

# Heart2Miss:

## Decentralized Community Rapid Cardiac Ultrasound Triage for Early Heart Failure Detection Using a Hub-and-Spoke Model



**Dr Diana H.P. Foo**

Clinical Research Centre

Sarawak General Hospital, Kuching, Sarawak, Malaysia.

# Fundings

- Heart2Miss was an initiative established with public-private partnerships in local community diabetes care.
- Study grants from AstraZeneca.
- Technical support and automated echocardiography software provided by Us2.AI.
- Study was designed, performed and independently analyzed by the study team.



# Disease burden of HF remains high, with challenges in early HF identification



## Disease Burden



HF is the **#1 cause of hospitalization** in people >65 years<sup>1,a</sup>



**Over 40%** have HF symptoms up to **5 years** prior to diagnosis<sup>2</sup>

**2x**

T2D+CKD **doubled** 1-year mortality or HF hospitalization<sup>3</sup>



## Workforce Gap<sup>4</sup>



**<20 nurses**

per 10,000 people in LMICs

vs

**80 nurses**

per 10,000 people in high-income countries

**55%** of countries (mostly LMICs) reported **insufficient nurses** to deliver primary care



## Complexities and delay in HF diagnosis



### Low patient identification

Lack of education and/or resources for HCPs to properly identify HF patients<sup>5,6</sup>



### Long wait lists

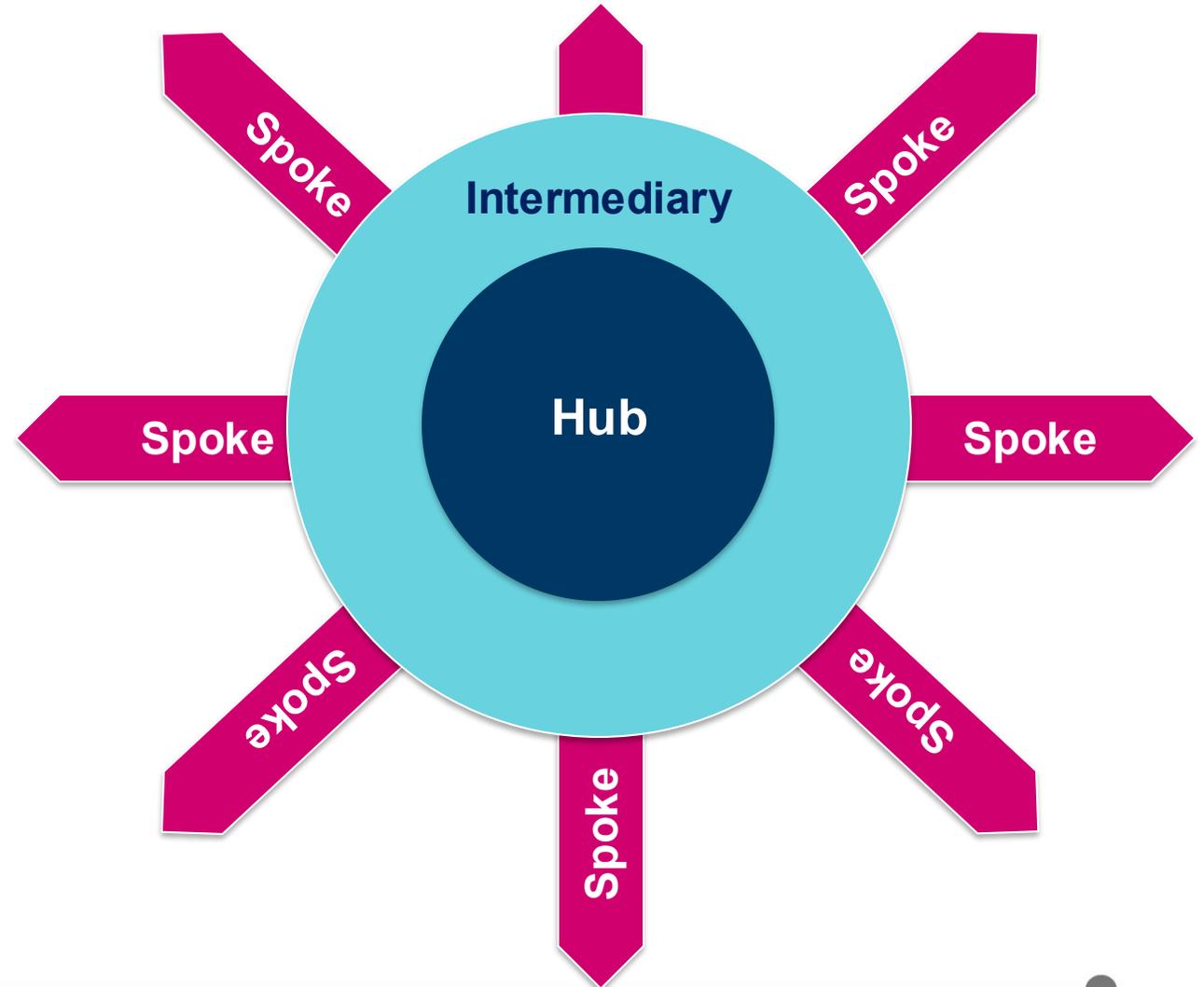
Appointments with cardiologists may be delayed in LMIC setting<sup>7</sup>



