



# Time & Distance Saved from Remote Monitoring of International Normalized Ratio (INR) and Warfarin Titration in NHCS Anticoagulation Clinic (ACC)



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## Objectives

Warfarin is a commonly used anticoagulant for patients. The therapeutic effect of warfarin is monitored by International Normalized Ratio (INR) which requires frequent consults at the anticoagulation clinic (ACC). The project aims to cut down frequent visits and travel time for patients and caregivers by introducing remote INR monitoring.

## Methodology

**Convenience:** Remote Monitoring allows INR testing to be done and monitored at home. This cuts down visits to the clinic.

**Specialised Care:** Pharmacists monitor INR results and titrate warfarin dosages for subtherapeutic & suprathreshold readings accordingly.

230 patients were enrolled during the study duration, their mean age was  $57.94 \pm 19.44$  years; 56.1% were males (n=129).

Indication for warfarin	Percentage of patients
Atrial Fibrillation	24.8% (57)
Intracardiac Thrombus	7.4% (17)
Mechanical Heart Valve	69.6% (160)
Others	6.1% (14)

**01 Enrolment**  
230 patients on warfarin therapy at ACC clinics were enrolled into this study.

**02 Patient Education**  
Patients were given instructions on the use of INR point-of-care-testing monitor.

**03 INR Remote Monitoring**  
Patients would regularly check & transmit their INR results to pharmacists.

**04 Patient Management**  
Pharmacists would titrate the warfarin dosage as per institution standard protocol.

## Results

There were a total of 3593 INR transmissions, of which 21.2% were subtherapeutic (n=738), 64.4% were therapeutic (n=2239), and 14.4% were suprathreshold (n=500).

✓ No significant bleeding or thromboembolic events were noted in this group of patients.

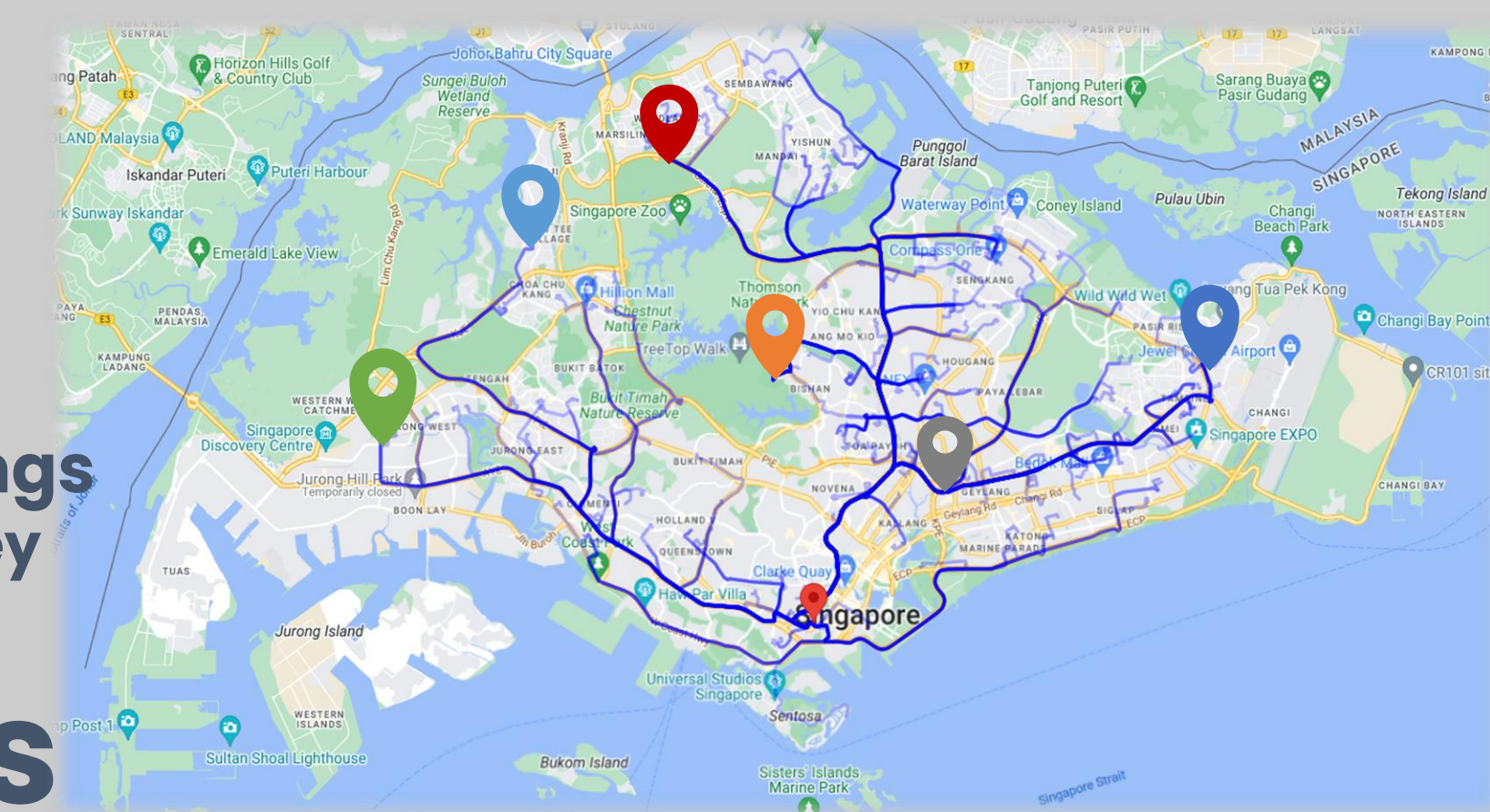
### Major Outcomes from Remote INR Monitoring

