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Brief Communication

Integrated Service Delivery Model in Primary Care to Improve Frailty in Older Malaysians: GeKo Integrated Service Delivery

S.S. Ahip[1,4,5], C.Y. Ting[4], M.A.B. Abdillah[1,4], Y.J. Tan[2,4], S.A.B. Sabri[3,4], O. Theou[5,6], S. Shariff-Ghazali[5,7], R. Visvanathan[5,8]

1. Kota Samarahan Health Clinic, Sarawak, Malaysia; 2. Asajaya Health Clinic, Sarawak, Malaysia; 3. Sadong Jaya Health Clinic, Sarawak, Malaysia; 4. Sarawak State Health Department, Malaysia; 5. Adelaide Geriatrics Training and Research with Aged Care (GTRAC) Centre, Faculty of Health and Medical Sciences, The University of Adelaide, Adelaide, South Australia, Australia; 6. Physiotherapy and Medicine, Dalhousie University, Halifax, Dalhouise, Canada; 7. Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor, Malaysia; 8. Aged and Extended Care Services, The Queen Elizabeth Hospital and Basil Hetzel Institute, Central Adelaide Local Health Network, Adelaide, South Australia, Australia

Corresponding Author: Sally Suriani Ahip, Kota Samarahan Health Clinic, Jalan Datuk Mohammad Musa, 94300 Kota Samarahan, Sarawak, Malaysia, Email address: sally.ahip@gmail.com, Telephone: +60125880709, Fax number: +6082673632

Abstract

BACKGROUND: This study aimed to evaluate the implementation stage of Malaysia's GeKo-Integrated Service Delivery (ISD) model for frailty management in primary care and explore its effectiveness in improving frailty scores.

METHODS: The implementation stage of Malaysia's first three GeKo-ISD clinics was assessed using the WHO-ICOPE (Integrated Care of the Older Persons) scorecard. This involved evaluating documents related to the GeKo services and conducting in-depth interviews with key informants identified from those documents. The efficacy of GeKo-ISD was assessed by documenting the change in mean frailty scores between baseline and 3 months post intervention, measured by the Pictorial Fit Frail Scale Malay Version (PFFS-M), in patients who received GeKo-ISD care from October 2022 to April 2023.

RESULTS: All three GeKo clinics achieved the sustaining implementation level, scoring a total of 50 out of 52. The paired t-test reported a significant reduction (p= 0.001) in the PFFS-M scores from baseline to 3 months after the GeKo-ISD intervention. The mean (SD) scores were 8.6 (4.6) at baseline and 7.0 (4.1) at 3 months post-intervention.

CONCLUSION: GeKo-ISD is a comprehensive approach of integrated care for older people, leveraging existing public funded primary care infrastructure. It shows promise, was impacted by the pandemic but now, with support from the government, exists in 32 centers across one state in Malaysia.

Key words: Integrated health care, PFFS-M, frailty, primary care, healthy ageing.

Introduction

The Malaysian population aged 60 and above is expected to quadruple by 2040, accounting for 17.6% of the estimated population of 40 million (1). Thus, the number of people with age-related conditions like frailty will rise, and healthcare systems must evolve to meet the health demands of this growing population (2). Our research shows that 37% of older patients treated at publicly funded primary care clinics in Malaysia are frail (3). Frailty is a state of vulnerability resulting from accumulated deficits over a lifetime, some of which could be targeted with primary or secondary prevention strategies (4, 5). Frailty is reversible and interventions such as exercise, nutrition and cognitive intervention can help (6).

From a policy and public health perspective, identifying frail older people in the community and primary care settings for intervention is crucial, to reduce healthcare cost arising from increased rates of health care utilization, institutionalization, hospitalization, morbidity, and mortality associated with frailty (7). Malaysia's public health care system is extensively subsidized, and frail older individuals are more likely to depend on it, therefore an increase in frail older people may not be sustainable in the long run (8).

The Pictorial Fit Frail Scale-Malay version (PFFS-M) was developed and validated for frailty screening in the Malaysian primary care setting (9–11). In 2019, Malaysia's first publicly funded GeKo (Geriatrik Komuniti, the Malay language translation for Community Geriatrics) Integrated Service Delivery (ISD) clinic was established in the state of Sarawak to support frailty risk identification and management. This cost-neutral initiative utilized the PFFS-M as the standard frailty screening tool and leveraged existing Malaysian Ministry of Health (MOH) infrastructure to deliver integrated care for older people (ICOPE). The MOH operates a nationwide network of publicly funded urban and rural primary care centres, reaching large number of older people, including those from lower socioeconomic backgrounds.