### Echo access challenges

Limited access to echocardiography in many regions and need for highly trained specialists

# Decentralized rapid echo triage model using hub-spoke approach provides scalable method for community-based HF screening



# Decentralized rapid echo triage model using hub-spoke approach provides scalable method for community-based HF screening



## Hub

### Tertiary Cardiology Referral Centre

- Establish diagnosis of HF
- Initiate treatment plan
- Procedural/Device intervention



## Intermediary

Train non-medical science grads as **mobile community sonographers**



**Telehealth verification** of initial AI-POCUS results



**Trigger standard TTE** for abnormal or incomplete cases



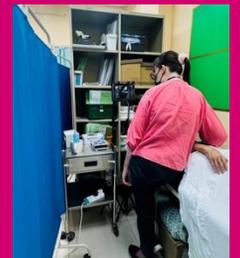
**Refer confirmed cases** to hub



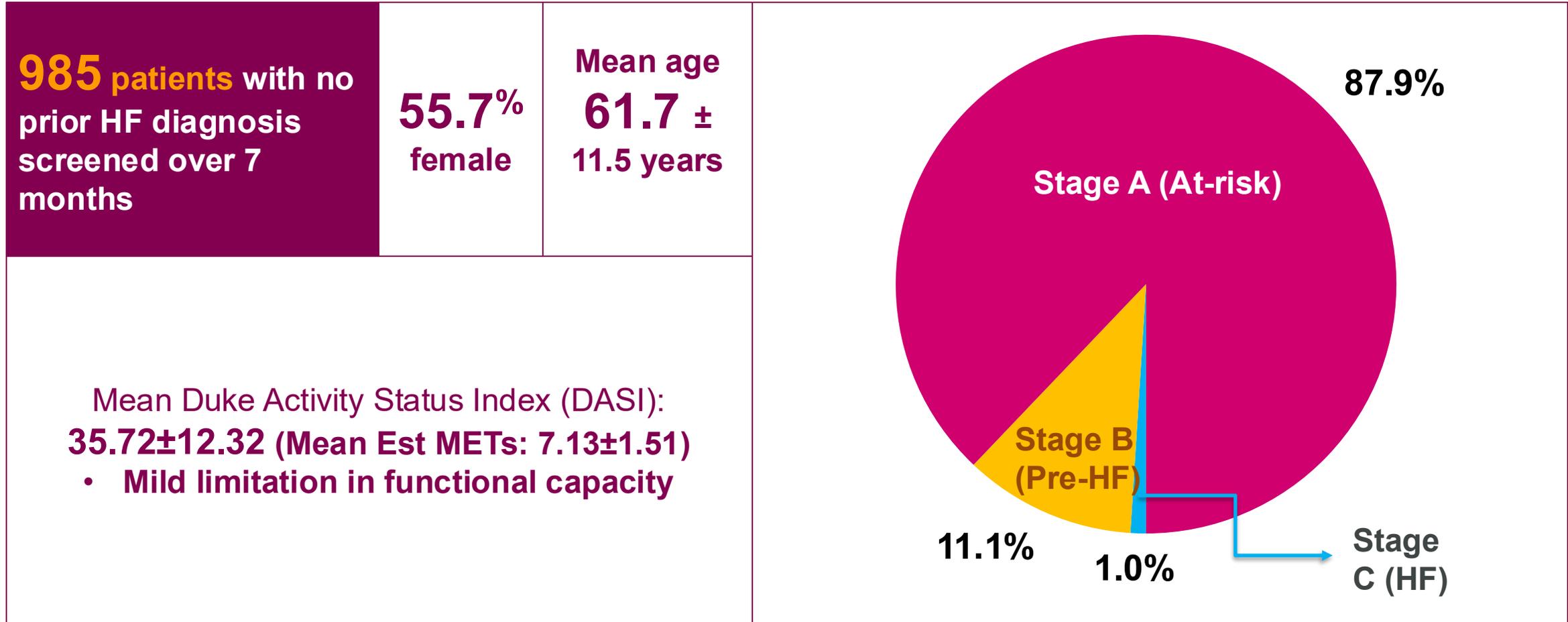
## Spoke

### Diabetes Primary Care

*Mobile Community Sonographers*

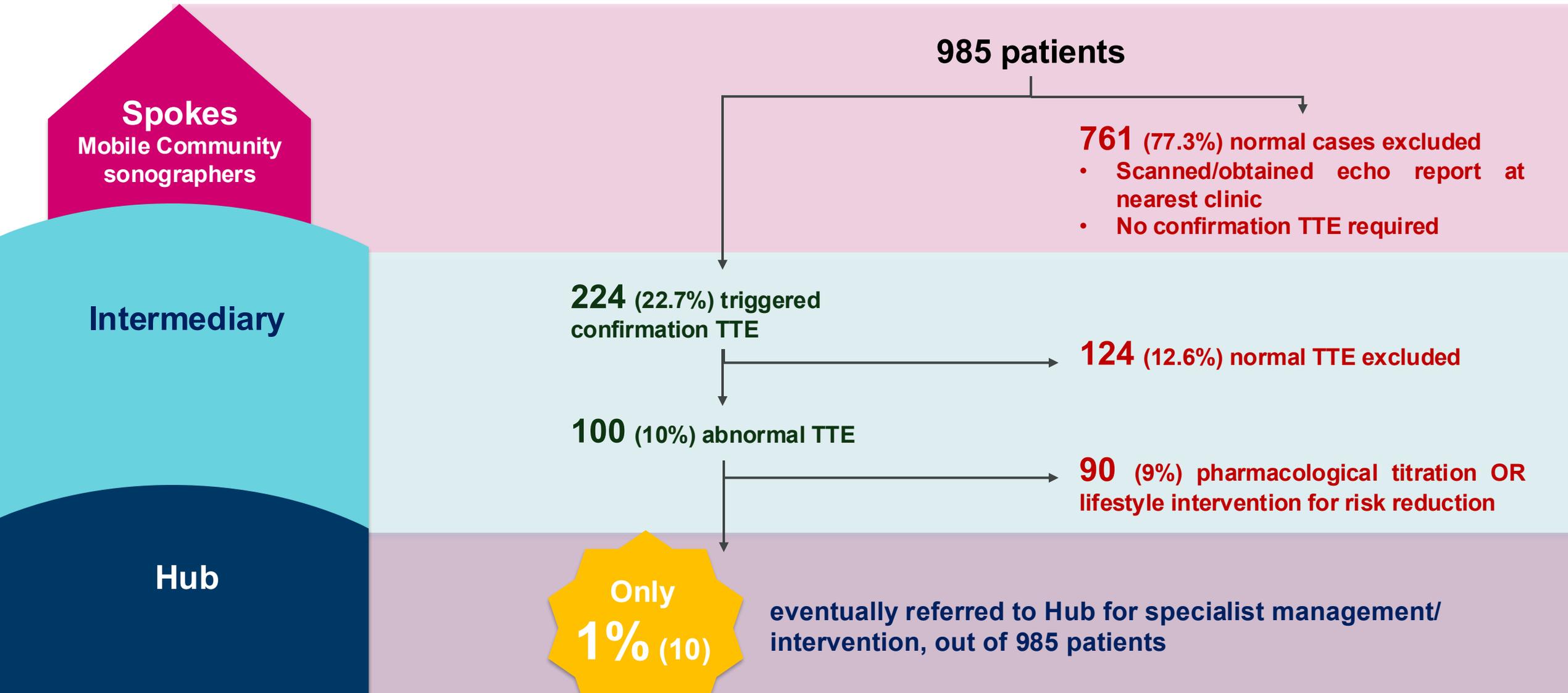


# Primary Outcome: Hub-Spoke-Intermediary Screening Model was effective in identifying prevalence rate based on HF staging



