¹
- Detected symptomatic arrhythmias within 10 days compared to 43 days with the standard of care²
- Outpatient monitoring for up to a year was significantly more likely to detect AF episodes compared to routine care³
- More than twice as likely to detect recurrent AF/AFI compared to standard of care post ablation⁴
- Long term monitoring, three times daily was more effective than routine Holter monitoring for 24 hours⁵
- Arrhythmias and heart failure are common and invalidating sequelae in adult patients with congenital heart disease (CHD). Mobile health (m-Health) enables daily monitoring and a timely response that might prevent deterioration.⁶

1. Stavrakis S, Whyte S, Sample K, et al. CLINICAL VALIDATION OF A NOVEL, SMARTPHONE-BASED 12-LEAD ECG DEVICE. *J Am Coll Cardiol*. 2022 Mar, 79 (9_Supplement) 2034. 2. Reed, Matthew J., et al. *EClinicalMedicine* 8 (2019): 37-46. 3. Halcox, Julian PJ, et al. *Circulation* 136.19 (2017): 1784-1794. 4. Hickey, Kathleen T., et al. *Journal of atrial fibrillation* 9.5 (2017). 5. Hermans, Astrid NL, et al. *International Journal of Cardiology* 329 (2021): 105-112. 6. Koole MAC, Kauw D, Winter MM, Dohmen DAJ, Tulevski II, de Haan R, Somsen GA, Schijven MP, Robbers-Visser D, Mulder BJM, Bouma BJ, Schuurin MJ. First real-world experience with mobile health telemonitoring in adult patients with congenital heart disease. *Neth Heart J*. 2019 Jan;27(1):30-37. doi: 10.1007/s12471-018-1201-6. PMID: 30488380; PMCID: PMC6311159.



Guideline Recommended Approach towards Remote Monitoring

More recently, smartphone-based ECG monitors have been developed that can be helpful for long-term intermittent surveillance.¹

2017 HRS/EHRA/ECAS/APHRS/SOLAECE Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation

Opportunistic screening by ECG strip is recommended in patients >65 years. Systemic ECG screening should be considered to detect Afib in patients >75 years or high risk of stroke.²

30 sec single-lead ECG is sufficient to diagnose and document A-fib.²

2020 ESC Afib Guidelines



1. Calkins, Hugh, et al. Ep Europace 20.1 (2018): e1-e160. 2. Hindricks et al, 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association of Cardio-Thoracic Surgery (EACTS). Eur Heart J, 2020.