This study reports on the evaluation of Malaysia's first three GeKo-ISD clinics (i.e. the intervention). The WHO-ICOPE (World Health Organisation- Integrated Care for Older People) scorecard was used to stage the implementation level whilst the effectiveness of the intervention was explored through a pre-post analysis, examining change to frailty scores (measured using the Pictorial Fit Frail Scale Malay Version (PFFS-M)) at baseline and three months following intervention.

Method

The GeKo-Integrated Service Delivery (ISD) model, focused on frailty management, was conceptualized by Dr. Sally Ahip in 2019 (Figure 1). It was inspired by the Canadian

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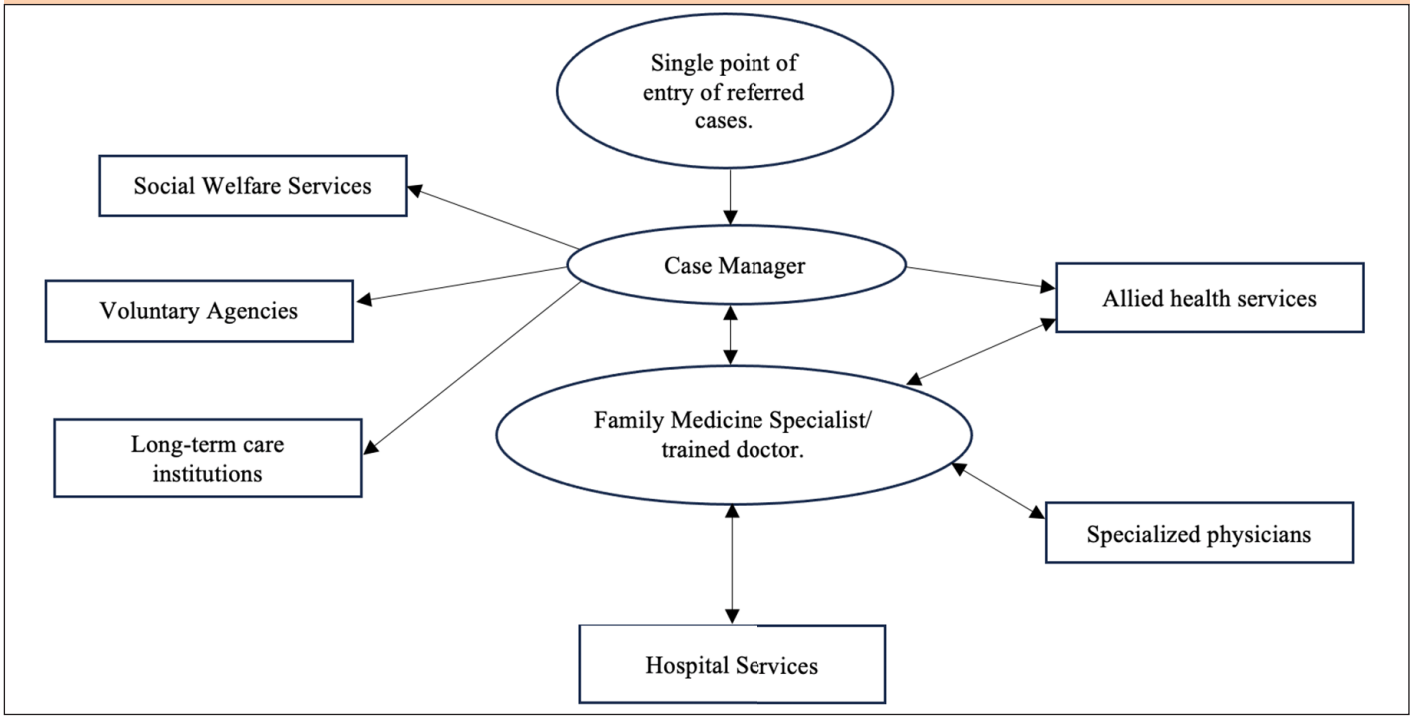
Figure 1. GeKo Integrated Service Delivery Model (GeKo-ISD)



PRISMA model of care and was aligned with the World Health Organization's ICOPE guidelines for older people (12, 13).

