Project Title

Cost-effectiveness of mobile clinic screening services for diabetes retinopathy management in Singapore

Project Lead and Members

Project lead: Chaitra Jagdish

Project members: Prof. Charumathi Sabanayagam, Alex Carter, Dr Kalpana Bhaskaran, Tiwari, He Feng

Organisation(s) Involved

Republic Polytechnic, Singapore Eye Research Institute (SERI), Singapore National Eye Centre (SNEC), Duke-NUS Medical School, London School of Economics, Diabetes Singapore

Healthcare Family Group(s) Involved in this Project

Ancillary Care

Applicable Specialty or Discipline

Ophthalmology, Endocrinology

Project Period

Start date: June 2023

Completed date: December 2023

Aims

To determine the incremental cost-effectiveness of mobile clinic AI-based assessment relative to an existing model of primary care-based assessment of diabetic retinopathy (DR) in Singapore from the health system and societal perspectives.

Background

See poster appended/ below

Methods

We developed a hybrid decision tree/Markov model to simulate the costs, effectiveness, and incremental cost-effectiveness ratio (ICER) of mobile clinic relative to primary care-based DR screening over a lifetime horizon. We estimated the costs from the heath system and societal perspectives. Effectiveness was measured in terms of quality-adjusted life-years (QALYS). Result robustness was calculated using deterministic and probabilistic sensitivity analyses.

Results

From the societal perspective that considers all costs and effects, the mobile screening model had significantly lower costs (total cost savings of S$515 per person) while generating similar QALYs (9.78) compared with primary care-based model (9.73). From the health system perspective that includes only direct costs, the cost savings are S$401 per person. By extrapolating these data to approximately 170,000 patients with diabetes currently being screened yearly for DR in the primary care polyclinics, the present value of future cost savings associated with the mobile clinic-based model is estimated to be around S$15 billion over a lifetime horizon.

Conclusion

Strengthening Primary Healthcare: AI-driven mobile clinics empower family doctors to provide early diabetic retinopathy screening, enhancing community healthcare and advancing Healthier SG's goals.

Informed Policy Making: This study shows that policymakers can leverage mobile clinics to boost preventive care, ease hospital strain, and improve health outcomes.

Project Category

Technology

Digital Health, TeleHealth, Tele-Mobility, Mobile Health

Care & Process Redesign

Productivity, Cost Saving, Access to Care, Waiting Time

Care Continuum

Chronic Care, Primary Care, Preventive Care, Community Health

Keywords

Diabetes, Telemedicine, Mobile Clinic, Diabetic Retinopathy screening, Cost Effectiveness

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Cost-effectiveness of mobile clinic screening services for diabetes retinopathy management in Singapore

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Purpose: To determine the incremental cost-effectiveness of mobile clinic AI-based assessment relative to an existing model of primary care-based assessment of diabetic retinopathy (DR) in Singapore from the health system and societal perspectives.

Design: Model-based, cost-effectiveness analysis of the mobile clinic DR screening program.

Participants: A hypothetical cohort of patients with type 2 diabetes previously not screened for DR.

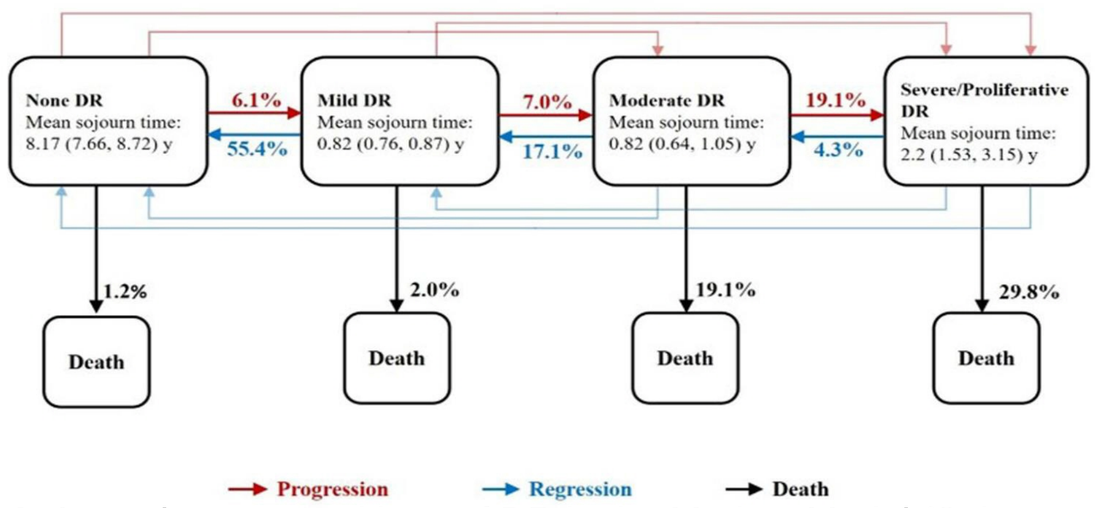

Figure 1. Annual state transitions of DR in the Markov Model (Sabanayagam, 2022)