Cumulative Travel Distance Savings:

**118,520km**

Total Travel Time Savings (0.8hrs for two-way journey for each consultation):

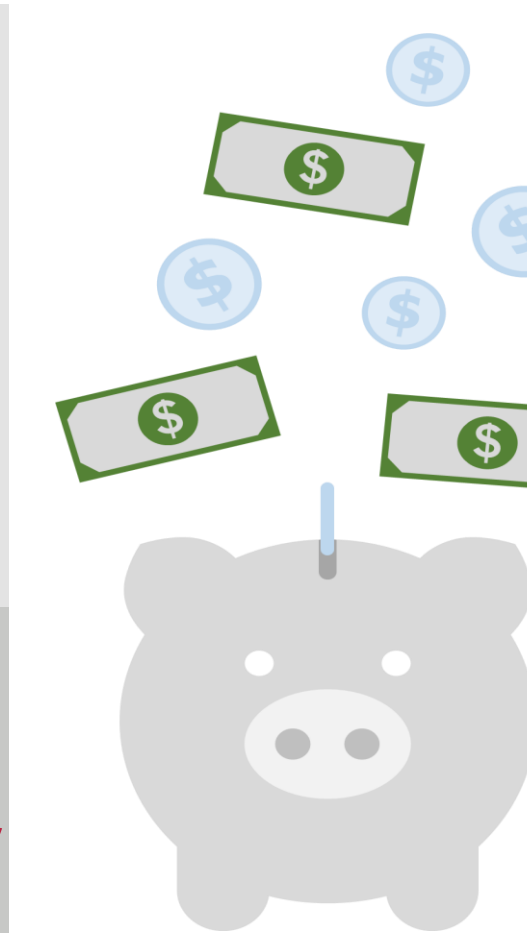
**2,861 hours**



📍 Two-way travel distance and time was calculated using Google API via car transport from each patient's residence to our institution.

**>3500**

Physical SOC Clinic Visits Avoided



Transportation cost & waiting time savings for Patients & Caregivers!

**Patient Empowerment:** Self-testing encourages patients to take an active role in their care, making informed decisions about their health.

**Improved Health Outcomes:** Regular INR monitoring can prevent blood clots and bleeding complications.

**Efficiency:** Streamlined workflow reduces visits to the doctor or laboratory.

**Better Utilisation of Healthcare Resources:** Reducing clinic appointments will free up healthcare resources to deliver timely care to other patients who need it more.

## Future Scope

Future research can be undertaken to develop machine learning (ML) algorithms to self-titrate warfarin dosages without input from healthcare professionals, thereby leading to further time and cost savings for healthcare systems.

## Conclusion

Remote monitoring of INR and titration of warfarin can lead to a significant decrease in travel time and distance and has the potential to improve overall patient experience.