The GeKo-ISD coordinates services between care agencies without requiring service consolidation (Figure 1). It leverages the existing publicly funded primary care infrastructure in Malaysia, hence minimizing the necessity for additional infrastructure or financial mechanisms and aiding translatibility (14). The GeKo-ISD has also adopted the WHO ICOPE framework and implements a systematic, evidence-based approach to frailty management. This included screening based on the intrinsic capacity domains using the PFFS-M, which encompasses domains identified in the ICOPE screening tool, followed by a comprehensive and person-centered assessment in primary care, development of a multi-domain personalised care plan that includes physical, mental, psychological, nutritional, and social intervention as well as links to specialised care, care plan monitoring, and caregiver and community engagement (15).

A family medicine specialist leads the GeKo-ISD initiative at publicly funded primary care clinics. The core multidisciplinary service providers in the GeKo-ISD primary care clinics included medical officers, assistant medical officers, dentists, nurses, pharmacists, nutritionists/dietitians, psychological officers, physiotherapists, occupational therapists, and healthcare assistants. The GeKo-ISD was developed for older persons aged 60 years and older, with clinical frailty scale (CFS) scores ranging from 4 to 7 or at least one geriatric syndrome and are willing to participate in assessment and intervention programmes. Older persons eligible for the GeKo-ISD were identified through various means; 1) Community health screenings for the older persons using the «Older Persons Health Screening Form», as mandated by the Ministry of Health Malaysia; 2) Older persons seeking care for acute or chronic medical conditions at primary care clinics offering GeKo services; 3) Referrals from the private health facilities including hospitals and private general practice clinics; and 4) Referrals from public health facilities including hospitals and primary care centres without GeKo services. Additional details on the GeKo-ISD have been included in Supplementary file 1.

The GeKo-ISD employs a case management system, which involves registering identified older people in the registry, coordinating planned multi-domain interventions by all healthcare professionals at the clinic level, and monitoring adherence to follow-ups and reassessments. Case managers are non-physician healthcare professionals, typically nurses, assistant medical officers, or healthcare assistants who have completed a two-day GeKo case manager programme. They are co-located with other GeKo health service providers and report to the GeKo clinic family medicine specialist and GeKo-trained doctor.

Baseline clinical evaluations done include blood pressure, grip strength and anthropometric measurements, the Timed-Up-And-Go-Test, and the PFFS-M. The PFFS-M is the standard frailty assessment tool used in all GeKo-ISD clinic. The PFFS-M evaluates fourteen health domains including mobility, function, cognition, social support, affect, medication, pain, weight loss, exhaustion, incontinence, vision, hearing, balance and aggression, which are important domains evaluated in a Comprehensive Geriatric Assessment (CGA) and the WHO-ICOPE (15). The PFFS-M has been validated for Malaysian older persons (16–18).

The personalized multi-domain GeKo-ISD intervention plan included group and individual exercise programmes, medication reviews, ADL (Activities of Daily Living) and IADL (Instrumental Activities of Daily Living) rehabilitation programmes, psychological intervention, oral health services,

and community engagements. These intervention programmes are delivered in the primary care clinic.

All GeKo ISD patients will be reassessed after three months of intervention, similar to baseline. The GeKo specialist or medical officer may discharge the patient from the intervention plan to receive conventional outpatient care if the PFFS-M score has improved to the patient's best capacity. Patients will be referred to GeKo clinic if they show clinical decline and changes in frailty status or PFFS-M scores after a stressor event, during routine outpatient care. If the PFFS-M score does not improve after 3 months of GeKo intervention, the GeKo specialist or medical officer should reevaluate the patient's care plan.

Evaluation of implementation strategy

The WHO ICOPE implementation framework provides a scorecard for evaluating the capacity of services and systems to implement ICOPE. This scorecard was used in this study to assess the level of implementation accomplished and evaluates 19 elements, including the ability to engage and empower people and communities, facilitate coordination of service delivery by diverse providers, prioritise community-based care, improve governance and accountability systems, and enable overall system improvement. Each item is scored on a scale of 0 to 3, with total scores for ICOPE implementation ranging from 0 to 52. Three levels of implementation are determined: a) 0 to - no or little implementation; b) 22 to 36 - commencement of implementation; and c) 38 to 52 - sustained implementation (19).