Method: The Diabetes Singapore, mobile clinic is an AI-based telemedicine screening program for DR. We developed a hybrid decision tree/Markov model to simulate the costs, effectiveness, and incremental cost-effectiveness ratio (ICER) of mobile clinic relative to primary care-based DR screening over a lifetime horizon. We estimated the costs from the heath system and societal perspectives. Effectiveness was measured in terms of quality-adjusted life-years (QALYS). Result robustness was calculated using deterministic and probabilistic sensitivity analyses.

Main Outcome Measures: The ICER.

	Cost ($)	Incremental Cost ($)/QALY	Effectiveness (QALYs)	Incremental Cost ($)/ (LY)
Societal Perspective				
Mobile Clinic	634.00	515.00	9.78	371.00
Primary Care	610.00		9.73	
Health System Perspective				
Mobile Clinic	610.00	401.00	9.78	289.00
Primary Care Centre	591.00		9.73	

Table 1. Cost-effectiveness Estimates

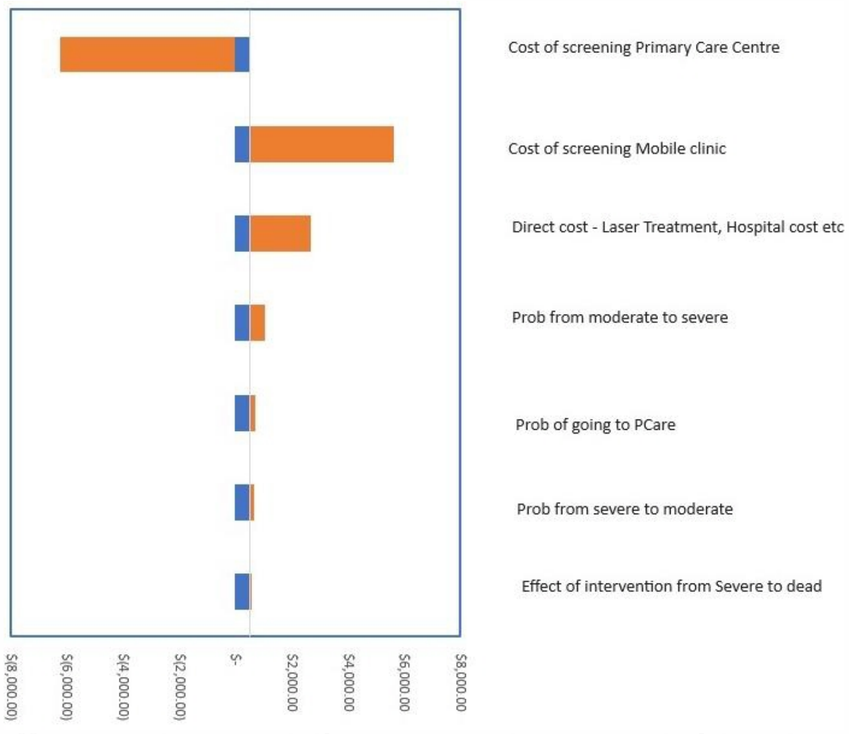

Figure 2. Tornado diagram showing the extent to which uncertainty in the individual parameters affects the incremental cost-effectiveness ratio (ICER) from the societal perspective.

Results: From the societal perspective that considers all costs and effects, the mobile screening model had significantly lower costs (total cost savings of S$515 per person) while generating similar QALYs (9.78) compared with primary care-based model (9.73). From the health system perspective that includes only direct costs, the cost savings are S$401 per person. By extrapolating these data to approximately 170,000 patients with diabetes currently being screened yearly for DR in the primary care polyclinics, the present value of future cost savings associated with the mobile clinic-based model is estimated to be around S$15 billion over a lifetime horizon.

Conclusion: Strengthening Primary Healthcare: AI-driven mobile clinics empower family doctors to provide early diabetic retinopathy screening, enhancing community healthcare and advancing Healthier SG's goals. **Informed Policy Making:** This study shows that policymakers can leverage mobile clinics to boost preventive care, ease hospital strain, and improve health outcomes.

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