College of Family Physicians Singapore

# The Singapore Family Physician

PERMIT NO. MDDI (P): 028/11/2025

Vol 52(6) Oct – Dec 2026

## Optimising Healthspan: Tackling Drivers of Ageing



# Seasonal Influenza and Endemic COVID-19:

Pneumonia is the second most common cause of death in Singapore,[1] where tropical heat and humidity predispose the population to year-round transmission of respiratory viral infections (RVIs).[2] Following the COVID-19 pandemic, there has been significant rebound in the transmission of endemic RVIs such as influenza and respiratory syncytial virus (RSV) in Singapore, with 28-day mortality rates of ~5% overall among adults hospitalised for vaccine-preventable respiratory infections **(Table 1)**.[3]

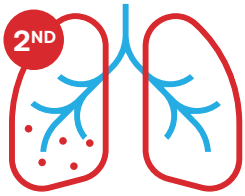



**Table 1.** Outcomes of hospitalisations for RSV, COVID-19, and influenza in Singaporean adults[3]

| Clinical outcome, n (%) | Total hospitalisations | 28-day mortality | ICU admission |
|---|---|---|---|
| **COVID-19 hospitalisations (2023), n (%)** | | | |
| Unboosted | 848 (6.6) | 82 (9.7) | 34 (4.0) |
| Boosted ≥1 year prior with ancestral mRNA vaccines | 5,645 (44.1) | 281 (5.0) | 163 (2.9) |
| Boosted <1 year prior with updated mRNA vaccines | 987 (7.7) | 44 (4.5) | 23 (2.3) |
| **Influenza hospitalisations (2021-2023), n (%)** | 3,999 (31.2) | 36 (0.9) | 69 (1.7) |
| **RSV hospitalisations (2021-2023), n (%)** | 1,332 (10.4) | 72 (5.4) | 51 (3.8) |

ICU, intensive care unit; RSV, respiratory syncytial virus.



## Vaccines protect against severe disease

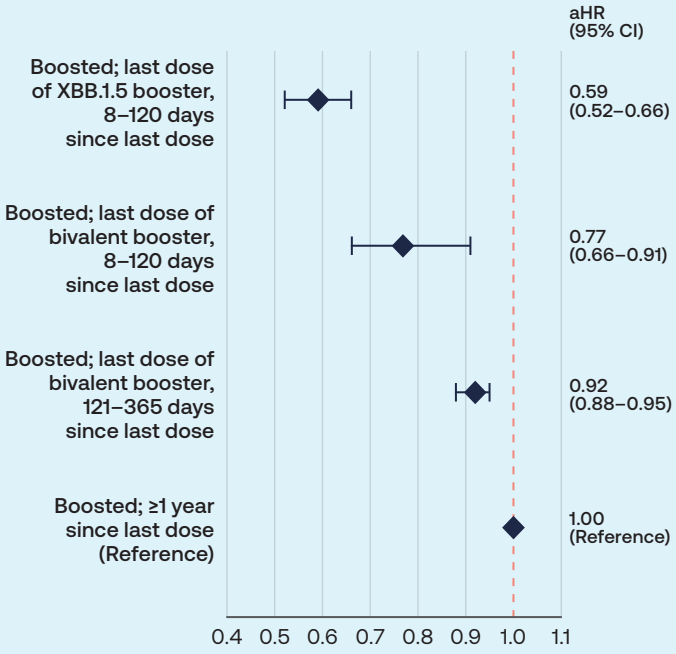
In Singapore real-world observational studies, vaccination against RVIs, including influenza and COVID-19, confers effective protection against hospitalisations and mortality.[4-6] In a retrospective study of ~20,000 Singaporean adults, relative influenza vaccine effectiveness declined to only 69% of baseline at weeks 42–49 post-vaccination, underlining the need for annual influenza re-vaccination, especially among at-risk groups – including older adults and individuals with chronic lung disease – in whom vaccine-effectiveness waned fastest.[6]

## Updated COVID-19 vaccine maximises protection



For COVID-19, updated vaccination with newer strains confers the best protection against SARS-CoV-2 infection, as well as against severe disease. During a JN.1 variant wave in Singapore, receipt of an updated XBB.1.5 booster 8–120 days earlier was associated with 41% lower risk of JN.1 infection, while receipt of a bivalent booster 121–365 days earlier was associated with 8% lower risk of JN.1 infection, compared with individuals last boosted ≥1 year earlier with ancestral monovalent vaccines **(Figure 1)**. In addition, recent receipt of an updated booster protected against post-acute sequelae including emergency department visits and hospitalisations.[4]

**Figure 1.** Vaccine effectiveness of ancestral versus bivalent COVID-19 vaccines against SARS-CoV-2 infection during JN.1 outbreak in Singapore[4]




aHR, adjusted hazard ratio; CI, confidence interval.

Data computed using Cox regression. Data points are presented as adjusted hazard ratios with bars representing 95% confidence intervals. Dotted line represents the reference group.

Updated COVID-19 vaccine doses have also been shown to be protective against long-term sequelae ("long COVID") in the Singaporean population, with almost a 40% decrease in risk among adults who received prior bivalent boosters, versus those boosted prior with ancestral COVID-19 vaccines.[7] These studies highlight the importance of updated COVID-19 vaccines in conferring more effective protection, particularly among at-risk groups.

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College of Family Physicians Singapore

Registration Number : S71SS0039J | Registration Period : 7 August 2023 to 6 August 2029 | PERMIT NO. MDDI (P): 028/11/2025

Journal of the Singapore Family Physician

Printed by Oxford Graphic Printers Pte Ltd



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**EDITORIAL**
https://doi.org/10.33591/sfp.52.6.e

# Optimising Healthspan: Tackling Drivers of Ageing

Dr Chiang Shu Hui Grace

**SFP2026; 52(6)**

Life expectancy has increased over the past decades due to significant advances in medicine and socioeconomic development. However, lifespan alone does not translate to healthspan. With an ageing population, it has become increasingly important to bridge the gap between lifespan and healthspan.

Optimising healthspan requires a multi-system approach from the macro, meso, and micro levels. Healthcare models should shift from a predominantly disease-centred model towards a more proactive and preventive approach. This means that healthcare systems need to recognise the interplay between the biological, behavioural, environmental, and social determinants of ageing. Ageing is a modifiable clinical trajectory,[1] and by identifying and modifying these determinants early in the life course, physiological reserve can be preserved and cumulative burden of diseased reduced.

Of note, among the interconnected drivers of ageing, the relationship between sarcopenia, frailty, and infection highlights the importance of holistic care. Older adults are more vulnerable to infection due to age-related changes in immune function and comorbidities.[2] In turn, having an infection can precipitate a rapid decline in physical function especially in individuals with limited physiological reserves, thereby contributing to poorer outcomes following an acute illness.[3,4] Vaccination against vaccine-preventable diseases together with frailty/sarcopenia prevention interventions tackling functional decline can be synergistic in optimising healthspan.

This issue will provide an update on the intricate relationship between infection, frailty, and sarcopenia, and highlight opportunities for prevention.

In Unit 1, Dr Hong Liyue offers a practical guide for Family Physicians on how to optimise healthspan within primary care.

In Unit 2, Dr Daphne Yang and A/Prof Lim Wee Shiong elaborate on how the key AWGS 2025 recommendations can be contextualised to Singapore's clinical practice, alongside existing guidelines for sarcopenia and frailty management.

In Unit 3, Dr Leong Hoe Nam discusses the consequences of infection especially in older adults and how practical primary care strategies can be integrated to optimise vaccination uptake.

In this issue, A/Prof Goh Lee Gan has selected 10 current readings on topics related to healthspan, infection, and vaccination.

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# Distance Learning Course on "Optimising Healthspan: Tackling Drivers of Ageing"

- Unit 1: From Lifespan to Healthspan
- Unit 2: Frailty and Sarcopenia: Clinical Consequences and Windows for Prevention
- Unit 3: Vaccination as a Key Enabler of Preventive Care in Older Adults: Redefining Healthy Ageing in Primary Care

https://doi.org/10.33591/sfp.52.6.u1

Unit No. 1

# FROM LIFESPAN TO HEALTHSPAN

Dr Hong Liyue

## ABSTRACT

**Singapore is a super-aged society; residents live for roughly a decade of their lives in poor health. Narrowing the gap between lifespan and healthspan is therefore a priority for primary care, so that older adults can maintain function and quality of life. This article describes the shift in healthcare delivery from a reactive to a proactive approach, summarises the WHO concepts of healthy ageing, intrinsic capacity, and functional ability, and reviews preventive interventions across the life course. It then offers practical guidance for Family Physicians within the Healthier SG framework: goal setting, brief screening for functional decline, targeted interventions, attention to social context and safety, and structured follow-up.**

**Keywords: Healthy Ageing, Healthspan, Prevention, Primary Care**

**SFP2026; 52(6): 5-8**

## INTRODUCTION

Human life expectancy has risen from approximately 47 years in 1900 to more than 80 years in many high-income countries.[1] Singapore has among the highest life expectancies in the world. According to World Health Organization (WHO) estimates, life expectancy at birth for Singapore residents is approximately 84 years, while healthy life expectancy is approximately 74 years, indicating about 10 years lived with illness, disability, and dependence.[2] A similar gap is seen in other developed countries, such as Japan, the United Kingdom, and the United States.[2] Years spent in poor health are associated with greater healthcare utilisation and expenditure, and strain the sustainability of a nation's health system.[3,4]

Our population is also ageing rapidly. In 2026, 21.4 percent of Singaporeans were aged 65 years or older, crossing the 21 percent threshold that defines a super-aged society.[5] The number of citizens aged 80 years and above has also risen by 60 percent, from 95,000 in 2016 to 152,000 in 2026.[5]

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These trends have direct implications for primary care, which is best placed to deliver preventive care by virtue of its continuity of care, long-term patient relationships, and proximity to the community. Longitudinal, holistic care focused on health promotion, disease prevention, and patient empowerment is provided most efficiently and cost-effectively by a strong primary care sector.[4] This imperative is further underscored by Healthier SG, the national health reform launched in July 2023.[6] Family Physicians will increasingly care for patients who live longer and expect to remain active and independent. This paper considers what can be done within routine primary care consultations to narrow the gap between lifespan and healthspan.

## A SHIFT IN APPROACH: FROM REACTIVE TO PROACTIVE CARE

Healthcare has traditionally operated reactively, responding to illness once symptoms or complications develop, and has been organised around acute illness and single-disease management. This model is poorly suited to an ageing population, in whom multiple concurrent chronic conditions are common[3] and who prioritise outcomes such as functional mobility, independence, and the ability to remain in their own homes. A proactive approach instead seeks to identify risk and early functional decline before disability is established, and to intervene while capacity can still be preserved or improved. Healthy longevity medicine, an emerging field that targets the biological processes of ageing, is similarly framed as a paradigm shift from reactive to proactive healthcare.[7]

This conceptual shift is reflected in global and local policy. The UN Decade of Healthy Ageing (2021 to 2030) emphasises age-friendly environments, integrated care, long-term care, and the reduction of ageism.[8] In Singapore, the Action Plan for Successful Ageing, Age Well SG, and Healthier SG put these priorities into practice,[9] consistent with the Ministry of Health's Three Beyonds framework of moving beyond healthcare to health, beyond hospital to community, and beyond quality to value.[4] Healthier SG in particular is a multi-year strategy that moves the emphasis from caring reactively for those who are already ill to proactively preventing illness, anchoring preventive care in the enrolled patient's Family Physician, and a personalised health plan.[6,10]

## HEALTHY AGEING: PREVENTION ACROSS THE LIFE COURSE

Lifespan denotes the chronological duration of life from birth to death.[1] Healthspan, by contrast, is conceptually complex and lacks a uniform definition. It is often described as the period of life spent in "good health", free from major chronic disease or significant functional decline.[1,11] At the

population level, healthy life expectancy—which subtracts years lived with disability from total life expectancy—serves as a surrogate marker.[12]

The WHO defines healthy ageing as the process of developing and maintaining the functional ability that enables well-being in older age.[13] This definition rests on three linked concepts:

- **Intrinsic capacity** refers to all the physical and mental capacities that a person can draw on, including locomotor capacity (physical movement), sensory capacity (hearing and vision), vitality (energy and balance), cognition, and psychological capacity.
- **Environment** comprises all the factors in the home, community, and broader physical and social surroundings that interact with an individual's capacities.
- **Functional ability** combines the intrinsic capacity of the individual, the environment a person lives in, and how they interact with their environment.

This framework has two key implications. First, declines in capacity may be slowed and, in some cases, partially reversed.[13] Second, where capacity cannot be restored, function may still be preserved through modification of the environment, which provides the rationale for community resources and social prescribing.

A life-course perspective is equally important. Intrinsic capacity is accrued in childhood, peaks in early adulthood, and then declines at a rate shaped by cumulative exposures and behaviours.[13] Healthy ageing therefore does not begin at 60. Younger adults with chronic conditions, declining physical activity, or sedentary occupations are the group in whom primary care interventions may most effectively alter later trajectories. The interventions with the strongest supporting evidence are summarised in the table below.

| Evidence-based interventions across the life course |
|---|
| 1. Physical activity, including resistance and balance training |
| 2. Cardiometabolic control (blood pressure, lipids, glycaemic control, weight) |
| 3. Smoking cessation and alcohol reduction |
| 4. Vaccinations |
| 5. Cancer screening (breast, cervical, colorectal) |
| 6. Hearing and vision correction |
| 7. Bone health and falls prevention |
| 8. Nutrition, including adequate protein intake |
| 9. Sleep, mood, and loneliness |
| 10. Cognitive engagement and social participation |

## WHAT CAN BE DONE IN THE PRIMARY CARE SETTING

Current health systems are often better designed to respond to episodic health needs than to the complex, chronic needs that arise with age. There is an urgent need for coordinated primary healthcare approaches that prevent, slow, or reverse declines in intrinsic capacity, and that help older adults compensate when decline is unavoidable. The steps below set out how this can be done in practice.

### Exploring and Establishing Goals

The Healthier SG enrolment and annual health plan reviews offer an opportune window to shift consultations away from isolated disease markers towards patient-centred functional goals.[6] Eliciting priorities in the patient's own terms, such as maintaining independent travel, preserving the ability to cook, or avoiding dependence on caregivers, helps anchor subsequent clinical decisions, improves concordance, and strengthens the patient-physician relationship.

### Screening for Decline

A brief screen for functional decline can be performed using the WHO ICOPE framework,[15] which examines cognition, mobility, nutrition, vision, hearing, and mood. Positive screens can then be followed by in-depth assessment. Suggested instruments are shown in the table below.

| Domain | Suggested Screen |
|---|---|
| Mobility and falls | Gait speed or five-repetition chair stand; questions on a fall in the past year, unsteadiness and fear of falling |
| Nutrition | Unintentional weight loss and reduced appetite |
| Cognition | Mini-Cog or another validated brief test, prompted by patient or family concern |
| Vision and hearing | Visual acuity chart; whispered-voice test or hearing questionnaire |
| Mood | PHQ-2, followed by PHQ-9 if positive |
| Frailty | FRAIL scale or Clinical Frailty Scale |
| Social connection | Brief loneliness question or three-item loneliness scale |

### Intervene on Modifiable Domains

**Exercise.** Older adults are recommended to undertake at least 150 to 300 minutes of moderate-intensity aerobic activity per week, muscle-strengthening activities on at least two days per week and, for those at risk of falls, multicomponent balance and functional training on at least three days per week.[16]

**Nutrition.** Adequate protein intake, approximately 1.0 to 1.2 g per kg body weight per day in healthy older adults and higher in acute or chronic illness,[17] supports muscle mass and function. Unintentional weight loss warrants further review and referral to a dietitian.

**Medication review.** Polypharmacy and potentially inappropriate medications are important and modifiable contributors to falls, confusion, and hospital admission. An annual medication review using validated tools such as the STOPP/START or Beers criteria[18,19] is recommended, with particular attention to sedative, anticholinergic, and hypotensive agents. Deprescribing should be undertaken through shared decision-making, with monitoring after each change.

**Vaccination and screening.** Vaccination status and participation in national cancer screening programmes should be reviewed at chronic disease visits.

### Address Social Determinants of Health

Social determinants influence health outcomes to a degree comparable with clinical factors. Useful screening questions address living arrangements, ability to manage medications and associated costs, frequency of leaving the home, and experience of loneliness. Social prescribing helps link patients to community programmes, such as those supported by the Health Promotion Board, and involving the Integrated Community Care Provider (ICCP) network of Active Ageing Centres, Senior Care Centres, enhanced Home Personal Care, and Home Therapy.

### Follow-up and Reassessment

Positive screens should lead to a defined action and a review date, recorded in the health plan. Reassessment is also indicated after an acute illness or hospitalisation and when the patient's social role or living situation changes.[15]

## NAVIGATING POTENTIAL BARRIERS

Implementing preventive care requires navigating several operational hurdles. Single-handed and small group private practices may lack the scale to manage patients with complex needs, and sharing of information across providers remains difficult[4]; Healthier SG seeks to address this.[6] Time constraints can be mitigated through interprofessional, team-based care in which nurses, allied health professionals, and community partners take on tasks such as baseline frailty screening, balance checks, and lifestyle counselling, and repeated short contacts are likely to be more effective than a single extended consultation. Health literacy and language also influence how well patients understand advice.[7] Finally, ageism, including clinicians' assumptions that decline is inevitable or that older patients are unlikely to change their behaviour, may limit the care offered.

## CONCLUSION

The focus of healthy ageing is not to prolong life irrespective of its quality, but to extend the period lived in good health. Singapore possesses the demographic imperative and has the support of the policy framework through Healthier SG to promote health prevention in the primary care setting with individualised health plans. Narrowing the gap between lifespan and healthspan is best placed in the primary care setting.

