



PHILIPPINE GUIDELINES on PERIODIC HEALTH EXAMINATION



Musculoskeletal Disorders



PERIODIC HEALTH EXAMINATION TASK FORCE 2022-2023



As of 29 September 2023



Disclaimer and Contact Information

This clinical practice guideline (CPG) was created for general practitioners, specialists, and allied health professionals who render primary care. The Department of Health (DOH) encourages adherence to this CPG. However, variabilities exist in disease manifestation, characteristics, and values and preferences of individuals. Hence, the recommendations written herein should not restrict clinicians from using their clinical judgment and considering a patient's individual needs and preferences in decision-making.

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Developers of this CPG are aware of its limitations. Evidence summaries were based on the best available scientific evidence at the time of its formulation. However, new evidence that emerged after CPG creation may affect its validity and applicability in the future.

Contact Us

Send us an email at eosalido@up.edu.ph for any questions or clarifications on the outputs and process of this CPG.

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Philippine Academy of Physicians in School Health, Inc



Philippine Academy of Rehabilitation Medicine



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Philippine College of Occupational Medicine



Philippine Orthopedics Association



Philippine Pediatric Society



Philippine Physical Therapy Association, Inc.



Philippine Rheumatology Association



Philippine Society of Geriatrics and Gerontology



Osteoporosis Society of the Philippines Foundation, Inc.



Department of Labor and Employment

List of Abbreviations

ACL	anterior cruciate ligament
AIS	adolescent idiopathic scoliosis
AWGS	Asian Working Group for Sarcopenia
BBS	Berg Balance Scale
BIA	bioelectrical impedance analysis
BMD	bone mineral density
BRFSS	Behavioral Risk Factor Surveillance System
CC	calf circumference
CCT	controlled cohort trial
CHT	continuous hormone therapy
CKCUEST	Closed Kinetic Chain Upper Extremity Stability Test
CP	consensus panel
COI	conflict of interest
CPG	clinical practice guideline
CSR	Cochrane systematic review
CT	computed tomography
CVD	cardiovascular disease
DALY	disability-adjusted life year
DMARD	disease-modifying antirheumatic drug
DOH	Department of Health
DXA	dual-energy X-ray absorptiometry
ERE	evidence review expert
EtD	evidence to decision
EWGSOP	European Working Group on Sarcopenia in Older People
FBT	forward bend test
FMS	Functional Movement Screen
FRAX	Fracture Risk Assessment Tool
GALS	Gait, Arms, Legs, and Spine locomotor screen
GBD	Global Burden of Disease
GPAQ	Global Physical Activity Questionnaire
GRADE	Grading of Recommendations, Assessment, Development, and Evaluation
GSHS	Global School-based Student Health Survey
GUG	Get Up and Go
HR	hazard ratio
HRQOL	health-related quality of life
INT	integrated neuromuscular training
IPAQ	International Physical Activity Questionnaire
LESS	Landing Error Scoring System
LR	likelihood ratio
LSAHP	Longitudinal Study of Ageing and Health in the Philippines
MAQ	Modifiable Activity Questionnaire
MD	mean difference
MOF	major osteoporosis fractures
MSD	musculoskeletal disease/disorder
MSKI	musculoskeletal injuries
MSRA	Mini Sarcopenia Risk Assessment
MVPA	moderate-to-vigorous physical activity

NCD	noncommunicable disease
NERPA	Novel Ergonomic Postural Assessment
NIH-ICE	National Institutes of Health - Institute of Clinical Epidemiology
NMB	net monetary benefit
NNS	National Nutrition Survey
OR	odds ratio
ORF	osteoporosis-related fractures
OSHA	Occupational Safety and Health Administration
OSTA	Osteoporosis Self-Assessment Tool for Asians
PAQ-A/PAQ-C	Physical Activity Questionnaire for older children or adolescents
PAVS	Physical Activity Vital Sign Questionnaire
PedsQL	Pediatric Quality of Life Inventory
pGALS	pediatric Gait, Arms, Legs, and Spine locomotor screen
PHEX MSD 2023	Periodic Health Examination for Musculoskeletal Disorders
PHIC	Philippine Health Insurance Corporation
PHP	Philippine peso
PICO	Population, Intervention, Comparator, and Outcome
PIO	Predictive Index for Osteoporosis
PPE	pre-participation physical evaluation
PPT	physical performance test
PWMAQ	Previous Week Modifiable Activity Questionnaire
QALY	quality-adjusted life year
RCT	randomized controlled trial
REBA	Rapid Entire Body Assessment
RGA	rapid geriatric assessment
RPAQ	Recent Physical Activity Questionnaire
RR	risk ratio
RULA	Rapid Upper Limb Assessment
SARC-F	Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls
SARC-Calf	SARC-F with calf circumference measurement
SC	steering committee
SCOOP	Screening for Prevention of Fractures in Older Women
SEBT	Star Excursion Balance Test
SF-12	Short Form 12 Health Survey
SGD	Singaporean dollar
SMD	standardized mean difference
SPPB	Short Physical Performance Battery
T2DM	type 2 diabetes mellitus
THS	Teen Health Survey
TUG	Timed Up and Go
TWG	technical working group
USD	United States dollar
USPSTF	United States Preventive Services Task Force
WHO	World Health Organization
WMD	weighted mean difference
WRMSD	work-related musculoskeletal disorder
YBT-LQ	Y-Balance Test Lower Quarter
YLD	years lived with disability
YRBS	Youth Risk Behavior Surveillance