Information to complete the scorecard was gathered through two methods:

i. Documents (October 22 to April 23) related to the GeKo services (such as policies, clinical guidelines and the GeKo implementation module used by healthcare professionals (HCPs) providing services, monitoring and evaluation reports) were obtained from Sarawak State Health Department, stakeholders, and persons-in-charge (GeKo family medicine specialists or the GeKo-trained doctor) of GeKo clinics at each primary care centre; and
ii. Structured interviews using the ICOPE implementation framework by a researcher (TCY) with key informants (KIs) identified from the above documents. KIs included policymakers, administrators and clinicians, who were involved in the overall planning, design, implementation, and monitoring of GeKo clinic services. IDIs were conducted either virtually or in-person in a room ensuring confidentiality, at a time suitable to the participant.

Effectiveness of GeKo intervention on frailty scores

The change in the PFFS-M scores between baseline and 3 months post GeKo clinic intervention was explored. The PFFS-M scores ranged from 0-43, with higher scores indicate greater frailty (10, 16, 20). Baseline sociodemographic variables included age, gender, ethnicity, marital status, education level, occupational status, household income, house ownership, living conditions, alcohol consumption, and smoking status. Other baseline variables collected included the PFFS-M, Katz ADL (21), Lawton IADL (22), and Timed Up and Go test (23). Description of these measures were included in Supplementary file 1.

The data presented above were taken from the patients' case notes at Sarawak's Samarahan division's first three GeKo-ISD clinics between September 1st and April 30th, 2023. The Samarahan division, one of Sarawak's twelve divisions on Borneo Island, is 18 kilometres southeast of Kuching, the capital city. Samarahan division is 4,967 km^2 broad and has five districts. Samarahan division has 293,300 population, 12.5% of whom are 60 years or older. In this study, the three GeKo-ISD were in three districts with different care levels: a) Kota Samarahan health clinic-level 1 (family medicine specialist with special interest in geriatrics-led), sub-urban; b) Asajaya health clinic-level 2 ((family medicine specialist-led), rural; and c) Sadong Jaya health clinic-level 3 (trained medical officer-led), rural. The GeKo-ISD started in Kota Samarahan Health Clinic (HC) in October 2019 and expanded to Asajaya and Sadong Jaya HCs in June 2022. Kota Samarahan, Asajaya, and Sadong Jaya HCs were 18 km, 52 km, and 63 km from Sarawak General Hospital in Kuching.

Statistical Analysis

The scores of the ICOPE scorecard were computed using summation function. For the effectiveness analysis, all quantitative data was extracted from the case notes and GeKo Registry into a microsoft Excel file and then exported to SPSS Version 27. Participants were excluded if more than 20% of the data was missing. The Shapiro-Wilk test of normality and Kolmogorov Smirnov test were done to examine the normality of data distribution. If the data distribution were not normal, the Wilcoxon signed-rank test will be employed. P value less than 0.05 was considered statistically significant. Paired t-test analysis was used to compare PFFS-M mean scores at baseline and 3 months post intervention. P value less than 0.05 was considered statistically significant.

Results

Of the 107 patients attending the clinics in the study period, only 44 (41.1%) had >80% of the data required and all participants were from the inaugural Kota Samarahan health clinic, a level 1 clinic.

Most of the participants were females (61.4%), with median age 77 years old, had lower education level (90.9%), monthly household income less than USD 333 (90.9%), financially dependent on family members or relatives (63.6%), and were staying in their own house without mortgage (75.0%) (Table 1). Majority had more than two co-morbidities (75%) and most patients were on more than 5 types of medications (66%). The PFFS-M mean (SD) scores at baseline was 8.6 (4.5).

Table 1. Baseline sociodemographic and clinical characteristics of GeKo patients (N = 44)

Patient characteristics	All
Age (years), mean (SD)	75.7 (8.03)
Gender, n (%)	
Male	17 (38.6)
Female	27 (61.4)
Highest education level, n (%)	
No formal education	19 (43.2)
Primary education	21 (47.7)
Secondary education	4 (9.1)
Tertiary education	Nil
Employment, n (%)	
Unemployed	38 (86.4)
Pensioner*	5 (11.4)
Employed	1 (2.3)
Household income**, n (%)	
< USD 333	40 (90.9)
USD 333 – USD 667	3 (6.8)
USD 667 – USD 1,111	1 (2.3)
> USD 1,111	Nil
Main source of income, n (%)	
Allowance from family members/ relatives	28 (63.6)
Pension fund	8 (18.2)
Welfare aid	5 (11.4)
Others	3 (6.8)
House ownership, n (%)	
Own without mortgage.	33 (75.0)
Family member/Relatives	9 (20.5)
Own with mortgage	2 (4.5)
PFFS-M (score), mean (SD)	8.6 (4.5)
Timed-Up-Go (seconds), mean (SD)	18.6 (9.85)
Number of co-morbidities, n (%)	
1	1 (2.3)
2	10 (22.7)
3 and above	33 (75.0)
Number of medication types, n (%)	
< 5	15 (34.1)
5 and above	29 (65.9)
KATZ Activities of Daily Living (scores), mean (SD)	5.5 (0.87)
LAWTON Instrumental Activities of Daily Living, (scores), mean (SD)	7.2 (1.63)