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**LEARNING POINTS**

- **Most residents live the last decade of life in poor health; narrowing the gap between lifespan and health span is a priority to allow maintenance of function and quality of life in old age.**
- **Primary care, supported by Healthier SG, is best placed to support the ageing population through a shift from reactive to proactive care.**
- **Practical actions include establishing goals, screening intrinsic capacity using the WHO ICOPE domains, exercise prescription, reviewing medications, and linking patients to community programmes.**
- **Time constraints and other potential barriers can be mitigated through team-based care, repeated short contacts, and a shared health plan.**

https://doi.org/10.33591/sfp.52.6.u2

Unit No. 2

# FRAILTY AND SARCOPENIA: CLINICAL CONSEQUENCES AND WINDOWS FOR PREVENTION

Dr Daphne Yang, A/Prof Lim Wee Shiong


## ABSTRACT

**Sarcopenia is an age-related progressive and generalised skeletal muscle disorder involving loss of muscle mass and strength, leading to reduced physical function. It is the antecedent cause of physical frailty, with both sharing similar clinical features, adverse outcomes and intervention strategies. Muscle health plays an important role in locomotor capacity, one of the domains of intrinsic capacity that is essential for healthy ageing. Recognising that muscle health starts to decline in midlife, with potential for reversibility with earlier recognition and intervention, the Asian Working Group for Sarcopenia (AWGS) 2025 consensus was updated to reflect sarcopenia management in the context of improving muscle healthspan across the life course. The AWGS 2025 update expands case-finding to at-risk older adults aged 50–64 years. Diagnosis of sarcopenia was revised to include presence of low muscle mass and strength, with physical performance as an outcome measure. Resistance exercise and quality nutrition with adequate protein intake remain the pillars of sarcopenia and frailty management. This article summarises how the key AWGS 2025 recommendations can be contextualised to our clinical practice locally, alongside existing guidelines for sarcopenia and frailty management.**


**Keywords: sarcopenia, frailty, intrinsic capacity, locomotor capacity, diagnosis, treatment, prevention, Singapore, Asia**

**SFP2026; 52(6): 9-18**

## INTRODUCTION

Frailty is a clinical syndrome describing the increased vulnerability of individuals to adverse outcomes from health-related stressors, as a result of reduced physiological reserves.[1] Faced with an ageing world demographic, the World Health Organisation introduced the term "intrinsic capacity" in 2015 to promote a function-centred approach to healthy ageing.[2,3] Optimisation of intrinsic capacity—the composite of all physical and mental capabilities that an individual can draw upon throughout life—can delay onset of frailty and its attendant consequences, including functional decline and mortality.[4] Intrinsic capacity has been shown to be related to and predictive of frailty risk, with impaired locomotion, impaired vitality, and a greater number of impaired domains associated with greater risk.[5,6]

Muscle health is integral to maintaining locomotor capacity, one of the domains of intrinsic capacity. Measures of muscle strength and function have been shown to be predictive of important clinical outcomes.[7] Sarcopenia is an age-related progressive and generalised skeletal muscle disorder involving loss of muscle mass and strength, leading to reduced physical function.[8,9] While muscle mass and strength peak in young adulthood, the decline begins in midlife around age 30, with strength affected more than mass, then accelerates further beyond age 60.[10,11] Sarcopenia has often been described as the antecedent cause of physical frailty, with both sharing similar manifestations of weakness and slowness, and leading to common outcomes including falls, functional decline, disability, hospitalisation, increased healthcare costs, institutionalisation, and mortality.[12]

## PREVALENCE OF SARCOPENIA AND FRAILTY

Commensurate with the rapidly ageing population, both sarcopenia and frailty are growing problems. Using the Asia Working Group for Sarcopenia (AWGS) 2014 criteria, the prevalence of sarcopenia was 5.5 to 25.7 percent in Asia.[13] Locally, sarcopenia prevalence varies from 6.1 to 44.3 percent depending on study setting, diagnostic criteria, and cutoffs applied.[14] In the community, 27 to 32.2 percent of older Singaporeans, predominantly men, have sarcopenia.[15,16]

As for frailty, the prevalence ranges between 3.5 to 27 percent in Asia Pacific, comparable to Europe and America.[17] The local prevalence ranges from 5.7 to 6.2 percent among older adults.[18] The Singapore Longitudinal Ageing Study found 32.5 percent of community-dwelling older adults were found to be pre-frail.[19]

### Sarcopenia and Frailty Transitions

Fortunately, there is potential for reversal from sarcopenia, pre-frailty, and early frailty to non-sarcopenic and robust states.[20–23] This bidirectional transition emphasises the importance of early detection and intervention for older adults at risk, and the need to shift in favour of a preventative life-course approach towards muscle health in order to safeguard our population against the cascade of adverse health outcomes related to sarcopenia and frailty.

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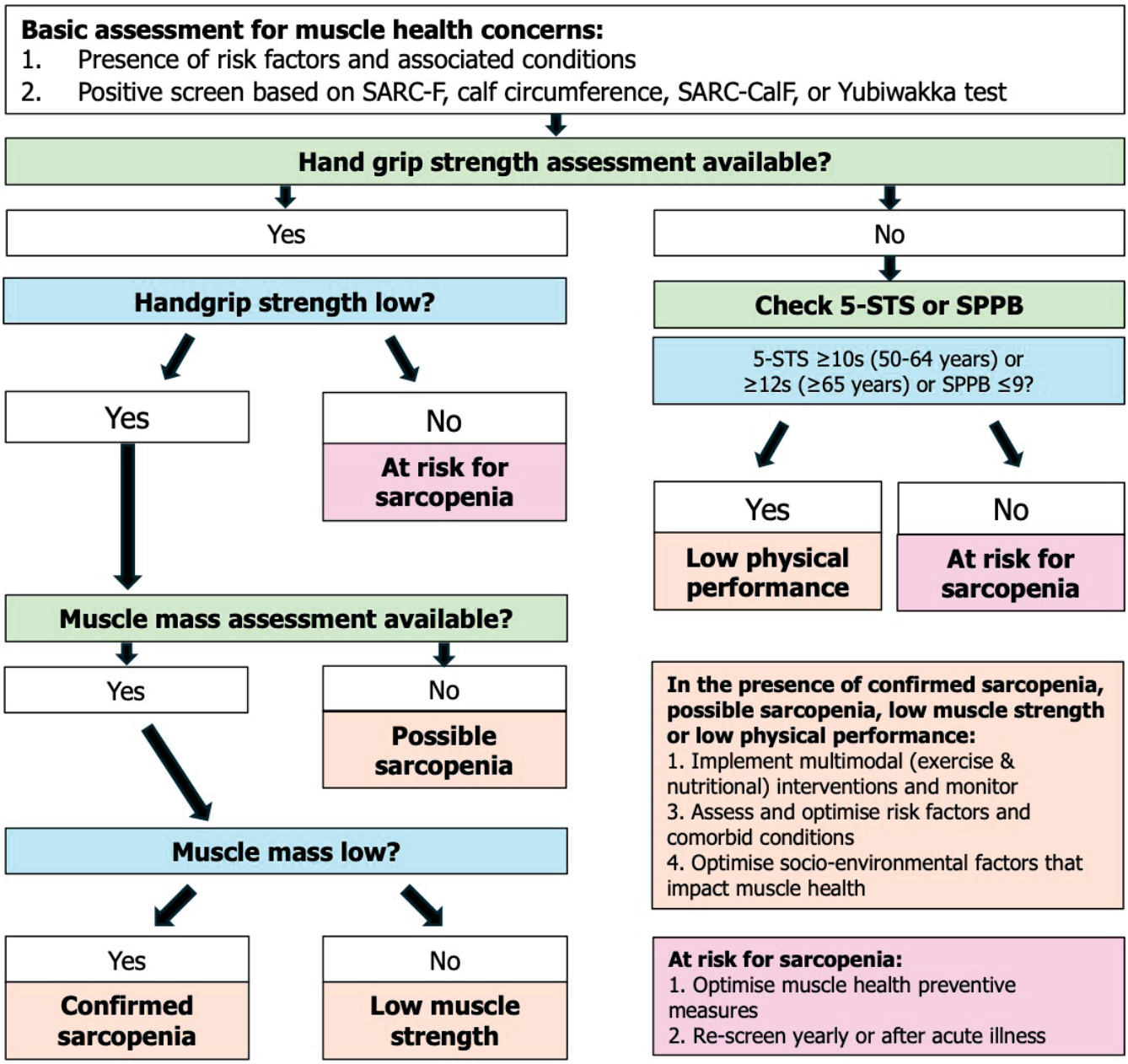
## ASIAN WORKING GROUP FOR SARCOPENIA 2025 CONSENSUS UPDATE

The Singapore Clinical Practice Guidelines (CPG) for sarcopenia were developed in 2022, drawing upon the AWGS 2019 consensus as well as supportive evidence based on local studies until 31 Dec 2020, providing contextualised recommendations to facilitate adoption of the AWGS 2019 consensus in our local practice.[14]

Recognising the need to expand sarcopenia management across the life course, the AWGS consensus was updated in 2025 to: 1) include middle-aged adults (50–64 years) in the target population for diagnosis; 2) update existing AWGS 2019 diagnostic algorithms to align with the Global Leadership Initiative in Sarcopenia (GLIS) recommendations; and 3) introduce an enhanced muscle health framework, integrated within the WHO Integrated Care for Older People (ICOPE) framework used for intrinsic capacity assessment (refer to **Figure 1**).[9]

**Figure 1. Enhanced framework for muscle health assessment and management (AWGS-2025 consensus)**




5-STS = 5 times sit-to-stand test
SPPB = Short Physical Performance Battery
Based on the AWGS2025 consensus update

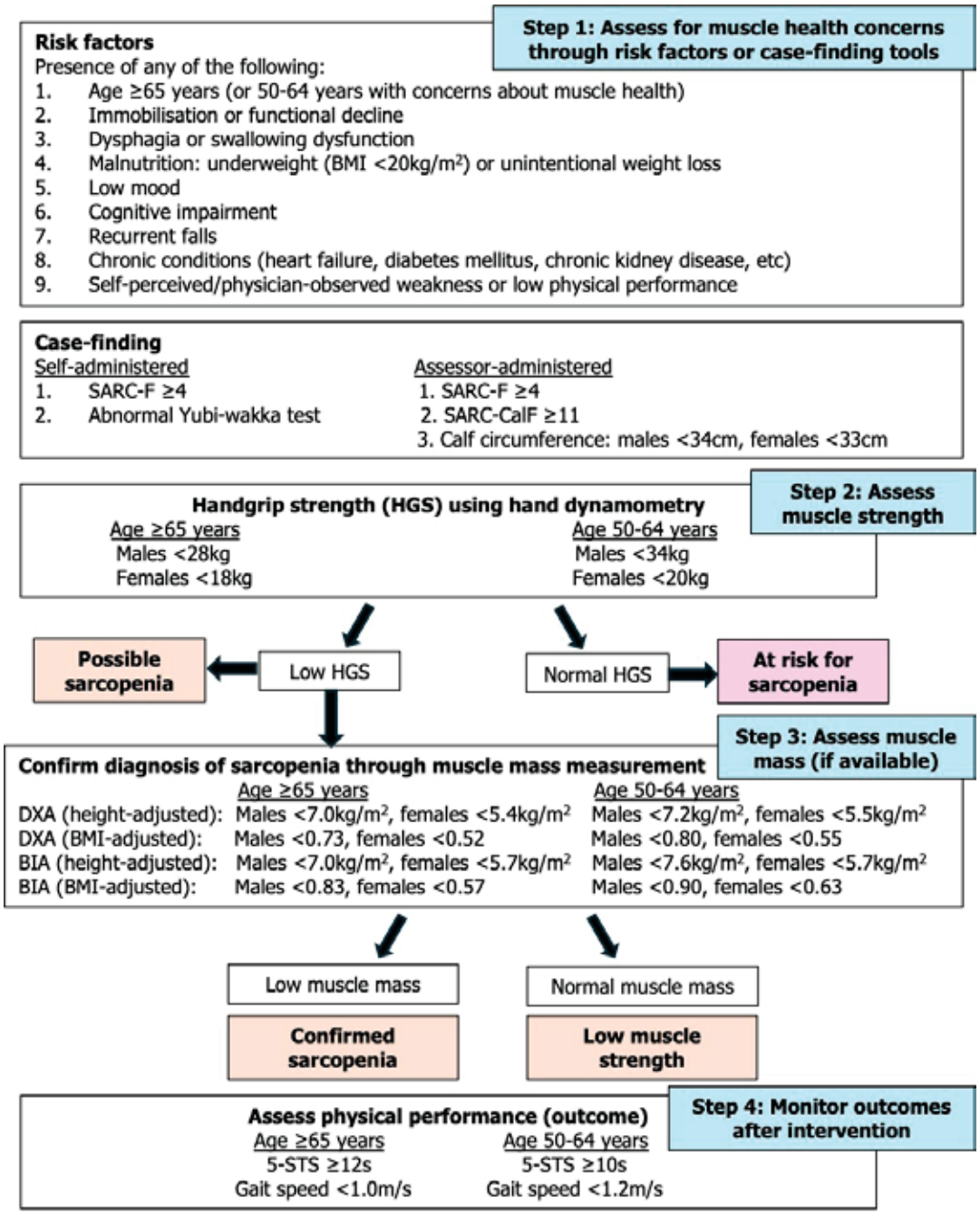
This article aims to summarise how the key AWGS 2025 recommendations can be contextualised to our current practice, alongside our local CPG for sarcopenia management as well as recommendations for frailty management based on the Asia-Clinical Practice Guidelines for the Management of Frailty and National Frailty Consensus Discussion.[18,24]

## SARCOPENIA CASE-FINDING

### A. Risk Factor Assessment

Similar to AWGS-2019 and Singapore CPG, the AWGS 2025 consensus recommends a case-finding approach for older adults aged 65 years and above, but also includes those aged 50–64 years who have muscle health concerns, with risk factors including functional decline, dysphagia, malnutrition risk, comorbidities (such as chronic heart, lung, kidney, liver disease, diabetes mellitus, etc), weakness or low physical performance, or concomitant geriatric syndromes such as cognitive impairment, low mood, and falls risk (refer to **Figure 2**). Opportunistic screening is also recommended following acute hospitalisation, illness or other significant health events that may accelerate muscle loss, or in care settings with an expected higher prevalence of sarcopenia such as rehabilitation or long-term care settings.[25]

**Figure 2. Modified AWGS 2025 algorithm for sarcopenia diagnosis**




5-STS = 5 times sit-to-stand test
BIA = Bioelectrical impedance analysis
BMI = Body mass index
DXA = Dual-energy X-ray absorptiometry
SPPB = Short Physical Performance Battery
Based on the AWGS2025 consensus update

**B. Case-Finding Tools**

Recommended case-finding tools are: SARC-F, calf circumference (CC), SARC-CalF, and Yubi-wakka test. It is important to note that current assessment cutoffs are validated only in older adults aged 65 and above. The SARC-F is a self-reported 5-item questionnaire that assesses strength, assistance in walking, ability to rise from a chair, climb stairs, and history of falls (refer to **Table 1**).[26] A SARC-F cutoff of ≥4 has low-moderate sensitivity and moderate-high specificity for sarcopenia diagnosis in the community and outpatient clinic setting.[27] If there is a high index of suspicion for sarcopenia and SARC-F score is between 2 to 4, further assessment and intervention is warranted given increased sensitivity for sarcopenia at this lower cutoff.[28,29]

CC has moderate-to-high sensitivity and specificity in predicting sarcopenia or low skeletal muscle mass.[13] Recommended cutoffs are CC <34 cm for men and <33 cm for women. As there is systematic overestimation of sitting over standing measurements by 0.7 cm leading to under-detection in the sitting position, CC should be measured in the standing position using a nonelastic tape and hence is preferably administered by an assessor rather than self-administered. Diagnostic performance of CC can be attenuated in sarcopenic obesity due to decreased sensitivity with under-detection in women.[30] SARC-CalF combines both CC and SARC-F, improving the sensitivity of SARC-F for case-finding by adding CC, with a score of ≥11 indicating sarcopenia.[31] Similar to CC, the diagnostic performance of SARC-CalF is attenuated by obesity with under-detection of sarcopenic obesity in both older men and women.[32]

The Yubi-wakka test is a self-administered screening test of muscle mass loss by assessing one's ability to surround the calf muscle using a ring formed with both thumbs and index fingers around the largest part of the calf.[33] A gap between the finger-ring and calf muscle suggests possible muscle loss. While it is easily administered and shown to have predictive validity in Japanese populations, a local study highlighted limitations in its diagnostic performance for case-detection of sarcopenia in the community, particularly in obese individuals.[34] This suggests that anthropometric differences can contribute to heterogeneity in diagnostic accuracy across Asian populations.

**C. Determining Presence of Possible Sarcopenia or Sarcopenia at Risk**

In the absence of further muscle mass assessment, middled-aged or older adults who screen positive for risk factors or on the case-finding tools should be evaluated for "possible sarcopenia" based on handgrip strength assessment. Those with low handgrip strength (i.e., possible sarcopenia) should undergo further evaluation for underlying causes (including drugs, diabetes mellitus, disease, deficiency) (refer to **Table 2**). Those with normal muscle strength are considered "at risk for sarcopenia" and should be re-assessed annually.

**Table 1. SARC-F Screening for Sarcopenia**

| Component | Question | Scoring |
|---|---|---|
| Strength | How much difficulty do you have in lifting and carrying 10 lbs (4.5 kg)? | None = 0<br>Some = 1<br>A lot or unable = 2 |
| Assistance in walking | How much difficulty do you have walking across a room? | None = 0<br>Some = 1<br>A lot, use aids, or unable = 2 |
| Rising from a chair | How much difficulty do you have transferring from a chair or bed? | None = 0<br>Some = 1<br>A lot or unable without help = 2 |
| Climbing stairs | How much difficulty do you have climbing a flight of 10 stairs? | None = 0<br>Some = 1<br>A lot or unable = 2 |
| Falls | How many times have you fallen in the past year? | None = 0<br>1–3 falls = 1<br>≥4 falls = 2 |
| | | **Total score :**_____<br>≥4 indicates sarcopenia |

**Table 2. 4Ds Mnemonic: Underlying causes of Sarcopenia**

**1. Drugs**

*Common*

- Statins
- Fibrates
- Steroids
- Alcohol

*Less common*

- Chloroquine
- Colchicine
- Antiretroviral drugs, e.g., lamivudine, zidovudine
- Chemotherapy medications

**2. Diabetes Mellitus**

**3. Other Diseases**

- Chronic lung, kidney, liver, or heart disease
- Osteoporosis
- Knee Osteoarthritis
- Neurological diseases
- Cancer
- Cognitive impairment, depression

**4. Deficiency**

- Vitamin D deficiency
- Caloric or protein deficiency

*Risk factors for under-nutrition:*

- Dentition or oral health problems
- Dysgeusia (loss of taste)
- Dysphagia
- Diseases/drugs causing anorexia or malabsorption
- Deprivation (Socioeconomic factors affecting access to food)

### D. Addressing Underlying Causes

Both individuals with "possible sarcopenia" and "at risk for sarcopenia" should be advised accordingly on nutritional and exercise interventions to improve muscle health, namely adequate caloric and protein intake, and regular resistance-based exercise and multi-component physical activity. Suitable cases, with diagnostic and/or management challenges, can be considered for referral to tertiary settings for further evaluation of underlying causes, muscle mass assessment, and tailored multidisciplinary intervention as needed.