# Secondary Outcome: Hub-Spoke-Intermediary Screening Model reduces tertiary centre overload

*(Diagnostic burden, referrals and outpatient management burden)*

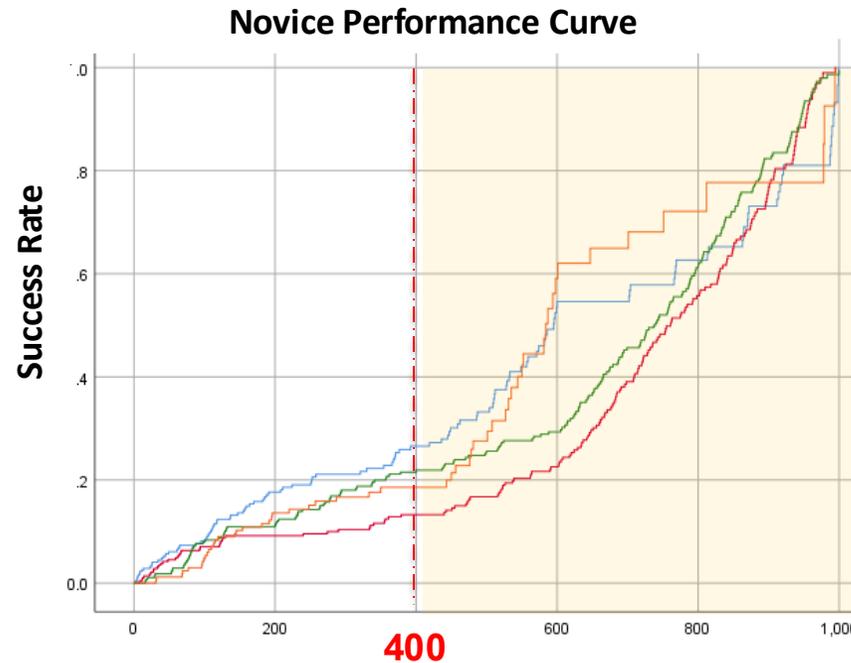


# Secondary Outcome: Novice performance significantly improves after 400 cumulative patient cases

Novice operators achieved **>85% analyzable scans** after just **4 weeks training**

Echo Parameter	Yield
IVSd	966 (98.1%)
LVPWd	953 (96.8%)
RWT	949 (96.3%)
LV mass index	949 (96.3%)
LVEDVi	897 (91.1%)
LVESVi	898 (91.2%)
LVEF	896 (91.1%)
LAVi	874 (88.7%)

Each individual novice operator showed **exponential up-trend after cumulative 400 cases.**



**Success Rate:**  
Defined as complete 3 echo views capture within 10 minutes

**Time taken** by novice operators to perform scans **reduced significantly**

	Case 1 - 400	Case 401 - 985
Time, minutes	<b>11.03</b> ± 5.28	<b>8.31</b> ± 4.41

**Mean difference: 2.31 min**  
(95% CI: 1.52-3.11),  $p < 0.001$

# Implications of Heart2Miss Study: Scaling Early HF Detection

## Beyond Partnerships → True Co-Creation



Public-private collaboration seeded **an evidence-based, real-world, scalable care model**, co-designed to meet **real local needs**

Not just deploy product/service

## Unlocking Untapped Talents → New Diagnostic Workforce



Trained underemployed bioscience graduates as **mobile community sonographers**

Create **new career pathways in health diagnostics**

## Driving System Change and Health Equity



Enable **early HF detection in underserved diabetes clinics** (Spokes)



**Relieve specialist bottlenecks** (Hub)



Build capacity **for sustainable & equitable community care**

# Thank you!

## Core Team (CRC SGH)

### PI & Co-PI



**Diana Foo (PI)**  
Clinician-  
Researcher



**John Yeo (Co-PI)**  
Clinician-  
Researcher

### Core Team Co-Is



**Macnicholson Igo**  
Echo Reader



**Mohammad Nor  
Azlan Sulaiman**  
Echo Reader



**Rose Jong**  
Novice Sonographer



**Alan Fong**  
Consultant  
Cardiologist



**Yenny Yeo**  
Project Manager

### Study Coordinators (SCs)



**Liana Lantong  
Sumbu**  
Novice Sonographer



**Stephanie Tayas  
Bumphray**  
Novice Sonographer



**Claudia Lennya  
Jana**  
Novice Sonographer

## Primary Care Co-Is



**Jennett  
Michael**  
KK Kota Sentosa



**Muhamad Irfan  
Yasin Ali Udin**  
KK Tanah Puteh



**Maila  
Mustapha**  
KK Jalan Masjid



**Maziah  
Ishak**  
KK Petra Jaya



**Sally Suriani  
Ahip**  
KK Kota  
Samarahan



**Lenny Martini  
Hamden**  
KK Batu Kawa