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Executive Summary

This CPG is an update of the 2004 Guideline on Periodic Health Examination for screening of musculoskeletal disorders (MSD). The 2004 CPG had seven recommendations for five musculoskeletal conditions or risk factors such as scoliosis, osteoporosis, predisposition to fall, hyperuricemia, and congenital musculoskeletal deformities. The current CPG has a wider scope (see Table 1). It contains 15 recommendations on screening asymptomatic, apparently healthy children and adults for MSDs in general; specific disorders that include scoliosis, work-related MSDs (WRMSDs), sarcopenia and osteoporosis; and risk factors such as low vitamin D, physical inactivity, risk for falls and musculoskeletal injuries (MSKI).

The guideline development process had four general steps: (1) identification of priority research questions; (2) evidence synthesis and analysis; (3) formulation of the recommendations based on the balance of benefit, harm, values, and preferences; and (4) implementation and evaluation. The process followed the GRADE approach (Grading of Recommendations, Assessment, Development, and Evaluation) including GRADE Adlopment, a systematic process of adapting evidence summaries, and the GRADE Evidence to Decision (EtD) framework.

Only six of the recommendations are strong; most are weak. This is because of the low to very low certainty of evidence on the net benefit of screening and scarce data on people's values and preferences, cost-effectiveness, acceptability, and impact of screening on equity. The need for more research on screening for MSD is recognized. When new evidence arises or when three years lapse, the recommendations in this CPG will be updated.

The guideline is intended to be used by general practitioners and specialists in the primary care setting, allied health practitioners, policy makers, employers and administrators, funders of healthcare, other stakeholders in the health industry, and even patients. It is supportive of the implementation of the Universal Health Care Act. Through these recommendations, we aim to identify early or mild MSD or at-risk individuals to facilitate treatment or apply preventive measures and to improve overall outcomes for individual patients and society.

Summary of Recommendations

Table 1. Recommendations on screening for musculoskeletal disorders and risk factors

Recommendation	Certainty of Evidence	Strength of Recommendation
Musculoskeletal disease		
1. Among asymptomatic, apparently healthy adults, we suggest screening for MSD using the Gait, Arms, Legs, and Spine (GALS) locomotor screen once a year.	Very Low	WEAK
2. Among asymptomatic, apparently healthy children, we suggest screening for MSD using the pediatric GALS (pGALS) locomotor screen once a year.	Very Low	WEAK
Scoliosis		
3. Among asymptomatic, apparently healthy children, we suggest against screening for scoliosis due to insufficient evidence.	Very Low	WEAK
Work-related musculoskeletal disorder		
4. Among asymptomatic, apparently healthy working adults, we suggest screening for the risk of WRMSD.	Low	WEAK
Physical inactivity		
5. Among asymptomatic, apparently healthy adults, we recommend screening for inadequate physical activity using the Physical Activity Vital Sign questionnaire (PAVS) at least annually.	Very Low	STRONG
6. Among asymptomatic, apparently healthy adolescents, we suggest screening for inadequate physical activity using either the Global School-based Student Health survey (GSHS) or the Physical Activity Questionnaire for Older Children or Adolescents (PAQ-C) at least annually.	Very Low	WEAK
7. Among asymptomatic, apparently healthy children, we suggest against screening for inadequate physical activity due to insufficient evidence.	Very Low	WEAK