## SARCOPENIA DIAGNOSIS

The AWGS 2025 consensus refines previous AWGS 2019 criteria by requiring both low muscle mass and low muscle strength for sarcopenia diagnosis, shifting low physical performance to an outcome measure rather than as part of the diagnostic criteria. Cutoffs for muscle mass and strength are age- and gender-specific and dependent on measurement method (refer to **Figure 2**).

### A. Skeletal Muscle Mass Measurement

A diagnosis of "possible sarcopenia" or "sarcopenia at risk" is usually sufficient for primary care or community preventive health settings to recommend interventions for muscle health. In cases where confirmatory muscle mass measurement is necessary, dual-energy X-ray absorptiometry (DXA) is still recommended as the imaging modality. Readings of lean mass from the four limbs are summed and divided by height-squared to yield the height-adjusted appendicular lean mass. However, as DXA measures lean mass rather than muscle mass per se, limitations include: 1) potential misclassification of body composition in individuals with high levels of water and fibrous tissue; 2) weak association between DXA-measured muscle mass and adverse health outcomes; and 3) lack of information about muscle quality.

Bioelectrical impedance analysis (BIA) is not routinely recommended for use in clinical care in view of the need for population- and device-specific equations and cutoffs. A validated multi-frequency device is preferred as there is better correlation with DXA-measured appendicular skeletal mass.[35] BIA readings can be affected by factors such as hydration status and obesity, and is contraindicated in those with pacemakers or cardiac devices.

Height-adjusted appendicular lean mass cutoffs may under-detect low muscle mass in individuals with sarcopenic obesity. BMI adjusted cutoffs for both DXA and BIA have been recognised for this purpose and validated to be comparable to height-adjusted cutoffs for clinical outcomes in the AWGS 2025 consensus update.[36–38]

### B. Muscle Strength Measurement

Consistency in the type of dynamometer used and adherence to measurement protocol are important in ensuring the validity of handgrip strength measurement in assessing muscle strength in clinical practice. The recommended positions for measuring handgrip strength are sitting with 90° elbow flexion for the Jamar (hydraulic) dynamometer and standing with full elbow extension for the Smedley dynamometer, respectively; the protocol for Smedley dynamometer also permits sitting for those who are unable to stand unassisted.[39] In addition, handgrip strength results of dynamometers are not interchangeable, with Smedley dynamometers having systemically lower readings compared to the Jamar.[40] Where possible, local validation studies of other hand dynamometers should be carried out to determine the presence of systematic or proportional bias relative to the Jamar or Smedley.

The AWGS 2025 cutoffs for low handgrip strength are <28.0 kg in men and <18.0 kg in women aged 65 and above, and <34.0 kg in men and <20.0 kg in women aged 50–64 years. The maximum reading of at least two trials using the dominant hand in a maximum-effort isometric contraction has better predictive validity for poor physical performance at two years.[41]

### C. Role of Physical Performance Measurement

While physical performance has been designated as an outcome measure of sarcopenia in the AWGS 2025 consensus, the 5-time sit-to-stand test (5-STS) and Short Physical Performance Battery (SPPB) remain clinically relevant as screening tools for physical function in clinical practice. Notably, they have also been recommended as feasible and valid assessments for locomotor capacity and physical function under the ICOPE framework. The 5-STS involves asking the participant to stand up from a chair and sit back down as quickly as possible five times. The SPPB assesses lower limb function in the three domains of balance, gait speed, and 5-STS. Each of the three subtests is scored from 0 to 4, and summing the three subtests yields the total score (range: 0–12). If 5-STS time is prolonged by ≥12 s (for older adults ≥65 years and above) or by ≥10 s (for adults aged 50–64 years old) or SPPB ≤9, it can indicate sarcopenia risk that necessitates further evaluation, particularly in primary care or community settings without access to muscle strength or mass measurement.[7,9] Either the stand or sit stop can be used, as long as the same protocol is consistently used.[42]

## FRAILTY SCREENING

Based on the Asia-Pacific Clinical Practice Guidelines for the Management of Frailty, it is recommended that adults more than 70 years of age or those who have unintentionally lost >5 percent of their body weight in the previous year be screened for frailty.[24]

Frailty screening tools differ based on their underlying theoretical framework. The predominant models of classification are: 1) the physical phenotype model (e.g., Fried's frailty phenotype with the key features of involuntary weight loss, exhaustion, muscle weakness, slow gait speed, low physical activity)[43]; 2) the deficit accumulation model (e.g., Frailty Index); and 3) mixed physical and psychosocial models (e.g., Edmonton Frailty Scale).

The FRAIL scale is based on the physical phenotype model and consists of self-reported assessment of five components: **F**atigue, **R**esistance (ability to climb one flight of stairs), **A**bility to walk one block, presence of >5 **I**llness, and **L**oss of weight >5 percent from baseline.[44] A score of 1–2 is pre-frail, and ≥3 is frail (refer to **Table 3**).

**Table 3. FRAIL instrument**

| Symptom/Sign | Assessment |
|---|---|
| Fatigue | Are you fatigued? |
| Resistance | Can you walk up one flight of stairs? |
| Ambulation | Can you walk one block? |
| Illness | Do you have more than five illnesses? |
| Loss of weight | Have you lost more than 5% of your weight in the last six months? |
| ≥3 = Frail<br>1–2 = Prefrail<br>0 = Robust | |

Another commonly used frailty screening tool for older adults, which functions as a global synthesis assessment tool using clinical descriptors and pictures, is the Clinical Frailty Scale (CFS). The CFS has been shown to predict institutionalisation and mortality risk in older adults[45]; a brief version for self and proxy administration has been modified for use in community-based settings (refer to **Figures 3a** and **3b**).[46–48]

## PRINCIPLES OF MANAGEMENT

After a patient is identified to have sarcopenia and/or frailty, the principles of management include: 1) addressing underlying precipitants; 2) improving core manifestations of physical frailty and sarcopenia through the pillars of exercise and nutrition; and 3) minimising vulnerability to adverse outcomes by addressing socio-environmental risks and reducing exposure to health-related stressors (e.g., undergoing recommended routine vaccinations or falls prevention education as part of preventive healthcare for older adults).

### A. Addressing Underlying Causes of Sarcopenia and/or Frailty

A search for underlying causes of sarcopenia should be undertaken (refer to **Table 2**).

Secondary causes of unintentional weight loss and fatigue as features of frailty should be evaluated, such as malignancy, obstructive sleep apnoea, depression, anaemia, hypotension, hypothyroidism, and vitamin B12 deficiency. In addition, medication lists should be reviewed for polypharmacy and potentially inappropriate medications that can be deprescribed or reduced.

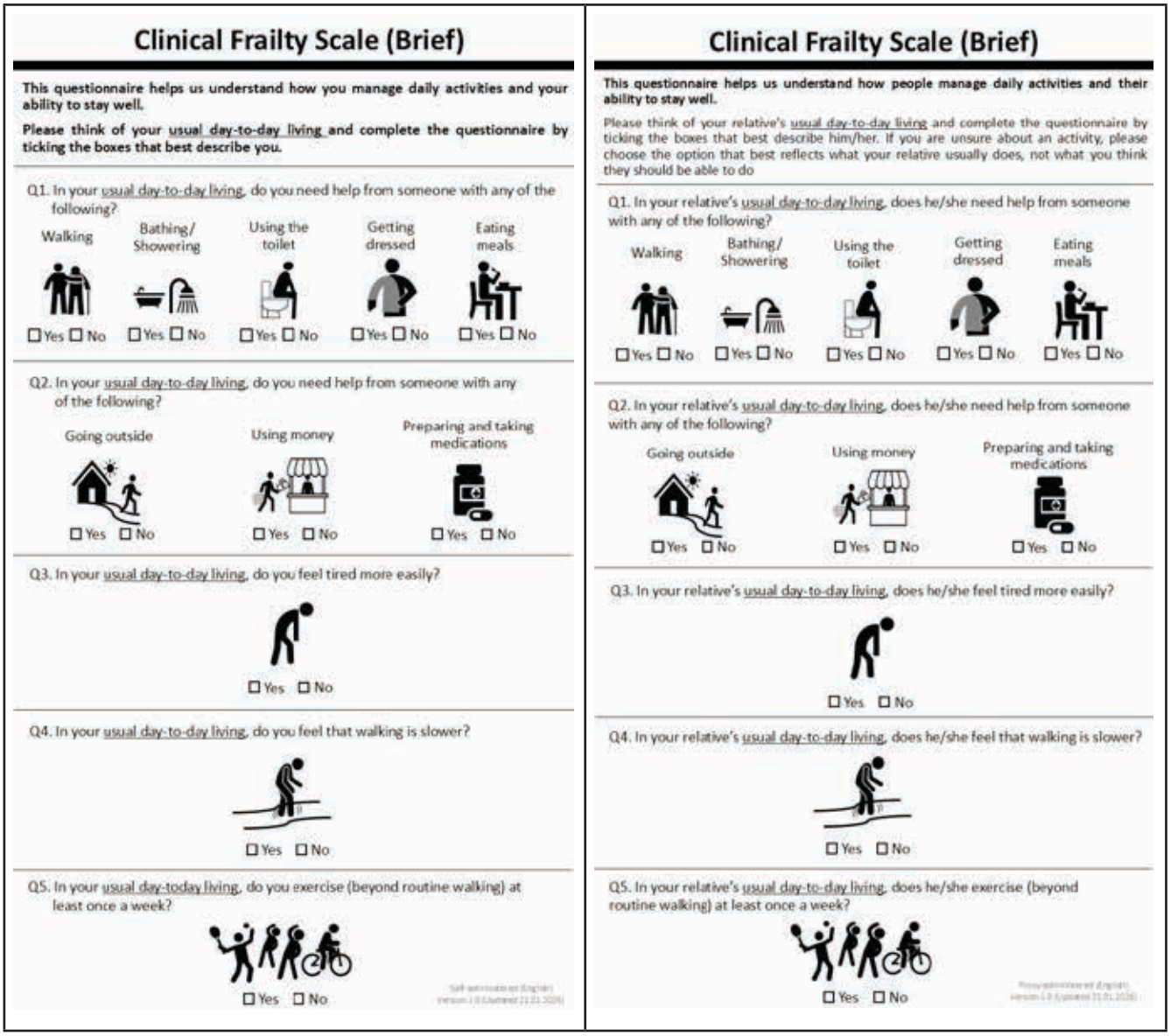
### B. Exercise

Exercise, particularly progressive resistance training, is first-line for the management of both sarcopenia and frailty.[49] Resistance exercise has been shown to improve handgrip strength and physical performance with moderate-large effect sizes.[50,51] Resistance training should be performed at least twice a week, and involve sufficient dose (i.e., frequency, duration, and volume) to induce a training stimulus. Progression in intensity should be individualised to optimise muscle gains without compromising safety and injury risk and should be planned in consultation with trained professionals such as physiotherapists and exercise trainers.[52]

### C. Nutrition

A high-quality diet with sufficient caloric and protein intake is synergistic when combined with exercise interventions for improving lean mass, muscle strength, and physical function in older persons with sarcopenia and/or physical frailty. Older persons have higher protein requirements than younger adults due to anabolic resistance. The recommended daily protein intake is 1.0–1.2 g/kg body weight for healthy older adults, as compared to 0.8 g/kg

**Figure 3a. CFS-Brief questionnaires for self and proxy-administration**

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body weight for the general adult population.[53,54] A diet-first whole food approach is preferred as food combinations in dietary patterns have potentially synergistic interactions and provide greater diversity of macro- and micronutrients.[55] Additional nutritional supplementation can be considered in older adults who are unable to meet their recommended protein intake needs through diet. Current evidence remains insufficient for recommending leucine or beta-hydroxy-beta-methylbutyrate (HMB) alone for sarcopenia management.[56]

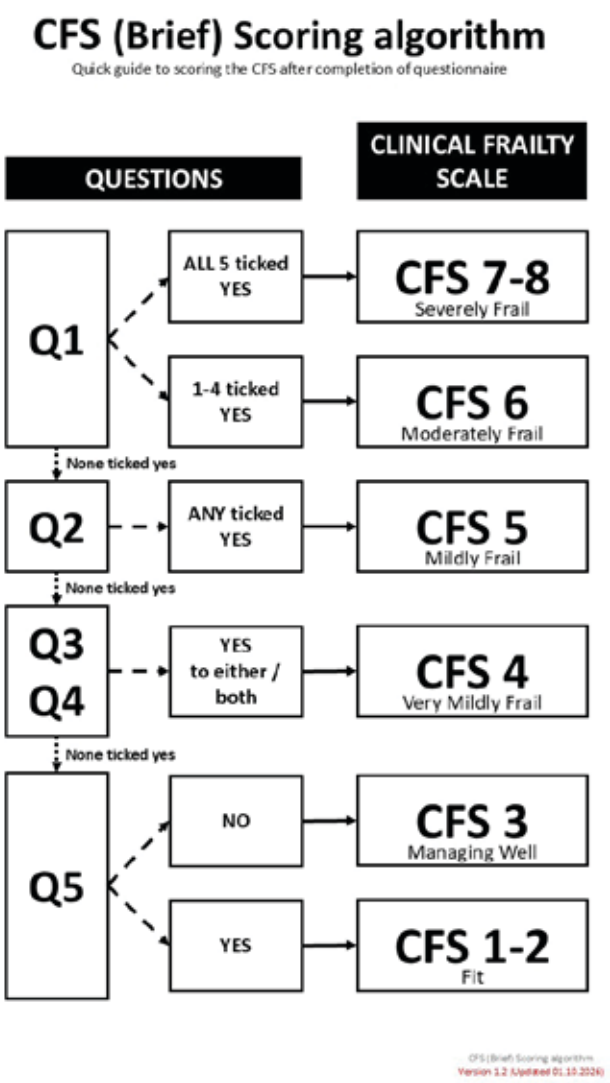
### D. Correcting Vitamin D Deficiency

Low vitamin D levels have been associated with increasing frailty risk.[57] Vitamin D supplementation in combination with exercise and protein supplementation significantly increased handgrip strength.[58] Hence, vitamin D supplementation for sarcopenia and frail older adults with vitamin D insufficiency (<30 μg/L) should be considered.[57]

## PREVENTION

To maximise muscle healthspan and prevent the onset of sarcopenia and physical frailty, we should start early in younger adulthood-midlife to improve muscle strength, then aim to maintain and/or minimise losses in older adulthood through adequate exercise and physical activity, reducing sedentary time, adopting healthy dietary habits, optimising cardiovascular risk factor control, and maintaining good sleep and mental health.[12] The Singapore Physical Activity Guidelines (SPAG) for older adults recommend a target of 150–300 minutes of moderate-intensity aerobic physical activity per week, with strengthening activities (≥2 days/ week) and multi-component physical activity (≥3 days/ week) for maintaining muscle strength.[59] In addition, our Singapore CPG also recommends encouraging older adults to have adequate protein intake of at least 1.0 g/kg body weight/day to prevent sarcopenia.

**Figure 3b. CFS-Brief scoring algorithm**

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## CONCLUSION

Sarcopenia and frailty are potentially reversible with early recognition and management. Promoting exercise and healthy dietary habits in early to midlife through to older adulthood can attenuate decline in muscle healthspan and provide a window of opportunity for healthcare practitioners to optimise healthy lifespan for our population.

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## LEARNING POINTS

- **Sarcopenia precedes the development of physical frailty, with both having similar clinical features, adverse outcomes, and management in older adults.**
- **Diagnosis of sarcopenia requires the presence of low muscle mass and strength. In the absence of muscle mass measurements, "possible sarcopenia" is defined by low muscle strength, whereas those "at risk for sarcopenia" have normal muscle strength despite presence of muscle health concerns.**
- **In primary care and community settings, persons with "possible sarcopenia" or are "at risk for sarcopenia" should be provided with exercise and nutritional advice to improve their muscle health.**
- **Look for and address secondary causes in older adults with or at risk for sarcopenia and frailty.**
- **Resistance exercise combined with adequate protein intake remain the backbone of sarcopenia and frailty management.**

https://doi.org/10.33591/sfp.52.6.u3

Unit No. 3

# VACCINATION AS A KEY ENABLER OF PREVENTIVE CARE IN OLDER ADULTS: REDEFINING HEALTHY AGEING IN PRIMARY CARE

Dr Leong Hoe Nam

## ABSTRACT

**As global demographics shift toward an increasingly aged population, maintaining functional capacity and independence in older adults has become a public health imperative. Traditional models of healthy ageing emphasise exercise, nutrition, social engagement, and chronic disease management. However, infectious diseases, particularly respiratory infections, remain a critical yet under-recognised driver of acute functional decline, frailty acceleration, and long-term disability. This paper explores vaccination as the "next pillar" of preventive care for older adults. We examine the biological interplay between immunosenescence, inflammaging, and multimorbidity, highlighting how acute infections trigger systemic inflammation, endothelial dysfunction, neuroinflammation, and cardiovascular events. Furthermore, we outline practical primary care strategies, including life-course adult immunisation schedules, co-administration workflows, and physician-led motivational interviewing to address vaccine hesitancy. By integrating immunisation into routine chronic disease medical reviews and long-term care frameworks, primary care physicians can protect functional reserves and foster resilient, healthy ageing.**

**Keywords: Healthy ageing; older adults; adult immunisation; vaccination; immunosenescence; inflammaging; multimorbidity; respiratory infections; frailty; preventive care**

**SFP2026; 52(6): 19-22**

## INTRODUCTION: THE EXPANDING FRAMEWORK OF HEALTHY AGEING

Healthy ageing is defined by the World Health Organization (WHO) as the process of developing and maintaining the functional ability that enables well-being in older age.[1] Historically, primary care strategies for healthy ageing have rested on four primary pillars:

- **Physical activity:** Preserving mobility, muscle strength, and balance
- **Healthy nutrition:** Optimising diet and managing metabolic risks (e.g., moderate alcohol intake)
- **Social interaction:** Promoting social participation and combating isolation
- **Chronic disease management and secondary prevention:** Controlling hypertension, hyperlipidaemia, and diabetes while encouraging smoking cessation and early disease screening

While these pillars are foundational, clinical evidence demonstrates that acute infectious episodes frequently undo years of preventive care.[1,2] An acute respiratory illness or vaccine-preventable infection can rapidly push a previously physiologically robust or pre-frail older adult across the disability threshold, leading to hospitalisation, cognitive decline, loss of independence, or even death.[2,3]

Consequently, **infection prevention via adult vaccination** emerges as the essential "fifth pillar" of healthy ageing.[1] By mitigating infection-induced systemic shocks, primary care providers can preserve functional capacity across the life course.