**Pensioner= retired civil servants who receives of Malaysian government pension; *1 USD = 4.5 MYR; SD- standard deviation; BMI: Body Mass Index; PFFS-M: Pictorial Fit-Frail Scale – Malay version; TUG: Timed Up and Go Test

Evaluation of GeKo clinic implementation with ICOPE Scorecard

The ICOPE scores for all 3 health clinics with GeKo-ISD levels of implementation as of 30th May 2023 are presented in Table 2. All three levels of GeKo clinics were at the sustaining implementation level with total scores of 50 of 52. All GeKo clinics had full scores for most items rated, except item A2 (offer caregivers support and training) and E2 (structure financing mechanisms to support integrated health and social care for older people), where all three clinics scored 2 of 3.

PFFS-M data was normally distributed, and a paired t-test showed a statistically significant reduction (p= 0.001) in the PFFS-M scores at baseline compared to the scores at 3 months post GeKo intervention with a mean (SD) score of 8.6 (4.6) and 7.0 (4.1), respectively.

Discussion

The WHO-ICOPE scorecard evaluation placed all three GeKo-ISD clinics in the sustaining implementation level in this study, which is the highest implementation level according to the framework. This result demonstrates the feasibility of implementing the GeKo-ISD frailty management approach in Sarawak's publicly funded primary care clinics. The positive findings reinforced the potential for successful implementation of the GeKo-ISD initiative and contributed to the Sarawak State Health Department's enthusiasm to encourage widespread implementation of GeKo-ISD clinics; as of 2023, there are 32 GeKo-ISD clinics across Sarawak. Furthermore, this study provides an evaluation framework for assessing the implementation of these new GeKo-ISD clinics and supporting service improvement initiatives. Furthermore, as a result of this study, a GeKo registry was established in 2023 to improve data collection and enable a systematic approach to continual evaluation and development of this clinical programme.

The aim of this study was to investigate the effectiveness of the GeKo-ISD intervention in influencing the PFFS-M score after three months, and the findings showed an improvement in frailty score. This finding is consistent with earlier studies that have documented frailty reversibility through integrated healthcare services and intervention in the community and primary care setting (24–26). However, the majority of these research used specific and tightly controlled intervention programmes, experimental settings, and funding, making translation into real-world clinical practice, challenging. In contrast, the GeKo-ISD reported a «real-world» frailty management intervention in a publicly funded Malaysian primary care setting that implements a coordinated, evidence-based system approach.

Nonetheless, these results should be interpreted with caution. There was a high attrition rate, and data gathering was most effective at the inaugural clinic. The COVID-19 pandemic may have influenced data collection and patient attrition in newer facilities. During these times, many of these publicly funded primary care clinics had to support the prevention and treatment of COVID-19, and patients were reluctant to expose themselves to infections in healthcare settings. Therefore, the study's limitation is its generalizability as only 41.1% of the study population was investigated. As a result, we recommend doing a larger study in the future to corroborate our findings.

Moving forward, it is also important to recognize that those who attend clinics may be more motivated, have better health literacy, and thus are more likely to show improvement in frailty scores, whereas those who drop out may be worsening,

Table 2. ICOPE scores for health clinics with different level of implementation as of 30 May 2023