## BIOLOGICAL DRIVERS: IMMUNOSENESCENCE, INFLAMMAGING, AND MULTIMORBIDITY

The susceptibility of older adults to severe infections and their downstream complications is rooted in complex biological changes associated with ageing.

### Immunosenescence and Inflammaging

**Immunosenescence** refers to the age-related dysregulation and decline of the immune system. It involves both the innate immune system (impaired phagocytosis by neutrophils and macrophages, altered dendritic cell signalling) and the adaptive immune system (decline in naïve B-cell and T-cell pools, reduced T-cell receptor diversity, and impaired antibody responses).[3] This results in poorer immune response to any infection, as well as to vaccinations administered to the elderly.[3]

Parallel to immunosenescence is inflammaging, a state of chronic, sterile, low-grade systemic inflammation driven by cellular senescence, mitochondrial dysfunction, impaired autophagy, and persistent NF-κB activation.[4,5] Inflammaging leads to elevated baseline levels of pro-inflammatory cytokines such as Interleukin-6 (IL-6), Interleukin-1 beta (IL-1β), and Tumor Necrosis Factor-alpha (TNF-α). When an acute pathogen (e.g., influenza, SARS-CoV-2, or respiratory syncytial virus [RSV]) strikes an already inflamed and dysregulated immune system, the host response is often either inadequate in clearing the pathogen or causes a pathologically hyper-inflammatory response, resulting in undesired, further extensive tissue damage.

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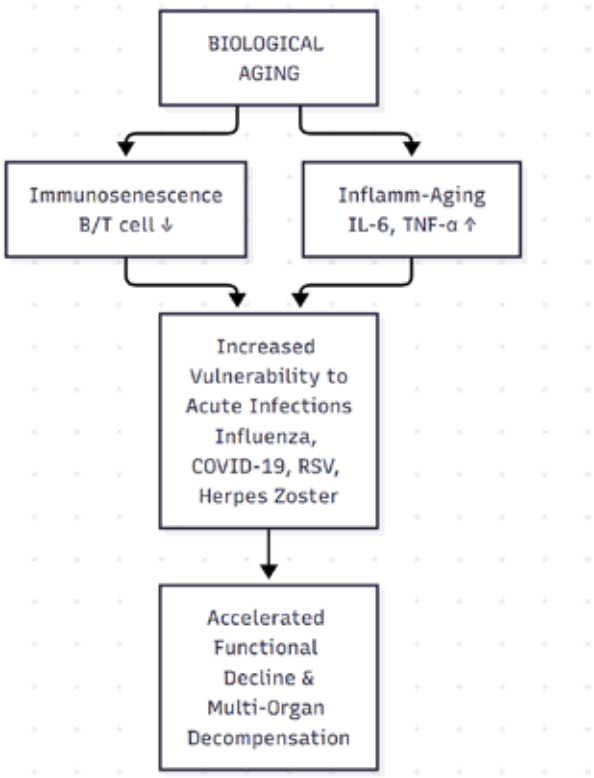



### The Additive Risk of Multimorbidity

The burden of chronic non-communicable diseases increases sharply with age.[6–8] In Singapore, for instance, data from the National Population Health Survey indicates that the prevalence of hypertension, hyperlipidaemia, and diabetes mellitus rises exponentially past age 50.[8] Over 50 percent of adults aged 60 and above live with multimorbidity (two chronic conditions).

The relationship between multimorbidity and infectious risk is reciprocal and additive. Underlying chronic medical conditions such as chronic obstructive pulmonary disease (COPD), asthma, diabetes, renal failure, and cardiovascular diseases significantly increase the risk and severity of vaccine-preventable infections like influenza, COVID-19, herpes zoster (HZ), and invasive pneumococcal disease.[9–14] Conversely, acute infections trigger acute decompensation of these underlying chronic illnesses.

## THE DOWNSTREAM IMPACT: INFECTIONS AS ACCELERATORS OF AGEING

Infections in older adults are not merely acute, self-limiting events; they serve as major systemic stress-tests that accelerate physical and cognitive decline.

### Neurological Impact: Disruption of the Blood-Brain Barrier and Dementia[15]

Systemic inflammation triggered by acute infections releases circulating cytokines (IL-6, TNF-α, IL-1β) that interact with brain endothelial cells and perivascular macrophages. This process disrupts tight junction proteins (such as ZO-1 and occludin), compromising the integrity of the blood-brain barrier (BBB). The resulting neuroinflammation induces microglial activation and loss of neurotrophic factors (e.g., BDNF).

Observational real-world data highlight these vascular and cognitive sequelae.[16] A propensity score-matched study using the UK Biobank cohort (50 years of age, COVID-19 cases vs matched controls) evaluated long-term neurological outcomes over a median follow-up of 24.1 months:

- All-cause dementia: Individuals infected with COVID-19 demonstrated a significantly increased risk of new-onset all-cause dementia compared to controls (HR 1.4; 95% CI 1.1–1.8).
- Vascular Dementia: The association was particularly marked for vascular dementia, where COVID-19 infection was linked to an 80 percent higher risk of new-onset diagnosis (HR 1.8; 95% CI 1.1–2.8).

### Cardiovascular Risk and Infection-Induced MACE

Infections act as acute cardiovascular stressors. Pathogens like influenza, SARS-CoV-2, Streptococcus pneumoniae, and RSV induce pro-inflammatory states, plaque instability, pro-thrombotic cascades, and myocardial strain.[17,18]

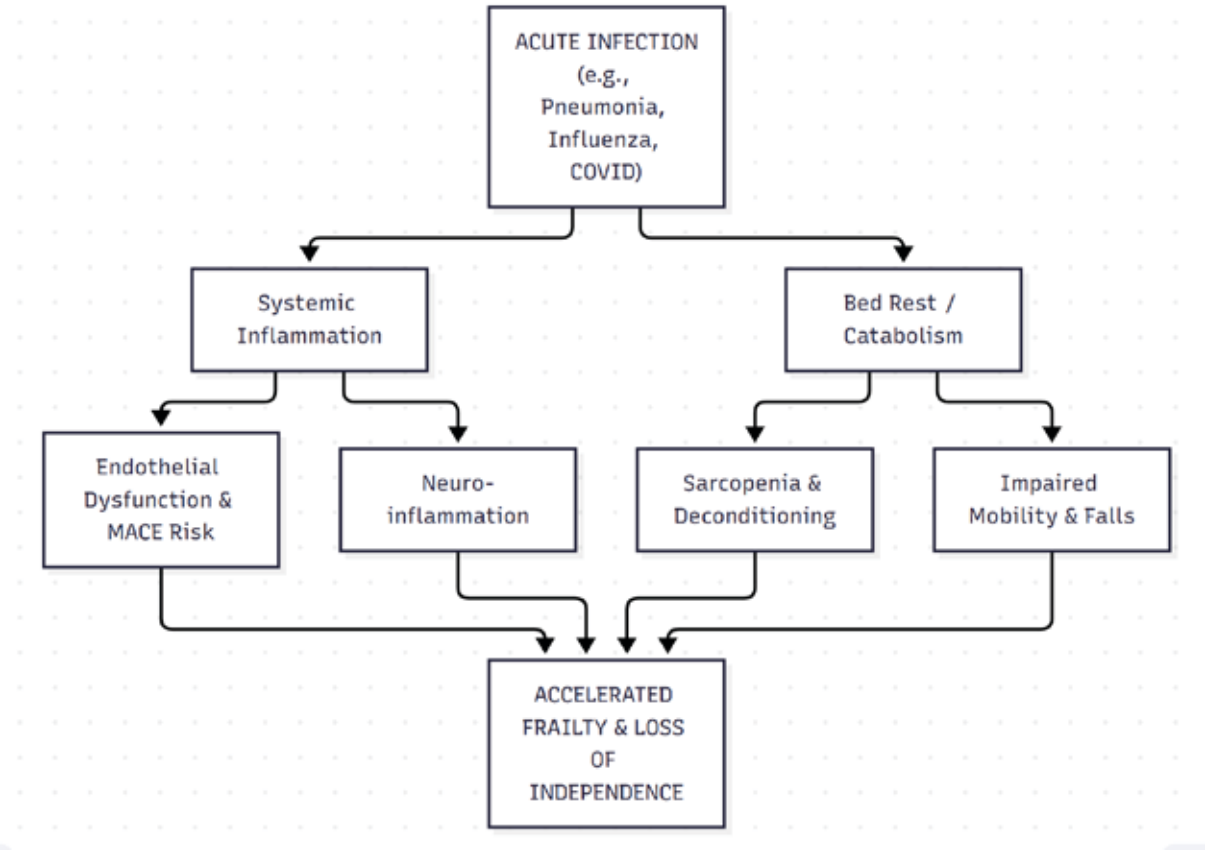
The European Society of Cardiology (ESC) consensus statements recognise vaccination as an established form of cardiovascular prevention.[19] Clinical trials show that influenza vaccination post-myocardial infarction (MI) or high-risk coronary intervention leads to a 41 percent reduction in cardiovascular and all-cause mortality, and a 28 percent reduction in major adverse cardiovascular events (MACE). In comparison, the role of primary PCI, beta blocker, and intensive statin reduces all-cause mortality by 27 percent, 26 percent, and 24 percent respectively. Despite this, many clinicians omit influenza vaccinations as a crucial intervention in individuals with ischaemic heart disease.[18]

### Functional Decline, Sarcopenia, and Frailty Cascades

Acute infection and subsequent hospitalisation routinely lead to enforced bed rest, catabolic stress, anorexia, and muscle mass loss (sarcopenia).[20] For a pre-frail older individual, a single hospitalisation for Community-Acquired Pneumonia (CAP)—where 28-day mortality in ICU-admitted European cohorts reaches 17 percent. However, this mortality rises to 27 percent at six months.[21] After an acute infection, a cascade of problems begins: from permanent loss of functional reserve, precipitating falls, institutionalisation, further new infections, to death. The initial mortality data does not account for the subsequent death from frailty.

## PREVENTION

As the adage goes, prevention is better than cure. Vaccination offers the easiest, and the most cost-effective, method in preventing infections in the population.[22]




Successful large scale public health implementation might even build an effective herd immunity, further protecting the at-risk individuals (the very elderly and the severely immunocompromised host). Even when a vaccine fails, the severity of the illness is attenuated by the vaccination. This has been well studied in influenza and COVID-19.[23,24]

Despite this overwhelming evidence, the influenza and COVID vaccine uptake in Singapore is paltry in comparison to our Asian neighbours (e.g., South Korea and Japan).[25] More can be done to elevate the health status of our elderly simply by vaccination.

A range of vaccines are available in Singapore and in many countries, with published guidelines recommending their utility in adults, and those with existing chronic illness. A vaccination checklist for older adults in Singapore would currently include[26,27]:

- Influenza
- Pneumococcal (PCV20 / PCV21)
- Shingles
- COVID-19
- Pertussis
- Respiratory syncytial virus

This list is expected to expand to include new pathogens in the distant future.

## CONCLUSION

Infections in older adults act as major systemic stressors that trigger systemic inflammation, endothelial damage, neuroinflammation, and acute functional decline. Viewing vaccination purely through the lens of acute pathogen control underestimates its broader clinical value. Adult immunisation is a cornerstone of secondary and tertiary disease prevention, protecting cardiovascular health, cognitive integrity, and physical function. Primary care physicians must champion vaccination as an essential pillar of healthy ageing, embedding life-course immunisation assessments into every routine older adult consultation.

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**LEARNING POINTS**

- **Age-related immunosenescence and inflammaging increase susceptibility to severe infection and infection-related complications in older adults. Acute infections can amplify systemic inflammation and contribute to cardiovascular, neurological, and functional deterioration.**
- **Multimorbidity and infection have a reciprocal relationship. Chronic conditions such as COPD, asthma, diabetes, renal failure, and cardiovascular disease increase vulnerability to vaccine-preventable infections, while acute infections can precipitate decompensation of underlying chronic disease.**
- **The consequences of infection in older adults extend beyond the acute infectious episode. Infection and hospitalisation can contribute to cardiovascular events, neuroinflammation, sarcopenia, frailty, and loss of functional independence.**
- **Vaccination should be integrated into routine preventive and chronic disease care for older adults. The article proposes vaccination as an additional pillar of healthy ageing, with immunisation status assessed during routine primary-care encounters.**

**ASSESSMENT OF 15 MCQS**

# FPSC NO : 136
# MCQS ON BASIC OBESITY MANAGEMENT ACCREDITATION 6
## SUBMISSION DEADLINE: 22 December 2026, 12 NOON

**INSTRUCTIONS**
- **To submit answers to the following multiple choice questions, you are required to log on to the College Online Portal (https://lms.wizlearn.com/cfps/)**
- **Please contact sfp@cfps.org.sg if you have not received an email on the new LMS account.**
- **Attempt ALL the following multiple-choice questions.**
- **There is only ONE correct answer for each question.**
- **The answers should be submitted to the College of Family Physicians Singapore via the College Online Portal before the submission deadline stated above.**
- **There will be NO further extension of the submission deadline**

**1. Which statement best describes the shift in approach that Healthier SG represents?**

A. A move from specialist-led to hospital-led care
B. A move from caring reactively for those already ill to proactively preventing illness, anchored by the primary care physician and a personalised health plan
C. A move from public to private provision of primary care
D. A move towards expanding acute hospital capacity to meet the rising demand from older adults
E. A move towards care that begins only after symptoms or complications appear

**2. According to the WHO framework, functional ability is determined by which of the following?**

A. Intrinsic capacity alone
B. Chronological age and the number of comorbidities
C. The interaction between intrinsic capacity and the environment
D. Biological age as measured by epigenetic clocks
E. The level of healthcare utilisation

**3. The WHO ICOPE framework is used for brief screening for functional decline. Which option lists the six domains it screens?**

A. Blood pressure, lipids, glucose, weight, smoking, alcohol use
B. Vaccination status, cancer screening, bone density, dental health, sleep, continence
C. Frailty, falls, polypharmacy, loneliness, finances, housing
D. Income, education, employment, housing, food security, social cohesion
E. Cognition, mobility, nutrition, vision, hearing, mood

**4. Which approach to medication review in older adults is consistent with the article?**

A. An annual review using tools such as STOPP/START or the Beers criteria, with particular attention to sedative, anticholinergic, and hypotensive agents
B. A review only when the patient is admitted to hospital
C. Stopping all unnecessary medications at once
D. A review limited to medications for chronic disease, excluding over-the-counter products
E. No routine review, because polypharmacy has little effect on falls or confusion

**5. Which exercise prescription matches the WHO recommendations cited for an older adult at risk of falls?**

A. 30 minutes of brisk walking daily and no other activity
B. 75 minutes of vigorous-intensity activity per week only
C. Resistance training once a week, with balance training added only after a fall
D. 150 to 300 minutes of moderate-intensity aerobic activity per week, muscle strengthening on at least two days per week, and multicomponent balance training on at least three days per week
E. Complete rest until a formal falls risk assessment has been done

**6. It is least appropriate to offer screening for sarcopenia for a 65-year-old lady with:**

A. Cognitive impairment
B. Swallowing impairment
C. Recent hospitalisation
D. Urinary incontinence
E. Weight loss

**7. The following tests can be used to screen for sarcopenia except:**

A. Calf circumference
B. Five times chair stand test
C. SARC-F
D. Timed Up and Go test
E. Yubi-wakka test

**8. A 65-year-old-man comes to you for concerns about his muscle strength. His SARC-F score is 4. Calf circumference is 30 cm. Handgrip strength is 30 kg. Which of the following diagnoses is correct?**

A. At risk for sarcopenia
B. Frailty
C. Low muscle mass
D. Possible sarcopenia
E. Sarcopenia

**9. Which is not an underlying cause of frailty?**

A. Alzheimer's dementia
B. Chronic heart failure
C. Polypharmacy
D. Previous amputation
E. Progressive malignancy

**10. Which of the following is most beneficial for improving muscle strength in older adults with sarcopenia and frailty?**

A. Aerobic exercise
B. Thyroid hormone replacement
C. Protein intake
D. Vitamin D supplementation
E. Resistance exercise

**11. Which age-related biological changes described in the article contribute most directly to increased vulnerability to severe infection in older adults?**

A. Increased naïve T-cell production and reduced cytokine production
B. Immunosenescence combined with chronic low-grade systemic inflammation
C. Increased antibody responses combined with endothelial stabilisation
D. Increased B-cell diversity and reduced innate immune activation
E. Increased autophagy and reduced cellular senescence

**12. A 72-year-old patient with diabetes and cardiovascular disease develops an acute respiratory infection. According to the framework presented in the article, why is this patient particularly vulnerable to adverse outcomes?**

A. Multimorbidity reduces the likelihood of systemic inflammation
B. Chronic diseases protect against infection-induced organ dysfunction
C. Multimorbidity increases infection risk, while infection may simultaneously precipitate decompensation of chronic disease
D. Infection-related complications occur independently of underlying chronic disease
E. Age-related immune changes affect vaccine responses but not infection severity

**13. Which mechanism described in the article provides a plausible link between acute infection and subsequent neurological decline in older adults?**

A. Cytokine-mediated disruption of blood-brain barrier integrity and subsequent neuroinflammation
B. Suppression of circulating cytokines and increased BDNF production
C. Reduced microglial activity following systemic infection
D. Increased tight-junction protein expression in cerebral endothelial cells
E. Reduction in systemic inflammation following acute infection

**14. Why does the article argue that preventing infection may help preserve functional independence in older adults?**

A. Infection-related hospitalisation generally increases muscle mass during recovery
B. Acute infections affect mortality but have little effect on long-term function
C. Functional decline occurs only in patients requiring intensive care
D. Vaccination directly reverses established sarcopenia
E. Bed rest, catabolic stress, and anorexia during infection can contribute to sarcopenia, deconditioning, and frailty

**15. Which approach most closely reflects the article's proposed role of primary care in promoting healthy ageing?**

A. Discuss vaccination only when an older adult presents with an acute infection
B. Restrict vaccination assessment to patients without chronic disease
C. Focus preventive consultations exclusively on exercise, nutrition, and cardiovascular risk factors
D. Incorporate life-course immunisation assessment into routine care of older adults alongside management of chronic disease and other preventive measures
E. Refer all vaccination decisions to specialist infectious disease services



# READINGS

A SELECTION OF TEN READINGS ON TOPICS RELATED TO
**2026 FAMILY PRACTICE SKILLS COURSE:**
**OPTIMISING HEALTHSPAN: TACKLING DRIVERS OF AGEING**

https://doi.org/10.33591/sfp.52.6.ur

# A SELECTION OF TEN READINGS ON TOPICS RELATED TO 2026 FAMILY PRACTICE SKILLS COURSE: OPTIMISING HEALTHSPAN: TACKLING DRIVERS OF AGEING

**FPSC136 – SATURDAY, 17 OCT 2026: 2.00pm–5.15pm (via Zoom)**
**All are available as free full text**

**Selection of readings made by A/Prof Goh Lee Gan**

## READING 1. QUALITATIVE STUDY OF PUBLIC VIEWS TOWARDS LIFESPAN, HEALTHSPAN, AND HEALTHY LONGEVITY MEDICINE IN SINGAPORE

**Wang B,[1,2] Szücs A,[1–4] Sandalova E,[2] Lim ZM,[1,2] Horberg EJ,[5] O'Keefe PA,[5] Island L,[1,2] Rosenthal S,[6] Maier AB.[7–9] Public Views towards Lifespan, Healthspan, and Healthy Longevity Medicine in Singapore: A Qualitative Study from the Healthy Longevity (HELO) Initiatives. Gerontology. 2025;71(12):1021–1030. PMID: 41105565.**

**doi: 10.1159/000548994. Free full text.**

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ABSTRACT

INTRODUCTION: Healthy Longevity Medicine (HLM) offers a strategy to reduce the healthspan-lifespan gap, yet public perspectives remain unclear. This study refines the Healthy Longevity (HELO) framework through a qualitative exploration of public views towards lifespan, healthspan, and HLM.

METHODS: Individuals living in Singapore participated in semi-structured group or individual discussions to explore (a) their understanding of lifespan and healthspan, (b) motivational factors for health behaviours, and (c) their awareness of HLM. Sampling maximised variation across age, sex, and ethnicity. Data obtained through 13 discussions were analysed with a mixed, inductive-deductive approach employing the HELO framework.

RESULTS: Thirty-six participants (mean age = 49.4 years, SD = 15.9, 19 males, 15 ethnic Chinese) were generally familiar with the definitions of lifespan and healthspan, emphasising the importance of quality of life. Health was defined comprehensively, and autonomy over behaviours was highly valued during ageing and in adopting health behaviours. Community resources and government health initiatives were deemed useful, recognising the potential to enhance social, mental, and physical health. Singapore's busy, achievement-oriented culture was identified as a barrier to healthy behaviours. Participants expressed enthusiasm for HLM's potential to extend the healthspan yet voiced concerns about lifestyle changes and potentially losing autonomy.

CONCLUSION: Personal values and priorities were central to motivations towards healthy longevity. HLM should assess and align diagnostic and treatment plans with individual preferences to support sustainable health behaviours. The Singapore public's alignment with government policies presents an opportunity to promote HLM adoption.

## READING 2. THE SG90 COHORT OF THE OLDEST-OLD IN SINGAPORE

**Guan L,[1,2] Feng L,[1,3,4] Khoo ALY,[1,3] Ye KX,[1,3,4] Ho R,[4,5] Ng TP,[6] Larbi A,[7,8] Kennedy BK,[1,3,9] Koh WP,[1,10] Chong YS,[10–12] Maier AB.[13–15] The SG90 cohort of the oldest-old in Singapore. Eur J Epidemiol. 2025 Sep;40(9):1133–1141. PMID: 40682752.**

**doi: 10.1007/s10654-025-01275-0. Free full text.**

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ABSTRACT

The global population is ageing rapidly. While genetics, lifestyle, and environment are known contributors to healthspan, most insights are drawn from Western cohorts, leaving Asian populations underrepresented despite unique biological, lifestyle, and cultural factors.

The SG90 cohort study aimed to fill knowledge gaps in healthy ageing by identifying modifiable medical, biological, lifestyle, psychological, behavioural, and social factors that contribute to longevity in the oldest-old.

The study recruited 1,158 participants aged 85 and above from the Singapore Chinese Health Study (SCHS) and Singapore Longitudinal Ageing Study (SLAS) between 2015 and 2021. Data collection involved face-to-face interviews to obtain sociodemographic, lifestyle, sleep, functional status, quality of life, medical conditions, and healthcare economics information, along with clinical assessments covering physical examinations, anthropometry, physical performance, cognition, and mental health. Biospecimens, including blood, saliva, stool, urine, toenails, hair, and skin tape strips were collected to support extensive multi-omic and cellular analyses.

Participants, primarily female (64.5%) and Chinese (97.5%) with a median age of 87 years [interquartile range (IQR): 86–89], were mostly non-smokers (72.1%) and infrequent alcohol consumers (94.9%), with 66.5% exercising regularly. Functional assessments indicate high independence, with median Basic activities of daily living (BADL) and Instrumental ADL (IADL) scores of 20 (IQR: 19–20) and 14 (IQR: 11–16), respectively. Thirty-six percent of participants rated their self-reported health as good to excellent.

The SG90 cohort study offers a comprehensive clinical and biological data resource on healthy ageing among Asia's oldest-old, laying a foundation for targeted interventions to promote healthy longevity and quality of life.

## READING 3. A SYSTEMATIC REVIEW OF DEFINITIONS OF HEALTHSPAN

**Masfiah S,[1] Kurnialandi A,[2] Meij JJ,[3] Maier AB.[4] Definitions of healthspan: A systematic review. Ageing Res Rev. 2025 Sep;111:102806. PMID: 40523529.**

**doi: 10.1016/j.arr.2025.102806. Free full text.**

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ABSTRACT

The term "healthspan" has been widely used in academic literature, technical reports, and brochures; however, it is unclear if the same definitions and operationalisations for healthspan are being used.

The objective of the systematic review (registration number CRD42023404872) was to summarise definitions of healthspan and their operationalisation searching using four databases: PubMed, Embase, Web of Science, and Scopus.

Out of 14,551 records, 207 records met the inclusion criteria, and 187 articles gave a definition of healthspan. Of these, 113 definitions were considered primary definitions, which refer to an author's definition without referencing other definitions. Healthspan definitions varied widely, describing the absence of various disease and/or disability and were operationalised by measuring the onset of chronic diseases, disability, or performance limitations. Two definitions included subjective measures, such as quality of life.

In conclusion, definitions of healthspan and their operationalisation are not standardised, hampering comparisons of data. A consensus on the definition and operationalisation of healthspan is urgently needed.

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## READING 4. TOWARDS DEFINING OPTIMAL CONCENTRATIONS OF MICRONUTRIENTS IN ADULTS TO OPTIMISE HEALTH

**Mahadzir MDA,[1] Tan S,[2] Elena S,[3] Chin EM,[2] Garg V,[2] Mantantzis K,[4] Péter S,[5] Maier AB.[6] Towards defining optimal concentrations of micronutrients in adults to optimise health. Mech Ageing Dev. 2025 Jun;225:112062. PMID: 40250530.**

**doi: 10.1016/j.mad.2025.112062. Free full text.**

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ABSTRACT

Micronutrients are essential for maintaining physiological homeostasis and optimising healthspan, defined as the years lived in good health without chronic diseases or disabilities. Despite increasing global life expectancy, improvements in healthspan have not kept pace, partly due to subclinical micronutrient deficiencies that often precede clinical symptoms.

The triage theory highlights how micronutrient insufficiencies compromise long-term health by prioritising critical metabolic functions. Micronutrients such as Vitamins B6, B9, B12, D, and K are particularly crucial in optimising healthspan, by influencing energy metabolism, neurological health, immune regulation, and bone integrity. Traditional tools like Dietary Reference Intakes (DRIs) provide population-level guidelines but fail to account for individual factors such as genetics, lifestyle, and nutrient interactions. Quantitative assessment of micronutrient concentrations using biomarkers offers a more precise approach but faces challenges, including high costs and limited accessibility. National nutrition surveys demonstrate potential in addressing population-level deficiencies and form the basis for advancing precision supplementation strategies to improve health outcomes and extend healthspan by defining optimal micronutrient concentrations.

Future efforts should aim to establish evidence-based thresholds for optimal micronutrient concentrations by integrating biomarker data with clinical outcomes, genetic profiles, and lifestyle factors, providing a framework to guide personalised and population-level supplementation strategies.

## READING 5. UNDIAGNOSED POSSIBLE SARCOPENIA, POOR ORAL HEALTH, AND COGNITIVE IMPAIRMENT AMONG COMMUNITY-DWELLING PRE-FRAIL OLDER ADULTS

**Wang R,[1] Tee LY,[2,3] Lim SC.[4,5] Undiagnosed possible sarcopenia, poor oral health, and cognitive impairment among community-dwelling pre-frail older adults. Sci Rep. 2026 Jul 14. PMID: 42449165.**

**doi: 10.1038/s41598-026-61804-z. Free full text.**

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ABSTRACT

Frailty is an age-associated state of reduced physiological reserve that increases vulnerability to adverse outcomes following acute insults such as infections, injuries, trauma, and surgery. It is associated with physical disability, dependence, hospitalisation, and premature mortality. Frailty encompasses physical, psychological, social, and oral health domains and is potentially reversible, particularly in its early stages. Given the adverse outcomes associated with frailty, there is increasing interest in identifying pre-frailty and its associated risk factors among community-dwelling older adults.

This study aims to identify risk factors associated with pre-frailty in community-dwelling older adults. A total of 416 community-dwelling older adults underwent comprehensive health screening to identify modifiable risk factors associated with pre-frailty. Assessments included demographic and clinical characteristics, physical performance tests, and oral health evaluations.

Potentially modifiable risk factors independently associated with pre-frailty included possible sarcopenia (OR 9.361, 95% confidence interval [CI] 4.267–20.534, p<0.001), reduced lower limb strength, as reflected by a five-times sit-to-stand test (5xSTS) ≥12 s (OR 2.398, 95% CI 1.359–4.229, p=0.003), poor oral health (OHAT ≥7) (OR 2.278, 95% CI 1.047–4.955, p=0.038), and cognitive impairment (AD8 ≥2) (OR 3.947, 95% CI 2.142–7.274, p<0.001).

Non-modifiable risk factors associated with pre-frailty included six years or fewer of formal education (OR 3.272, 95% CI 1.855–5.770, p<0.001) and a history of falls within the preceding 12 months (OR 3.138, 95% CI 1.221–8.068, p=0.017). After adjustment for education, possible sarcopenia (OR 3.482, 95% CI 1.477–8.211, p=0.004), cognitive impairment (OR 4.875, 95% CI 2.028–11.721, p<0.001), and lower limb strength (OR 5.753, 95% CI 2.402–13.782, p<0.001) were associated with pre-frailty.

All cases of possible sarcopenia, cognitive impairment, and poor oral health identified during screening were previously undiagnosed. Possible sarcopenia, poor oral health, and cognitive impairment are potentially modifiable risk factors associated with pre-frailty. Their high rate of underdiagnosis highlights the importance of targeted case-finding among pre-frail community-dwelling older adults to facilitate early intervention.

## READING 6. IMPACT OF SARCOPENIC OBESITY ON FRAILTY, COGNITION, AND FUNCTION IN COMMUNITY-DWELLING OLDER ADULTS

**How LA,[1] Lee XX,[1] Hui-En SAL,[2] Teo YH,[2] Goh KC,[3] Tan LF.[3] The Impact of Sarcopenic Obesity on Frailty, Cognition, and Function in Community-Dwelling Older Adults. J Frailty Sarcopenia Falls. 2025 Sep 1;10(3):150–156. PMID: 40901342.**

**doi: 10.22540/JFSF-10-150. Free full text.**

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ABSTRACT
OBJECTIVES: The impact of sarcopenic obesity (SO) on frailty, cognition, and function compared to sarcopenia and obesity alone remains unclear. This study examined SO's effects on these domains in community-dwelling older adults.

METHODS: We assessed 202 older adults (mean age 80.4±7.3 years) attending a community frailty screening clinic. Obesity was defined as BMI ≥25, and sarcopenia was assessed using Asian Working Group for Sarcopenia guidelines. SO was defined as the presence of both conditions. Assessments included the Clinical Frailty Scale, Modified Barthel Index, Singapore-modified Mini-Mental State Examination, and mobility aid use.

RESULTS: Multivariate regression showed SO was significantly associated with frailty (OR 4.71), impaired function (ß: -16.53), and mobility limitations (OR 5.73). SO was also linked to cognitive impairment (OR 3.56). Sarcopenia alone was associated with frailty (OR 3.39), impaired function (ß -11.46), and mobility limitations (OR 3.32), but not cognition. Obesity alone showed no associations. SO posed higher risks for frailty, cognitive impairment, functional decline, and mobility limitations compared to sarcopenia or obesity alone.

CONCLUSIONS: SO is associated with greater risks of frailty, cognitive impairment, functional decline, and mobility limitations than sarcopenia or obesity alone.

## READING 7. SARCOPENIA, SARCOPENIC OBESITY, AND FRAILTY IN INDIVIDUALS WITH CHRONIC KIDNEY DISEASE

**Chao CT,[1–3] Kovesdy CP,[4,5] Merchant RA.[6,7] Sarcopenia, sarcopenic obesity, and frailty in individuals with chronic kidney disease: a comprehensive review. Kidney Res Clin Pract. 2026 Mar;45(2):174–188. PMID: 39973319.**

**doi: 10.23876/j.krcp.24.207. Free full text.**

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ABSTRACT

Population ageing is a global challenge that increases the burden of chronic kidney disease (CKD) and geriatric syndromes such as sarcopenia, sarcopenic obesity, and frailty. These conditions affect almost half of older CKD individuals and are associated with poor outcomes, including CKD progression, cardiometabolic complications, increased health and social care costs, and mortality. They can be both the cause and consequent of CKD and lead to a vicious downward spiral if not addressed early.

Frailty is a multidimensional syndrome characterised by reduced physiological reserve and increased vulnerability to stressors. Sarcopenia refers to the progressive and generalised loss of skeletal muscle mass, strength, and/or physical performance with ageing.

Sarcopenic obesity denotes the combination of sarcopenia and obesity that synergistically leads to poor outcomes. They share common pathogenic mechanisms, such as multimorbidity, inflammation, oxidative stress, uraemic milieu, insulin resistance, endocrine disturbances, CKD complications, and psychosocial factors that may limit access to proper nutrition and resources.

Management requires a multidisciplinary and patient-centred approach, taking into consideration their baseline physical function and endurance, CKD stage, nutrition status, comorbidities, symptoms, treatment goals, cost, and accessibility. Interventions include exercise, nutrition, comorbidity optimisation, geriatric assessment, sensory training, and kidney-oriented care.

This review summarises the current knowledge on the diagnosis and treatment of sarcopenia, sarcopenic obesity, and frailty in individuals with CKD, followed by up-to-date summaries of how best to manage affected individuals.

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## READING 8. GLOBAL BURDEN OF CHIKUNGUNYA VIRUS INFECTIONS AND THE POTENTIAL BENEFIT OF VACCINATION CAMPAIGNS

**Ribeiro Dos Santos G,[1,2] Jawed F,[1] Mukandavire C,[3] Deol A,[3] Scarponi D,[3] Mboera LEG,[4] Seruyange E,[5] Poirier MJP,[6] Bosomprah S,[7] Udeze AO,[8] Dellagi K,[9] Hozé N,[10–12] Chilongola J,[13] Nasrallah GK,[14] Cauchemez S,[15] Salje H.[16] Global burden of chikungunya virus infections and the potential benefit of vaccination campaigns. Nat Med. 2025 Jul;31(7):2342–2349. PMID: 40495015.**

**doi: 10.1038/s41591-025-03703-w. Free full text.**

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Erratum in Nat Med. 2025 Dec;31(12):4312. doi: 10.1038/s41591-025-04065-z. Free full text.

ABSTRACT
The first vaccine against chikungunya virus (CHIKV) has now been licensed; however, due to a limited knowledge of the underlying global burden, its potential to reduce disease burden remains unknown.

We used data from seroprevalence studies, observed cases, and mosquito distributions to quantify the underlying CHIKV burden in 180 countries and territories, and we explored the potential impact of vaccination campaigns.

We estimate that 104 countries have experienced CHIKV transmission, covering 2.8 billion people, and that, in epidemic settings, the mean duration between outbreaks is 6.2 years, with 8.4 percent of the susceptible population infected per outbreak. Globally, there are 35 million annual infections, mainly in Southeast Asia, Africa, and the Americas.

Assuming a vaccine efficacy against disease of 70 percent and a protection against infection of 40 percent, vaccinating 50 percent of individuals over 12 years of age in places and times where the virus circulates would avert 4,436 infections, 0.34 deaths, and 17 disability-adjusted life years per 100,000 doses used. These findings highlight the global burden of chikungunya and the potential of CHIKV vaccination campaigns.

## READING 9. LESSONS FROM THAILAND'S SUCCESSFUL PREVENTION OF MOTHER-TO-CHILD HEPATITIS B TRANSMISSION

**Poovorawan Y,[1,2] Inma P,[1] Nilyanimit P,[1] Kanokudom S,[1] Jullapetch C.[3] Lessons from Thailand's successful prevention of mother-to-child hepatitis B transmission: Advancing toward elimination by 2030. Asian Pac J Allergy Immunol. 2025 Mar;43(1):1–9. PMID: 40094485.**

**doi: 10.12932/AP-220125-2021. Free full text.**

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ABSTRACT
Thailand has achieved remarkable success in preventing and reducing hepatitis B virus (HBV) incidence through its nationwide newborn vaccination programme, introduced in 1992 as part of the Expanded Programme on Immunisation (EPI).