No.	ICOPE Scorecard Items	ICOPE score for different level of implementation#		
		Level 1	Level 2	Level 3
A1	Actively engage older people, their families and caregivers and civil society in services delivery	3/3	3/3	3/3
A2	Offer caregivers support and training	2/3	2/3	2/3
B1	Actively seek and identify older people in need of care in the community	2/2	2/2	2/2
B2	Undertake comprehensive assessments when older people enter health or social care services and a decline in intrinsic capacity is suspected or observed	3/3	3/3	3/3
B3	Support appropriately trained health and social care workers to develop comprehensive care plans for older people that are feasible, practical and target intrinsic capacity and functional ability.	3/3	3/3	3/3
B4	Establish networks of health and social care providers to enable timely referral and service provision.	3/3	3/3	3/3
C1	Deliver care through a community-based workforce, supported by community-based services	3/3	3/3	3/3
C2	Make available the infrastructure that is needed to support safe and effective care delivery in the community	3/3	3/3	3/3
C3	Deliver care that is acceptable to older people, effective and targets functional ability	3/3	3/3	3/3
Total score for services dimensions (A1-C3)*		25/26	25/26	25/26
D1	Support the active engagement of older people and their families or caregivers, civil society and local service providers in policy and service development	3/3	3/3	3/3
D2	Create or update policy and regulatory frameworks to support integrated care and to protect against elder abuse	3/3	3/3	3/3
D3	Implement quality assurance and improvement processes for health and social care services	3/3	3/3	3/3
D4	Regularly review the capacity to deliver care equitably	3/3	3/3	3/3
E1	Develop capacity in the current and emerging workforce to deliver integrated care	3/3	3/3	3/3
E2	Structure financing mechanisms to support integrated health and social care for older people	2/3	2/3	2/3
E3	Establish equitable human resource management processes to support the paid and unpaid workforce	2/2	2/2	2/2
E4	Use health information and communication technologies to facilitate communication and information exchange	2/2	2/2	2/2
E5	Collect and report data on the intrinsic capacity and functional ability of older adults within existing health information systems	2/2	2/2	2/2
E6	Use digital technologies to support older people's self-management	2/2	2/2	2/2
Total score for services dimensions (D1-E6)*		25/26	25/26	25/26
OVERALL TOTAL SCORE**		50/52	50/52	50/52

#Level 1 GeKo Health Clinic: Kota Samarahan Health Clinic, with GeKo led by family medicine specialist trained in community geriatric care; Level 2 GeKo Health Clinic: Asajaya Health Clinic, with GeKo led by family medicine specialist; Level 3 GeKo Health Clinic: Sadong Jaya Health Clinic, with GeKo led by medical officer; *No to minimal implementation= 0 – 10; Initiating implementation = 11 - 18; Sustaining Implementation = 19 – 26; ** No to minimal implementation= 0 – 20; Initiating implementation = 22 - 36; Sustaining Implementation = 38 – 52

Table 3. Paired-t test for PFFS-M scoring before and 3 to 6 months after joining GeKo (N = 44)

	Mean (SD)	Shapiro-Wilk test of normality		Kolmogorov Smirnov		Paired t test	
		Statistic	p value	Statistic	p value	95% CI	t/p value
Pre-PFFS-M scoring	8.6 (4.6)	0.957	0.099	0.120	0.120	0.39-2.79	2.680/ 0.010
Post-PFFS-M Scoring	7.0 (4.1)	0.955	0.086	0.119	0.127		

PFFS-M: Pictorial Fit Frail Scale-Malay version; SD: Standard deviation; Significant at $p < 0.05$

and alternative models of care such as home visits and peer mentors may need to be considered to support these individuals. Learning from other care models in use worldwide, such as those detailed in the United Nations Decade of Healthy Ageing Progress Report (2021-2023), could serve as a roadmap for adaptation and translation (27).

To our knowledge, this is a novel study that reports primary care based integrated healthcare in a middle-income country and family physician led frailty management in Malaysia. This positive preliminary finding supports the feasibility of scaling up of the GeKo-ISD model for frailty management in primary care to be incorporated into other countries.

Conclusion

This study provided novel insights into the implementation strategy and preliminary effects of a suburban community integrated geriatric care plan for frailty management in an upper middle-income country and in a primary care setting. This study also demonstrated that the WHO ICOPE framework is practical and adaptable in Sarawak via the GeKo-ISD, and hence potentially applicable in many other upper middle-income countries. The long-term consequences, economic impact, and sustainability of the GeKo ISD must be evaluated through larger scale research.

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Conflicts of Interest: Dr. Olga Theou and Kenneth Rockwood have asserted copyright of the Pictorial Fit-Frail Scale, which is made freely available for education, research, and not-for-profit health care. Licenses for commercial use are facilitated through the Dalhousie Office of Commercialization and Industry Engagement. All other authors have no conflict of interest to disclose in relation to this research.

Ethical standards: The authors ensure that this is an original work and presented accuratedly. All authors have significant and equal contribution in all aspects of this research project.

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