Before the vaccination era, HBV endemicity in Thailand was high, with a carrier rate of 6–8 percent percent, and mother-to-child transmission was a major route of infection. Early trials demonstrated the efficacy of hepatitis B vaccines, especially when administered within 12 hours of birth, followed by scheduled doses. The national vaccination programme was initially piloted in two provinces in 1988 and expanded to full coverage by 1992. By 2024, carrier rates among children under 10 years dropped to less than 0.1 percent, meeting the WHO goal of zero mother-to-child transmission.

Studies confirm the vaccine's long-term protection, with no cases of chronic infection in vaccinated individuals with detectable anti-HBs over 20 years. Moreover, literature indicates that hepatitis B vaccination provides long-lasting protection more than 35 years. Additional measures, including antiviral use for high-risk mothers and expanded screening and treatment programmes, have further supported HBV elimination.

The programme's impact has significantly reduced liver-related diseases and positioned Thailand as a model for HBV control. As the nation moves towards its 2030 goal of hepatitis elimination, ongoing efforts focus on screening older populations with a high prevalence of infection and ensuring treatment access to achieve lasting eradication.

## READING 10. DENGUE VACCINATION: A PRACTICAL GUIDE FOR CLINICIANS

**See KC.[1] Dengue Vaccination: A Practical Guide for Clinicians. Vaccines (Basel). 2025 Jan 30;13(2):145. PMID: 40006692.**

**doi: 10.3390/vaccines13020145. Free full text.**

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ABSTRACT

Dengue is a growing global public health challenge, with rising incidence and case fatality rates fuelled by urbanisation and climate change. The substantial mortality, morbidity, and economic burden associated with the disease underscore the need for effective prevention strategies, including vector control, personal protective measures, and vaccination.

This narrative review provides a practical guide for clinicians to ensure the appropriate administration of dengue vaccines to at-risk groups, such as individuals in endemic regions and travellers to these areas. Live-attenuated tetravalent dengue vaccines, including Dengvaxia®, Qdenga®, and Butantan-DV, have demonstrated efficacy in clinical trials but require careful use due to the risk of antibody-dependent enhancement (ADE).

To mitigate this risk, guidelines recommend vaccination primarily for individuals with prior confirmed dengue infection, emphasising the importance of accessible and affordable point-of-care rapid testing. Co-administration of dengue vaccines with other live-attenuated or inactivated vaccines has been shown to be safe and immunogenic, broadening their potential application. However, live-attenuated vaccines are contraindicated for immunocompromised individuals and pregnant women.

Enhancing clinician awareness, expanding diagnostic capabilities, and prioritising high-risk populations are critical steps in optimising vaccination strategies. Combined with robust prevention programmes, these efforts are essential to reducing the global burden of dengue and mitigating its impact.



# SPCC 2026 ABSTRACTS

SELECTION OF ABSTRACTS PUBLISHED AT
**SPCC 2026**

https://doi.org/10.33591/sfp.52.6.ua

## MEDICATION OPTIMISATION SERVICE PILOT AT SINGHEALTH POLYCLINICS (SHP)

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### INTRODUCTION

Falls can cause significant morbidity and mortality in the elderly. Medication use is one of the most modifiable risk factors for falls. High-risk medications such as psychotropics, hypoglycaemics, and anti-hypertensives may cause sedation or dizziness, increasing falls risk. We evaluated a pharmacist-led Medication Optimisation Service (MOS) to complement falls and frailty management at SHP's Geriatric Service Hub.

### METHODS

The MOS comprises medication reconciliation and medication review via shared decision-making, reducing medications, and simplifying drug regimens. Post-consult MOS was offered to all GSH patients in phase 1 of the pilot. To streamline the service, pre-consult MOS was offered to GSH patients taking ≥5 medications in phase 2, allowing drug-related issues to be discussed with doctors before the patient consultation.

### RESULTS

Eighty patients were reviewed since the initiation of MOS in mid-2023. Sixty percent of patients have drug-related issues, with 42.5 percent having adherence issues. Thirty-nine patients received pharmacist interventions, leading to prescription changes for 26 patients, such as dose adjustments, stopping inappropriate medications, and modifying administration timing to promote compliance. Patients and doctors valued the pharmacists' contribution to safe medication use. Learning points included co-locating the pharmacist, doctor, and nurse for seamless patient care, having MOS as a pre-consult review and holding multidisciplinary team discussions for holistic patient management.

### CONCLUSION

The MOS helps to address medication-related issues in frail elderly patients, making it a valuable component of comprehensive falls prevention strategies. Wider implementation across polyclinics could yield significant population health benefits, as primary care pharmacists are well-positioned to minimise iatrogenic harm during patients' routine reviews.

**Keywords: Falls, Frailty, Pharmacist, Medication optimisation**

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## IMPROVING FAMILY MEDICINE RESIDENTS' PREPAREDNESS AND CONFIDENCE FOR DAY-TO-DAY WORK DURING TRANSITIONS BETWEEN CLINICAL POSTINGS—A QUALITY IMPROVEMENT PROJECT

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### AIM

Family Medicine residents undergo frequent changes of clinical postings during training. These transitions contribute significantly to physical, psychological, and emotional fatigue. A survey showed low rates of preparedness of residents prior to embarking on new postings. This project sought to enhance the preparedness and self-efficacy of SingHealth Family Medicine residents during posting transitions.

### METHODS

A quality improvement project was conducted. Using the Ishikawa diagram and Pareto chart for assessment of root causes, main causes included: a) lack of posting materials that focused on administrative duties; b) lack of awareness of platforms for residents to obtain information regarding technical aspects of posting; and c) lack of manpower to conduct orientation. The creation of individual posting guides was performed for the first Plan-Do-Study-Act (PDSA) cycle. Guide content was aligned to the residents' needs, including pre-posting preparation, day-to-day work, and posting specific administrative requirements. Materials were updated on Microsoft Teams OneDrive shared folder for ease of access. Outcomes were collected at 1 week, 3 months, and 6 months post-PDSA cycle 1 using a Likert scale to evaluate resident's level of a) confidence and preparedness; b) non-clinical related knowledge; and c) confidence in achieving posting learning goals.

## RESULTS

Pre and post intervention scores (n=15) showed a median improvement of 40 percent, 40 percent, and 60 percent at the 1-week mark for the three outcomes respectively with sustained improvements at the 3- and 6-month mark.

## CONCLUSION

The development of posting guides is effective in improving Family Medicine residents' confidence and preparedness for new clinical postings.

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# MEETING THEM WHERE THEY'RE AT: INTERPROFESSIONAL COLLABORATION AS EXPERIENCED BY AUSTRALIAN SOCIAL PRESCRIBING LINK WORKERS IN PRIMARY CARE

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## BACKGROUND

Social prescribing (SP) is a non-medical person-centred approach that takes individual psycho-socio-economic contexts and needs into account. Little is known about SP Link Workers' (SPLWs) experiences of interprofessional collaboration with general practitioners (GPs), while providing person-centred care. This study aimed to better understand how SPLWs build relationships and share decisions to implement integrated care for clients.

## METHODS

A qualitative in-depth interview study with (SPLWs) working in co-location with GPs. Five SPLWs, one team leader, and one practice manager were interviewed. A hybrid deductive/inductive thematic analysis was undertaken in NVivo, and themes were organised according to the Sunnybrook Interprofessional Collaboration (IPC) framework.

## RESULTS

Five of the seven IPC components emerged. Role Clarification and boundary setting was discussed by all participants, with SPLWs highlighting that their professional boundaries were often stretched through unrealistic expectations from both GPs and clients. Role clarification was prioritised by SPLWs as it protected their capacity to deliver needed care: *"At the very beginning to have open and respectful relationship … Like I will not tell you something that I cannot do"*. Interprofessional Communication and relationship building was central to the delivery of SP: "*I think the first step is always communication*". Co-location with GPs, nurses, and practice managers was an important enabler. Shared Decision-Making was conceptualised as shared goal-setting between SPLWs and clients rather than shared decision-making with GPs. Interprofessional Values and Ethics were only discussed with regards to consent to access health records, and the clients' rights and choices: "*We'll also go through the client's rights and responsibilities … privacy and confidentiality as well as person-centred approach*". Interprofessional Education was valued and sought by SPLWs; however, this was focused on SPLWs only, not GPs.

## CONCLUSION

This study provides helpful insights into experiences of SPLWs of interprofessional practice. To further understanding of interprofessional practice in SP, larger studies involving GPs, practice managers, primary care nurses, and a broader range of SPLWs are being planned.

**Keywords: Social Prescribing, Link-worker, Inter-professional practice**

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## PREVALENCE OF HYPERTENSION PHENOTYPES IN AN URBAN SINGAPORE POPULATION: A CROSS-SECTIONAL STUDY

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### AIM
To determine the prevalence of hypertension phenotypes and their associated factors in a low-risk population in Singapore.

### METHODS
The study used a cross-sectional study design to analyse a population of adults aged 21–69 years, with a low 10-year cardiovascular risk (based on 2023 Singapore modified Framingham risk score) and not on any antihypertensives. Participants were recruited from public or clinic settings using convenience sampling. Following informed consent, a study team member performed clinical examination and investigations using questionnaires and validated instruments like office BP (OBP) and 24-hour ambulatory BP (ABP) monitoring devices.

### RESULTS
Data from 981 participants was analysed. The mean age of the participants was 45.5 ± 11.8 years. Most were males (51.6%) and of Chinese ethnicity (91.2%). Almost half of them had a normal body mass index (BMI) (47.0%) and two-thirds had a normal waist circumference (60.7%). The lifestyle data revealed that most participants were non-smokers (90.9%) and engaged in physical activity (81.3%).

A quarter of participants met the criteria for hypertension based on office BP (25.5%) and average 24-hour ABP (22.2%). More than a third of the participants met the criteria for hypertension diagnosis by any ABP target (38.5%).

Nocturnal Hypertension (NH) was the most prevalent hypertension phenotype (36.2%), while White-Coat Hypertension had the lowest prevalence (6.5%). Daytime Hypertension and Masked Hypertension (MH) were observed in 17.5 percent and 19.4 percent, respectively. A non-dipping (ND) BP pattern was identified in 59.7 percent of the cohort.

### DISCUSSION & CONCLUSION
This study revealed a high prevalence of NH, ND, and MH in a low-risk, urban Singaporean population. The findings underscore the limitations of OBP measurement or home BP monitoring and advocate for the wider use of 24-hour ABP to unmask true hypertension prevalence and its related risks to effectively reduce cardiovascular risk.

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## SYSTEM-LEVEL ENABLERS OF INTERPROFESSIONAL COLLABORATION FOR LIVER CANCER CARE: DO THE EXPERIENCES OF LIVER SERVICE LEADERS ALIGN WITH STATE-WIDE POLICY?

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## INTRODUCTION
This study explored how Liver Service leaders in New South Wales (NSW), Australia experience and navigate interprofessional collaboration with general practitioners (GPs) in the delivery of liver care, including viral hepatitis and hepatocellular carcinoma (HCC) management.

## METHOD
A policy analysis of the NSW Cancer Plan 2022–2027 was conducted to identify system-level expectations for cancer services in primary care. Qualitative semi-structured interviews were carried out with 26 Liver Service leaders across NSW (11 specialist nurses; 15 specialist doctors; 6 urban; 9 regional). Additional consultations were held with key informants from 10 Primary Health Networks (PHNs) to explore available GP support resources, education, and clinical guidance related to viral hepatitis B and C (HBV/HCV) and HCC.

## RESULTS
Policy analysis identified collaboration with GPs as a key system-level enabler for timely HBV/HCV and HCC care. Liver Service leaders described interprofessional collaboration as challenging, driven by high workloads and time pressures, and intensified in regional settings by limited liver specialists, significant GP shortages, and dependence on short-term locums. Some Liver Services provided innovative one-on-one education and support networks to build GP confidence and capacity, viewing this as a worthwhile investment despite reducing their own service capacity. Liver Services and PHNs also promoted HealthPathways to strengthen GP capacity.

## CONCLUSION
System-level barriers, including high workload, limited capacity, low confidence, and insufficient training among GPs restricted effective collaboration. Policies must be accompanied by realistic implementation strategies that address system barriers to achieve real-world changes.


**Keywords: Liver Services, Interprofessional collaboration, workforce shortages, capacity building, clinical education**

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# GENERAL PRACTIONERS' CLINICAL REASONING AND DECISION-MAKING IN PAEDIATRIC TYPE 1 DIABETES

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## BACKGROUND
Dual Process Theory asserts that both System 1 and System 2 thinking are used in clinical reasoning and decision-making. There is limited research on this within the context of general practice, particularly regarding paediatric type 1 diabetes (T1D).

## AIM
To investigate how general practitioners (GPs) perform clinical reasoning and decision-making regarding paediatric T1D presentations.

## METHODS
Thirty-minute, semi-structured interviews were conducted with six Australian GPs. DPT provided a theoretical model underpinning the semi-structured interview guide. Two clinical case vignettes detailing possible paediatric T1D presentations were used as prompts. GPs were asked how they would manage the paediatric patient and their presentations in these vignettes. Thematic analysis was used to analyse interview data.

## RESULTS
All GPs (n=6) reported intuition and gut feeling as part of their clinical reasoning and decision-making. All GPs (n=6) explored a differential diagnosis and further investigation (n=6) when undertaking clinical reasoning and decision-making. Most GPs (n=5) reported patient and parent/carer factors influenced their decision-making.

## DISCUSSION
Interviews indicated that GPs incorporated both System 1 and System 2 thinking in their clinical reasoning and decision-making. In the case of suspected T1D, GPs were inclined to refer paediatric patients to emergency care or specialist care. This possibly reflects a common understanding of the urgency of T1D.

## CONCLUSION
In turn, delayed referral and diagnosis may occur in cases where T1D is not suspected by GPs. Further research with a larger sample size is essential for understanding GPs' clinical reasoning and decision-making.

## ENHANCING MENTAL HEALTH SERVICES IN PRIMARY CARE: LEVERAGING ASSOCIATE PSYCHOLOGISTS THROUGH AGILE JOB REDESIGN TO ADDRESS ALLIED HEALTH WORKFORCE SHORTAGES

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### INTRODUCTION

Demand for mental health services in Singapore is increasing, while specialist allied health professionals (AHP) mental health workforce, i.e., Clinical Psychologists and Counselling Psychologists capacity remains constrained. Mental disorders impose an estimated S$1.7 billion annual economic burden through direct healthcare costs and productivity losses. NUP implemented an Associate Psychologist (AP) role through Agile job redesign over five years to improve community and primary care subsidised mental health service access while preserving specialist AHP Psychologists' capacity.

### METHODS

Phase 1 used iterative workflow testing to compare administrative rescheduling with an AP-enabled model comprising screening, eligibility triage, reminder calls, and appointment management, and implemented protocolised psychoeducation and basic counselling as intervention for stable follow-up cases, and supervised case management and competency-based structure to ensure safety. The intervention aimed to reduce avoidable defaults, optimise psychologist expertise, and increase capacity through task-sharing. Phase 2 translated the model across seven NUP clinics.

### RESULTS

Default rates improved from 37.2 percent to 30.7 percent after AP implementation and further to 25.8 percent during subsequent implementation. During scale-up, most clinics sustained default rates between 20 and 30 percent. Monthly attendance remained high at 438 to 568 cases per month, while APs contributed 14 to 33 cases per clinic per month. Psychologist productivity remained stable despite staff turnover, indicating preservation of specialist capacity through redistribution of lower- to moderate-complexity activities.

### CONCLUSION

The AP model demonstrates how Agile workforce redesign can improve access, reduce defaults, shorten lead times, and increase service capacity without relying solely on specialist AHP Psychologists workforce expansion. By redistributing lower-complexity activities to supervised APs, psychologist expertise can be preserved for complex care. In the context of rising demand, workforce shortages, and substantial societal cost, this model represents a scalable workforce transformation strategy for primary care mental health services, ensuring subsidised mental health access for the community.

**Keywords: Allied Health Professionals; Job Redesign; Community Mental Health Access; Mental Health Services; Primary Health Care; Workforce Shortages; Agile Methodology**

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## LEARNING BASIC LIFE SUPPORT ALGORITHM WITH VIRTUAL REALITY: A SMALL-SCALE STUDY ON RETENTION OF LEARNING

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### INTRODUCTION

Evidence regarding skill retention following virtual reality (VR) training suggests that basic life support (BLS) skills often improve immediately after training but decline over time. Furthermore, VR-based training may be less effective in developing certain critical skills, such as defibrillation, compared with conventional training methods. These skills are highly relevant for first responders to collapse in outpatient and primary care settings. The aim of this study was to examine retention of the basic life support (BLS) algorithm learnt using a VR-based BLS programme (VRBLS) in a context relevant to primary care responders.

### METHODS

This was a pre- and post-test study. Twelve medical students completed a BLS practical assessment six months after learning with VRBLS. Performance, assessed by BLS trainers using a standardised checklist, was compared with their immediate post-learning results. Assessment components included patient assessment, CPR, ventilation, and post-5-cycle actions.

## RESULTS

Six-month performance was significantly higher than immediate post-learning scores for patient assessment ($p<0.001$), CPR ($p<0.001$), ventilation ($p<0.001$), and post-5-cycle actions ($p<0.001$).

## CONCLUSIONS

Learning the BLS algorithm via VRBLS was effective for retention and enhancement of performance over six months. Traditional training often separates BLS skills into discrete tasks, whereas VRBLS presents a full, realistic sequence, helping students integrate steps into a coherent algorithm. This immersive, continuous experience may support deeper encoding, improve technical performance, and increase confidence in performing BLS. These positive findings are encouraging but require further validation with larger cohorts and longitudinal studies.

**Keywords: Cardiopulmonary Resuscitation, Virtual reality, Retention, Medical student, Algorithm**

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# CLINICAL OUTCOMES OF PATIENTS WITH TYPE 2 DIABETES MELLITUS SEEN BY CHRONIC DISEASE MANAGEMENT ADVANCED PRACTICE NURSES IN SINGAPORE

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## INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is commonly seen by Chronic Disease Management (CDM) Advanced Practice Nurses (APNs). Improvement in clinical outcomes for patients with T2DM reduce complications and mortality. Research has demonstrated favourable clinical outcomes for patients seen by primary care APNs.[1,2] This study aimed to determine clinical outcomes of patients with T2DM seen by CDM APNs in public primary care setting in Singapore.

## METHODS

Retrospective de-identified electronic health data of patients newly referred and seen by APNs for two or more consecutive visits in 2023 was obtained from institution Information Management and Analytics department; an independent party entrusted to anonymise data. Clinical and laboratory data at or before first APN visit (baseline) and at or soonest after last APN visit were reviewed. T2DM control was based on glycated haemoglobin (HbA1c) and lipid control on low density lipoprotein (LDL). Blood pressure (BP), Hba1c, and LDL targets were determined by national guidelines. Data was analysed with descriptive statistics and McNemar's test.

## RESULTS

Of 303 patients with T2DM seen by CDM APNs in 2023, mean age was 63.4 years, 52.8 percent female and 81.8 percent Chinese. 90.8 percent had three or more chronic conditions (multimorbidity). Only 55.1 percent of patients had well-controlled T2DM at baseline and there was a significant increase in proportion of well-controlled T2DM to 62.8 percent by last APN visit ($p=0.004$). Among 135 patients with suboptimal DM control at baseline, 47.4 percent showed clinically significant improvement either to target or HbA1c decrease by ≥0.5 percent by last APN visit. The proportion of patients with BP within target also significantly improved from 60.1 percent at baseline to 67.1 percent by last APN visit ($p=0.028$). Less than half (42.5%) had LDL within target at baseline, which improved to 58.6 percent by last APN visit ($p<0.001$).

## CONCLUSION

There was improvement in clinical outcomes for patients with T2DM seen by CDM APNs. Future research may examine if pharmacological or non-pharmacological management impact long-term outcomes.

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## WHAT ARE THE PERCEIVED FACTORS INFLUENCING UPTAKE OF HPV SELF-SAMPLING AMONG SINGAPOREAN WOMEN ATTENDING PRIMARY CARE POLYCLINICS? A QUALITATIVE STUDY

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### AIM
Cervical cancer screening rates remain low (45.4%) in Singapore despite a national screening programme. To improve participation, the 2025 cervical screening guidelines introduced human papillomavirus (HPV) self-testing as an alternative screening option. This study explored women's perceptions and decision-making processes about HPV self-testing in a public primary care clinic prior to its implementation.

### METHODS
This qualitative study was conducted between June and December 2024. Women of diverse ages, ethnicities, and educational backgrounds were purposively recruited for individual in-depth interviews using a semi-structured interview guide. Interviews were audio-recorded, transcribed, checked for accuracy, and analysed thematically. Sample size was guided by data saturation.

### RESULTS
Seventeen women aged 31–67 years were interviewed. Reactions to self-testing ranged from enthusiasm to reluctance, with none having previously tried it. Views were shaped by perceptions of the self-testing device and process. Key factors influencing uptake included privacy, convenience, confidence in self-testing, perceived accuracy, and concerns about pain or complications. Preferences for test kit types were influenced by prior experiences with similar devices. Many expected self-testing to cost less than clinic-based screening. Familiarity with clinic-based screening and social influences also affected decisions.

### CONCLUSION
HPV self-testing should be implemented as an alternative rather than a replacement for clinic-based screening. It offers privacy and convenience and may appeal to women less likely to attend clinics for screening. Clear instructions and adequate support can address concerns about accuracy, pain, and confidence in performing the test. Streamlined logistics may enhance convenience for women who might use self-testing as a backup when clinic visits are not feasible. Offering a choice of device types and ensuring affordable pricing may further facilitate uptake.

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## IMPACT OF USING A WEARABLE STETHOSCOPE FOR SELF-MANAGEMENT OF ASTHMA POST-EXACERBATION

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### INTRODUCTION
This study assessed the effectiveness of a wearable stethoscope (AeviceMD) on health outcomes and quality of life (QoL) of adults following rescue therapy for acute asthma exacerbations in 10 public primary care clinics.

### METHODS
A two-group randomised controlled trial was conducted with assessments at baseline, week 4, and week 12. Participants had asthma exacerbation on the day of recruitment or two within six months. The control group received the usual nurse-led education and asthma action plan. The intervention group had an additional AeviceMD device, which monitored heart rate, respiratory rate, and wheezing. Health outcomes included asthma control measured using the Global Initiative for Asthma (GINA) tool and frequencies of rescue therapy. QoL was assessed using the EQ-5D-5L and the 32-item Asthma Quality of Life Questionnaire (AQLQ). Intention-to-treat analysis was applied.

### RESULTS
Of 162 recruited participants, 161 were analysed (81 intervention, 80 control). Mean age was 50.1 years; most were female (56.5%) and Malay (46.9%), with monthly income below $3,000. Baseline characteristics, health outcomes, and QoL were comparable between groups. Both groups demonstrated improvements in GINA, EQ-5D, and AQLQ scores over time, and no statistically significant between-group differences were observed.

## CONCLUSION

Although no significant improvement was observed, the wearable device might have increased patients' awareness of their respiratory status through continuous lung sound monitoring. However, participants were unable to translate these physiological insights into effective self-management actions. This suggests additional educational support may be necessary to help patients interpret device data and integrate findings into actionable self-care decisions.

**Keywords: Asthma, Wearable devices, Stethoscopes, Self-Management**

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## SCREEN TIME EFFECTS ON CHILDREN: THE NEGATIVE IMPACT—A SCOPING REVIEW

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## INTRODUCTION/AIM

With the onset of Covid-19 pandemic, the concept of home-based learning for children evolved and the screen time extended into their leisure time activities. Post pandemic period, the increase in screen time usage among children persisted. Screen time overuse is a cause for public health concern in view of the negative effects on child and adolescent health. The scoping review aims to examine the existing literature on the adverse impact of screen time on children.

## METHODS

The scoping review was conducted using the methodological framework of Arksey and O' Malley. A systematic search was performed in PubMed for studies published between January 2019 and December 2024. Identified abstracts and full text articles were screened and reviewed. The findings were summarised as per the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) extension for scoping reviews. The negative effects were described in the form of themes for clarity.

## RESULTS

About 14 studies were included from a total of 73 studies. The following themes were noted from the review of studies:

1. Slowness in language development
2. Impaired cognitive control
3. Emotional dysregulation
4. Increased risk of obesity from sedentary behaviour
5. Decrease in social coping
6. Craving behaviour due to activation of dopamine and reward pathways
7. Sleep pattern disruption
8. Internalising and externalising behaviour

## CONCLUSION

The scoping review highlights the negative impact of screen time on children. The existing screen time guidelines set by MOH need to be continually emphasised at all levels of care. As screen time is going to be an integral part of our life, newer, more effective intervention strategies at both school and home are critical in preventing screen time overuse and updating policies adhering to this effect may benefit all at the national level.

**KeywordsExposure Keywords: smart phone, tablet, social media, video games, childMeSH (Exposure): Screen time, digital media**

- **Outcome Keywords: language delay, inattention, aggression, digital eye strain**
- **MeSH (Outcome): developmental delay, obesity, anxiety**

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## INCREASING UPTAKE OF DIABETIC FOOT SCREENING AT ST LUKE'S COMMUNITY CLINIC

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### INTRODUCTION

Foot ulcers and lower extremity amputations (LEA) are major causes of morbidity and mortality in diabetes mellitus (DM). Singapore has one of the highest LEA rates globally, and three in four cases are preventable with regular foot assessments. Annual diabetic foot screening (DFS) is standard of care. At St Luke's Community Clinic, only 20 percent of 465 DM patients completed DFS in 2023. We aimed to increase the rate of DFS ordered for DM patients per month from 9.8 percent to 27 percent over six months.

### METHODS

Quality improvement tools (fishbone, Pareto, PICK chart) identified key barriers. Intervention 1 targeted limited consultation time through a nurse-led workflow, enabling nurses to identify patients due for DFS, order DFS with doctor endorsement, and utilise Clinic Assist pop-up reminders. Intervention 2 targeted poor patient awareness by providing educational leaflets pre-consultation to encourage patients to request DFS.

### RESULTS

Following Intervention 1, DFS ordering rates exceeded target, reaching 36 percent ordered for DM patients in April 2024, with sustained 32.5 percent and 18.6 percent in subsequent months. Across both cycles, monthly ordering rate increased from 9.8 percent to 16.2 percent. Year-on-year, DFS ordered rate improved from 25.1 percent in 2023 to 47.8 percent in 2024 (1.9-fold). DFS completion improved from 20.2 percent in 2023 to 40.6 percent in 2024 (twofold). The same workflow increased diabetic retinopathy screening completion from 11.4 percent in 2023 to 25.1 percent in 2024 (2.2-fold).

### CONCLUSION

Structured nurse-led workflow is feasible and effective in improving diabetes preventive care. It strengthens multidisciplinary collaboration, addresses time constraints, enhances patient engagement, and has potential for wider implementations.

**Keywords: Primary Health Care; Diabetes Mellitus; Diabetic Foot; Quality Improvement; Delivery of Health Care**

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## CHLORHEXIDINE GLUCONATE HANDWASH-RELATED SKIN DRYNESS: A PRIMARY CARE SURVEY

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### AIM

This survey captures primary care clinicians' perspectives on 4% Chlorhexidine Gluconate handwash-related hand dryness and assessed receptivity to alternatives.

### METHODS

A cross-sectional survey was conducted at Toa Payoh Polyclinic among 42 clinicians and non-clinical staff using 4% CHG frequently, capturing participants' experience of hand hygiene practices and skin responses. Severity was self-rated using the Overall Skin Dryness Scale.

### RESULTS

There were a total of 42 respondents: 39 clinicians and three non-clinical staff. Hourly handwashing: three participants washed >6 times, 10 washed 4–5 times, 11 washed 2–3 times, and 18 washed <2 times. Hand dryness was prevalent, with 33 reporting dry, tight, itchy, or cracked skin. Severity: Nine experienced no dryness, 23 mild dryness, and 10 moderate dryness.

### DISCUSSION & CONCLUSION

4% CHG-related hand dryness is prevalent, affecting 78.6 percent of participants. Eighty-one percent of respondents expressed willingness to trial gentler alternatives, indicating strong receptivity to product changes.

**Keywords: 4% Chlorhexidine Gluconate, skin dryness, alternative handwash, receptivity**

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## ASSESSING CLINICAL EXPOSURE AND EMPATHY DEVELOPMENT IN NURSING STUDENTS: A CROSS-SECTIONAL STUDY USING SIMULATED PATIENTS

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### INTRODUCTION
Empathy is an important skill for healthcare professionals, especially in primary care settings. However, it is not fully understood how clinical placement experience shapes empathy development in nursing students. This study aimed to examine whether clinical exposure affects the level of empathy shown by nursing students, as rated by simulated patients.

### METHODS
A cross-sectional comparative design was used. A total of 56 nursing students from four-year groups took part: Year 1 (no clinical experience, n=22); Year 2 (basic medical-surgical exposure, n=18); Year 3 (specialist clinical placements, n=17); and Year 4 (patient management training, n=8). Each student completed two 5-minute simulated patient encounters, where a patient shared a real personal difficulty. Students conducted an interview, and empathy was scored on a scale of 0 to 10 using the Carkhuff Empathy Rating Scale.

### RESULTS
Mean empathy scores rose with each year of study: Year 1 (M=6.34, SD=1.49); Year 2 (M=6.81, SD=1.80); Year 3 (M=7.26, SD= 066); and Year 4 (M=7.50, SD=0.38). A significant positive correlation was found between year of study and empathy scores (r=0.336, p=0.006).

### CONCLUSION
Students with greater and more varied clinical exposure showed higher empathy levels. Future research should use qualitative methods to better understand how different types of placements and teaching approaches can further support empathy development in nursing education.

**Keywords: Clinical Competence, Empathy, Nursing, Patient Simulation, Students**

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## FACILITATORS' PERCEPTION TOWARDS LEARNING WITH STIMULATION IN AN IMMERSIVE ENVIRONMENT: A CASE STUDY

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### INTRODUCTION
Simulation and immersive learning are increasingly used to prepare nursing students for managing acute events in primary care and outpatient settings. This study aims to explore facilitators' perceptions of student learning with stimulation in an immersive environment across three complex clinical scenarios.

### METHODS
Data were collected from facilitators' narrative responses to guided reflection questions and a post-stimulation debriefing discussion involving three facilitators. Content analysis focuses on three immersive stimulation sessions: assisting in chest tube insertion (Year 2); assisting in intubation and conducting a primary survey (Year 3); and managing a code blue scenario (Year 4).

### RESULTS
Four themes emerged: (1) students require intensive psychological preparation; (2) multiple supportive interventions are needed to optimise learning (clear briefing, stepwise skills breakdown, guidance when students "freeze", checklists, hands-on practice, and non-judgemental debriefing; (3) session effectiveness is influenced by interruptions, briefing clarity, contextual, alignment to primary/emergency settings, and facilitators' non-verbal communication; and (4) students achieved learning outcomes not attainable in typical practical classes, particularly understanding the flow of care, teamwork, and communication.

## CONCLUSION

Immersive simulations was a first-time experience and a space for mutual learning and growth. Although students initially reported confusion, structured psychological preparation and supportive facilitation appear to mitigate these responses and appeared to mitigate these responses and enhanced engagement and confidence. Immersive stimulation shows promise for teaching complex clinical skills and acute event management relevant to primary care but increases facilitators' workload and needs in-depth qualitative research approach.

**Keywords: Nursing Students, perceptions, technology, stimulation training, virtual reality**

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## TEACHING MULTIMORBIDITY WITHOUT A RULEBOOK: FACULTY EXPERIENCES IN FAMILY MEDICINE RESIDENCY TRAINING

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[1]National Healthcare Group Polyclinics

## INTRODUCTION

Multimorbidity is highly prevalent in Singapore's primary care settings, yet a distinct gap exists regarding how medical educators navigate and instruct this complex topic. This study aimed to investigate Family Medicine faculty members' experiences, contextual challenges, and expectations when teaching multimorbidity to residents, with the objective of informing future faculty development programmes.

## METHODS

An exploratory qualitative descriptive study was conducted across all three sponsored Family Medicine Residency institutions in Singapore using maximum variation sampling. Data collection involved eight individual in-depth interviews and three focus group discussions utilising a semi-structured topic guide grounded in Situated Learning Theory. Qualitative content analysis was applied to systematically code and inductively categorise the transcripts into prominent themes.

## RESULTS

Eleven sessions were conducted with 16 faculty members. Five central themes emerged: (1) faculty experienced mixed emotions, finding teaching fulfilling yet frustrating when facing resident resistance; (2) multimorbidity cases are ubiquitous but lack explicit pedagogical guidelines, causing reliance on personal clinical experience; (3) the Residency Continuity Clinic (RCC) serves as a vital longitudinal platform for experiential learning; (4) case-based discussions are primary tools used to unpack implicit and explicit clinical skills; and (5) residents' competency progresses across seniority levels, identifiable via the RIME framework.

## CONCLUSION

While the RCC offers an optimal environment for continuity of care, faculty face heavy clinical workloads and a lack of structured curriculum models. Establishing standardised multimorbidity teaching guidelines, inter-institutional collaborations, and formal lesson plans are essential to enhance Family Medicine training and optimise complex patient outcomes in Singapore.

**Keywords: Education, Medical, Graduate, Faculty, Family Medicine, Multimorbidity, Qualitative Research**

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## Building Capacity for Digital Health Research: Training and Support Needs of Clinical Research Coordinators

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[1]SingHealth Polyclinics, Singapore

### INTRODUCTION
Clinical Research Coordinators (CRCs) are frontliners for successful research implementation, yet their competency and confidence in handling digital health studies are unclear. This study aimed to assess CRCs' perceptions and confidence in conducting digital health research, and to identify key barriers and enablers.

### METHODS
A mixed-methods study was conducted among CRCs in Singapore's public healthcare system. Participants completed an online cross-sectional survey. Purposively sampled interviews ensured diversity in CRC experience and types of digital health studies. Descriptive statistics summarised the survey data. Qualitative data were coded and thematically analysed, guided by the Capacity, Opportunity, Motivation - Behaviour (COM-B) model.

### RESULTS
Among 208 survey respondents, most were female (85.1%), aged 20–29 years (43.3%), with 1–5 years of CRC experience (43.3%). Nearly half (49.0%) had managed digital health studies, primarily involving mobile or web applications (71.6%), wearables (55.9%), and artificial intelligence (34.3%). Common challenges included technical glitches (87.3%), participant resistance (64.7%), and training for participants (64.7%). Interviews with 12 CRCs revealed that while digital health was valued for advancing healthcare, barriers included older adults' low digital literacy, and software and technical glitches. CRCs highlighted the need for clear troubleshooting instructions, scenario-based training, and timely technical support.

### CONCLUSION
As digital health research expands, targeted education and capacity-building for CRCs are essential. The study findings provide insights for development of training programmes and support systems to enhance the confidence and readiness of CRCs in digital health research.

**Keywords: Clinical Competence; Clinical Research; Digital Health; Research Personnel; Training**

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## IMPLEMENTATION OF A RESPIRATORY DISEASE VACCINATION EDUCATION INITIATIVE AMONGST HIGH-RISK INDIVIDUALS IN DIALYSIS CENTRE AND TRANSITION CARE FACILITIES

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### BACKGROUND
Under Healthier SG (HSG), vaccination is a key national priority. However, it is unclear whether high-risk individuals in dialysis centres (DCs) and transition care facilities (TCFs) are enrolling in HSG and receiving recommended respiratory vaccines.

### METHODS
We implemented an educational initiative from **Apr to Oct 2025** at one DC and two TCFs, covering the benefits, effectiveness, side effects, and management of influenza, pneumococcal, and COVID-19 vaccines. In the DC, eligible patients viewed a 5-minute educational video and were given a memo to obtain vaccines from their HSG doctor. In the TCFs, eligible patients received counselling and were vaccinated before discharge if agreeable. Demographics and vaccine eligibility were collected; for TCF patients, vaccine acceptance and reasons for rejection were recorded. Staff were also invited to share challenges and suggestions.

## RESULTS

A total of 334 patients were reached. Of these, 45.8 percent were enrolled in HSG, compared to the national average of 59 percent. 280 (83.8%), 228 (68.3%), and 331 (99.1%) were eligible for influenza, pneumococcal, and COVID-19 vaccines respectively. Among the 272 TCF patients, 146 (58.9%) received influenza vaccination, 114 (55.3%) received pneumococcal vaccination, and five (1.9%) received COVID-19 vaccination. Among those who gave reasons for rejection, the top three were pain (n=16), fear of side effects (n=15), and perceived lack of benefits (n=12). Staff highlighted challenges including the inability to vaccinate directly in DCs, patients needing to attend their designated HSG clinics to receive fully subsidised vaccines, and short COVID-19 vaccine expiry dates. Suggested strategies included allowing fully subsidised vaccination at any clinic and engaging family members to improve acceptance.

## CONCLUSION

Vaccination uptake among high-risk individuals in DCs and TCFs remains suboptimal. Policy, organisational, and patient-level strategies are needed to improve awareness and uptake.

**Key words: Respiratory vaccination, Vaccine hesitancy, Dialysis patients, Transitional care facilities, Vaccine uptake, High-risk population**

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### Understanding Older Adults' Digital Health Usage for Sustainable Healthcare Systems

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## AIM

Digital platforms enable older adults to access medical information and participate in preventive care, potentially reducing healthcare system burden and promoting sustainability. This study explored older adults' digital usage patterns for healthcare and their perspectives on digital health engagement to support sustainable healthcare delivery.

## METHOD

A qualitative study was conducted across four SingHealth polyclinics between August and September 2025. Using purposive sampling, English-speaking participants aged 60 years and above were interviewed until data saturation was reached. Interviews were transcribed using the Singapore Government's Transcribe AI tool. Analysis was guided by the Digital Divide Framework across three levels: physical access, digital skills and usage quality, and tangible health outcomes.

## RESULTS

Thirty participants (mean age 71.6 years, 18 males, 20 Chinese ethnicity) were recruited. Most had secondary education (n=18), others tertiary (n=10) or primary (n=2). All owned smartphones with internet access. Common activities included step tracking, appointment scheduling, queue monitoring, and viewing laboratory results. Few engaged with complex functions like health information resources or advanced monitoring features. None used telehealth due to technological unfamiliarity and preferences for face-to-face consultations. Most were unaware how digital tools could improve health outcomes or reduce healthcare reliance. Participants wanted improved digital literacy but were divided between preferences for group versus individual training approaches.

## CONCLUSION

Older adults demonstrate selective digital health engagement, primarily using basic administrative functions whilst underutilising advanced self-management features. Targeted digital literacy interventions could enhance patient self-efficacy and reduce healthcare system dependency, supporting sustainable healthcare delivery.

## LEARNING POINTS

Older adults demonstrated partial engagement with digital health platforms. Understanding how older adults use digital for health, and the challenges they face, is the key to support sustainable healthcare.

**Keywords: Digital usage, Elderly, Qualitative, Sustainability**

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## A SURVEY ON THE HEALTH DIGITAL LITERACY OF OLDER ADULTS IN SINGAPORE

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[1]SingHealth Polyclinics, Singapore

### AIM

Understanding digital health literacy patterns among older populations is crucial for developing targeted educational interventions that can bridge this gap and improve health outcomes. This study aimed to examine the digital literacy levels of older Asian adults and explore their use of digital health applications.

### METHODS

Adults aged 60 and above were recruited from January to October 2025 through an e-survey administered on the secure FORMSG platform. Collected data included demographic information, existing comorbidities, electronic health literacy (eHEALS), EQ-5D-5L scores, general self-efficacy, and patterns of digital health application use.

### RESULTS

Among 320 elderly participants (mean age 69.2 ± 6 years, 52.8% female, 54.4% Chinese), digital health literacy was moderate with a mean eHEALS score of 27.3 ± 8.8. Most participants (75%) had accessed health portals, with Health Buddy being the most utilised application (48.1%), followed by Healthy 365 (14.1%) and Health Hub (7.5%). Participants accessed digital health portals a median of three times over 12 months, primarily for appointment viewing (67.5%) and scheduling (40.3%). Chronic disease monitoring features showed poor uptake, with only 1.6% using cholesterol tracking and 1.6% using blood glucose monitoring. Telehealth engagement was low, with 82.8% not engaging in these services. The primary barriers were insufficient knowledge for usage (33.2%) and concerns about consultation comprehensiveness (25.3%). Digital tracker usage showed high engagement in step tracking (79.5%) but low participation in health monitoring features such as meal logging (5.7%).

### CONCLUSION

Older adults demonstrated moderate digital skills and predominantly used health applications for simple tasks such as checking appointments, with very low utilisation of monitoring or telehealth services due to limited knowledge and confidence.

### LEARNING POINTS

Older adults in Singapore demonstrated a foundational level of digital literacy. However, their use of digital health platforms remained largely confined to simple administrative tasks that require minimal technical knowledge. Digital tools were seldom used for active health management, limiting meaningful engagement with the fuller range of features that digital health platforms offer.

**Keywords: Digital health, older adults**

Authors are invited to submit articles for publication in *The Singapore Family Physician* on the understanding that the work is original and that it has not been submitted or published elsewhere. Your original article will be considered for publication on the understanding that it has to be approved by the Editorial Board via a double-blinded peer-review process and *subject to revision*. Authors are encouraged to consult the recommendations in the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* (http://www.icmje.org/index.html), which the SFP is in accord with.

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The submission should comprise the following:

1. Title Page
2. Summary/Abstract
3. Key Words
4. Text/Manuscript
5. Tables (if any)
6. Illustrations (if any)
7. Concluding paragraph
8. Learning Points

Authors are advised to ensure the anonymity of study subjects and patients by removing any and all information that could compromise their privacy from the submission.

The text should be typed in Arial font, 12-point size, with no line spacing.

### Title Page

The title should be concise and highlight the key elements of the article.

Include on the title page the first and last names, designation, qualifications, present appointments, and type and place of practice of each contributor.

Include name, address, handphone number, and email address of the first author to whom correspondence should be sent.

Insert at the bottom: name and address of institution or practice from which the work originated.

**Abstract**
The summary should describe why the article was written and present the main argument or findings.

Limit words as follows: 250 words for major articles; 200 words for case reports.

All Original articles (examples: randomised controlled trials, cohort studies, observational studies, and review articles) must be accompanied by a structured abstract while all other categories of manuscripts (examples: PRISM and Case Records of Family Medicine) should have unstructured abstracts.

**Structured Abstract** – Organise the abstract according to the following headings:

- **Introduction** – states the purposes/aims of the study/ investigation
- **Methods** – describes the selection of study subjects/ experimental animals, observational, and analytical methods
- **Results** – provides specific data and its statistical significance, if possible
- **Conclusion** – succinct emphasis of new and important aspects of the study or observations

**Key Words**
Add, at the end of summary in alphabetical listing, **key words** of up to five in number that will be used for article indexing and retrieval under Medical Subject Headings or MeSH. MeSH is the NLM controlled vocabulary thesaurus used for indexing articles for WPRIM and PubMed. Please refer to www.nlm.nih.gov/mesh/ for details.

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The text should have the following sequence:

- **Introduction:** State clearly the purpose of the article. Summarise the rationale for the study or observation. Give only strictly pertinent information and references, and do not review the subject extensively. Provide a context or background for the study (that is, the nature of the problem and its significance). Cite only directly pertinent references, and do not include data or conclusions from the work being reported.
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- **Selection and Description of Participants (under methods)**
  Describe the selection of the subjects clearly, including eligibility and exclusion criteria and a description of the source population. If the study was done involving an exclusive population, for example in only one sex, authors should justify why, except in obvious cases (e.g., prostate cancer). Authors should define how they determined race or ethnicity and justify their relevance.
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  Dosages should be quoted in metric units.

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  Do not use patients' names, initials or hospital numbers to ensure anonymity.
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  Discuss eligibility of experimental subjects. Give details about randomisation. Describe the methods for and success by any blinding of observations. Report treatment complications. Give number of observations. Report losses to observation (such as dropouts from a clinical trial). Avoid non-technical uses of technical terms in statistics, such as "random" (which implies a randomising device), "normal", "significant", "correlations", and "sample". Define statistical terms, abbreviations, and symbols.
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  Provide data on all primary and secondary outcomes identified in the Methods Section. Extra or supplementary materials and technical details can be placed in an appendix where they will be accessible but will not interrupt the flow of the text, or they can be published solely in the electronic version of the journal.

  Give numeric results not only as derivatives (for example, percentages) but also as the absolute numbers from which the derivatives were calculated, and specify the statistical significance attached to them, if any. Restrict tables and figures to those needed to explain the argument of the paper and to assess supporting data. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables.

  Separate reporting of data by demographic variables, such as age and sex. Facilitate pooling of data for subgroups across studies. This should be routine, unless there are compelling reasons not to stratify reporting, which should be explained.

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  Example:
  Moussavi S, Chatterji S, Verdes E, Tandon A, Patel V, Ustun B. Depression, chronic diseases, and decrements in health: results from the World Health Surveys. Lancet. 2007 Sep;370(9590):851–8. https://doi.org/10.1016/S0140-6736(07)61415-9.

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Tables should be submitted on a separate page. Label them in Roman-numeric sequence [I, II, III, etc] and ensure they are clear and with explanatory legends as required. Give each column a short or abbreviated heading. Place Table explanations in the footnotes, not in the heading. Explain in footnotes all non-standard abbreviations that are used in each Table.

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Summarise your main findings and its clinical implication, preferably in a single paragraph and no more than 3-4 sentences. Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, distinguish between clinical and statistical significance, and avoid making statements on economic benefits and costs unless the manuscript includes the appropriate economic data and analyses. Avoid claiming priority or alluding to work that has not been completed. State new hypotheses when warranted, but label them clearly.

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Include a minimum of three (3) Learning Points as a take-home message for readers.

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The Case Records of Family Medicine is a newly created series to encourage submissions from Family Medicine teaching programmes and for Family Medicine departments to submit cases of learning value to the *Singapore Family Physician*. Cases discussed during peer review learning and Family Medicine grand ward round teachings are just some examples of submissions that are suitable for this

series. Authors planning to submit their case studies to the Case Records of Family Medicine section should structure their article according to these headings:

**Title**
The title should define the key focus of the case study.

**Case Presentation**
The author(s) will provide a pertinent summary of the medical and/or psychosocial issue pertaining to the health or disease management of the case. It should cover the situation and relevant background of the case. Author(s) should conceal the identity of the subject and/or related or accompanying personnel; abbreviation should be used instead, if necessary.

**Diagnoses/Problems identified**
The assessment of the diagnoses/problems identified will constitute a problem list and will serve as a focus for the management of the case. If the case was a diagnostic dilemma, the author(s) should showcase the diagnostic challenges and their work in narrowing to the correct diagnosis and/or differential diagnoses.

**Management of the case**
This section covers the approach to the management of the case by the author(s).

**Literature review on latest evidence/guidelines (related to diagnosis and/or management)**

The author(s) should provide a literature review of current evidence/guidelines, if any, of the basis of the case's diagnosis/management, or to highlight the gaps of knowledge if such evidence is lacking.

The author(s) will provide a concise summary of the lessons learnt from this case study.

**Clinical Practice pointers (up to three (3))**
The author(s) will suggest ways to apply the new knowledge in clinical practice or to highlight the limitations of its applications, if any.

**RECOMMENDED FORMAT FOR PRISM (Patients' Revelations as Insightful Studies of their Management) SECTION**

Authors planning to submit their case studies to the PRISM section should structure their article according to these headings:

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The title should be framed into a question to define the key focus of the case study.

**Patient's revelation: What happened?**
The author(s) will provide a concise description of the setting in which the subject raised his/her medical or psychosocial issue pertaining to their health or disease management. It should cover the background, encounter, and interaction of patient with the healthcare professional (doctor, nurse, or allied healthcare professional).

Author(s) should conceal the identity of the subject and/or related or accompanying personnel: abbreviation should be used instead, if necessary.

**Gaining insight: What are the issues?**
The issue(s) raised by the patient should be framed into question(s). The question(s) will constitute a problem list and will serve as a focus for the management of this subject.

**Study the management: How do we apply in our clinical practice?**
This section covers the approach to the management of the subject by the author(s). The author(s) should provide a literature review of current evidence, if any, of the basis of the subject's management, or to highlight the gaps of knowledge if such evidence is lacking. The author(s) will suggest ways to apply the new knowledge in clinical practice or to highlight the limitations of its applications, if any.

**Conclusion**
The author(s) will provide a concise summary of the lessons learnt from this case study.

The article submitted to the PRISM section should be written by no more than three authors. Each article should not exceed 2,000 words. Photographs or charts may be included but should conform to the specific instructions for any other articles submitted to *The Singapore Family Physician*.

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The College of Family Physicians Singapore would like to thank the Expert Panel for their contribution to the Family Practice Skills Course #131 on "The Art and Science of Prescribing Lifestyle Changes in Primary Care: Implementing Lifestyle Medicine in your Daily Practice", held on 24 & 25 Jan 2026.

**Expert Panel:**
Dr Ng Lee Beng
Dr Koh Li Wearn
Dr Leonard Leng
Dr Shariffa Syahidah
Ms Susan Tan
Dr David Teo
Dr Leonard Eng
A/Prof Lee Kheng Hock

**Chairperson:**
Dr Suraj Kumar

## Persons with Intellectual Disabilities 4

The College of Family Physicians Singapore would like to thank the Expert Panel for their contribution to the Family Practice Skills Course #132 on "Persons with Intellectual Disabilities 4", held on 31 Jan & 1 Feb 2026.

**Expert Panel:**
Dr Chen Shiling
Dr Wei Ker-Chiah
Ms Deborah Quek
Dr Vivien Lee
Dr Chew Bao Li
Ms Joy Teo

**Chairperson:**
Dr Vivien Lee
Dr Chen Shiling

## Chronic Disease Management 2026

The College of Family Physicians Singapore would like to thank the Expert Panel for their contribution to the Family Practice Skills Course #133 on "Chronic Disease Management 2026", held on 7 & 8 Mar 2026.

**Expert Panel:**
A/Prof Goh Lee Gan
Dr Jeremy Hoe
Dr Benjamin Lam
A/Prof Richard Lee
Dr Desmond Wai
Dr Rohit Khurana

**Chairperson:**
Dr Shaina Neo
Dr Soon En Loong

# Why Flu and COVID-19 Vaccines Still Matter in 2026

## COVID-19 vaccination still matters

As with other endemic respiratory diseases, periodic COVID-19 waves continue to be expected in Singapore year-round, with new SARS-CoV-2 variants emerging.[2] COVID-19 remains a significant contributor to morbidity and mortality arising from acute respiratory infections during endemicity.

In a modelling study that estimated excess influenza-, RSV-, and SARS-CoV-2-associated hospitalisations in Singapore from 2015–2023, 19.3% of hospitalisations for acute respiratory infections were attributed to COVID-19.[2] In another study in Singaporean adults, Omicron COVID-19 was more severe compared to influenza (28-day mortality, 4.5%–9.7% in COVID-19 hospitalisations versus 0.9% in influenza hospitalisations).[3] In particular, older adults and individuals with pre-existing comorbidities including asthma, chronic obstructive pulmonary disease, ischemic heart disease, or heart failure, remain at increased risk of severe COVID-19 disease.[8,9]

## Overcoming vaccine hesitancy

Despite vaccination against respiratory infections being included into Singapore's National Adult Immunisation Schedule, the National Vaccination Programme (for COVID-19), and being fully subsidised as part of the nationwide Healthier SG programme,[10] vaccine uptake in Singapore can be further improved. Uptake of updated COVID-19 boosters has significantly dropped post-pandemic, with fewer than 5% of adults having received an updated COVID-19 booster.[4]

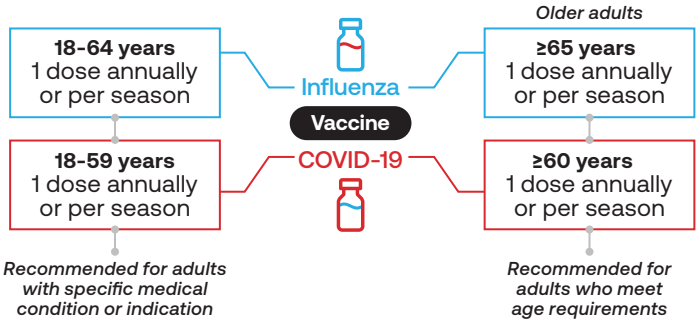
Vaccine hesitancy remains, even among older Singaporeans,[11] irrespective of the substantial and growing evidence demonstrating the real-world safety and effectiveness of COVID-19 vaccines.[12] Local studies identified that having a regular family physician, and receiving point-of-care informational interventions, can increase uptake of vaccinations against respiratory infections.[13,14]

Physicians must continue acting as effective advocates for vaccination, particularly among groups at higher risk of severe outcomes.

## National Vaccination recommendations

From 12 October 2026, COVID-19 vaccination is included in the National Childhood and Adult Immunisation Schedules (NCIS/NAIS), with updated XFG vaccines rolled out concurrently. Recommendations continue to highlight up-to-date protection for older adults (≥60 years), medically vulnerable individuals aged ≥6 months, and residents of aged care facilities. Healthcare workers and persons living or working with medically vulnerable individuals are also encouraged to be vaccinated.[15]

**Figure 2.** Vaccination recommendations for prevention of respiratory infections in adult Singaporeans[15,16]




Similarly, under the National Adult Immunisation Schedule, influenza vaccination is recommended for older adults aged 65 years and above, or individuals with comorbidities.[16] Given the overlaps between eligible age categories for COVID-19 vaccination (Figure 2), co-administration of COVID-19 and influenza vaccines may improve uptake and convenience by reducing the number of patient visits, without compromising patient safety and health.[17] Notably, co-administration of these vaccines has not shown an association with substantially inferior immune response or more frequent adverse events versus COVID-19 vaccine administration alone.[18]

## Conclusion

**Vaccine-preventable respiratory infections remain a year-round public health challenge in Singapore**, where a humid tropical climate predisposes to year-round viral transmission. A large proportion of patients hospitalised with pneumonia in a tropical setting have evidence of a RVI on systematic testing.[2] The list of vaccine-preventable respiratory infections has expanded beyond influenza and pneumococcal vaccination in recent years to include COVID-19. However, vaccine hesitancy is a major obstacle to vaccine uptake and infection prevention. Co-administration of COVID-19 and influenza vaccines may help improve vaccine uptake without compromising patient safety. **Physician recommendations are important in educating patients of potential benefits of vaccination against respiratory infections.**

**For Singapore Healthcare Professionals only**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