Recommendation	Certainty of Evidence	Strength of Recommendation
Risk of musculoskeletal injuries		
8. Among asymptomatic, apparently healthy children and adults, we suggest against screening for risk of MSKI.	Very Low	WEAK
Low vitamin D		
9. Among asymptomatic, apparently healthy infants, children, and adults, we recommend against screening for low vitamin D.	Very Low	STRONG
Risk of falls		
10. Among asymptomatic, apparently healthy older adults ≥ 60 years old, we recommend screening for fall risks.	Low	STRONG
11. Among asymptomatic, apparently healthy adults <60 years old, we suggest against screening for fall risks.	Low	WEAK
Sarcopenia		
12. Among asymptomatic apparently healthy adults ≥ 60 years old, we recommend screening for sarcopenia using a combination of tools (SARC-Calf with or without grip strength assessment) annually or after the occurrence of a major health event (fall, fracture, hospital admission).	Very Low	STRONG
13. Among asymptomatic, apparently healthy adults <60 years old, we suggest against screening for sarcopenia due to insufficient evidence.	Very Low	WEAK
Osteoporosis		
14. Among asymptomatic, apparently healthy women ≥ 65 years old, we recommend screening for osteoporosis using FRAX with or without BMD or OSTA.	Low	STRONG
15. Among asymptomatic, apparently healthy men at any age and women <65 years old, we recommend against screening for osteoporosis.	Very Low	STRONG

1. Introduction

The Philippine Guidelines on Periodic Health Examination (PHEX) was a CPG published in 2004.¹ It was a comprehensive guide on screening interventions committed to providing early preventive services for apparently healthy Filipinos. It was the first to offer evidence-based recommendations for screening, made possible through the concerted effort of medical and paramedical organizations composed of more than a hundred experts, researchers, and stakeholders.¹ It was inspired by the Canadian and the US Preventive Services Task Forces (USPSTF), but tailored to the Philippine setting.

The process of updating this guideline commenced in 2021 in time to support the Universal Health Care Act,² which aims to provide all Filipinos access to quality and affordable medical services starting with primary care benefits. The task of updating the PHEX was divided among several task forces, with each task force corresponding to a particular disease or risk factor. This manuscript is dedicated for the update of recommendations on screening for MSDs.

In this CPG, health screening aims to identify individuals with an early MSD and those at risk of developing these diseases. MSDs refer to disorders of muscles (e.g., sarcopenia), bones (e.g., osteoporosis, fragility fractures, traumatic fractures), joints (e.g., osteoarthritis, rheumatoid arthritis, gout), and adjacent connective tissues (e.g., systemic lupus erythematosus).³ There are more than 150 different MSDs that lead to temporary or lifelong limitations in function.

MSDs are acutely or chronically painful, and they cause limitations in mobility, dexterity, and participation in society. Childhood MSDs like juvenile arthritis or scoliosis affect the child's development. Diseases that involve working-age adults like localized and regional pain syndromes, rheumatoid arthritis, gout, and work- or sports-related injuries and fractures reduce work ability and productivity and drive early retirement. These have an enormous societal impact in terms of direct health-care costs and indirect costs (i.e., work absenteeism or productivity loss).³

Based on 2019 Global Burden of Disease (GBD) data, MSDs were estimated to affect 1.71 billion people and were the biggest contributor to years lived with disability (YLDs) worldwide. MSDs make up approximately 150 million YLDs, accounting for 17% of all YLDs.⁴ They are also the largest contributor to the need for rehabilitation services in both adults and children.⁵ Low back pain accounts for much of the overall burden of MSDs (570 million prevalent cases worldwide, responsible for 7.4% of global YLDs). Other prevalent MSDs include fractures, osteoarthritis, neck pain, amputations, rheumatoid arthritis, and gout.⁴

The 2019 GBD data also reported 117.54 thousand deaths with the age-standardized death rate showing a stable trend from 1990–2019. The peak age of onset and disability-adjusted life years (DALYs) of MSDs was 50–54 years in 2019. The burden of MSDs in females was much higher than that in males (1.29 times more incident cases, 2.24 times more deaths, and 1.45 times more DALYs in females than in males). Occupational risk exhibited the highest contribution to MSDs; tobacco use, and high body mass index (BMI) were also major risk factors. The burden of MSDs tends to be higher in regions with a lower sociodemographic index, including the Philippines.⁶

On top of the direct adverse effects of MSDs, they are found to frequently coexist and increase the risk of developing other noncommunicable diseases (NCDs), such as cardiovascular diseases (CVDs) and mental health issues.^{3,7} The need to screen for MSDs to enable early diagnosis and treatment is thus clear and urgent.

Aside from the burden of illness, the PHEX MSD Task Force considered other factors in prioritizing the MSDs for screening such as the availability of: (1) screening tests that are accurate enough, (2) safe confirmatory tests, (3) effective and safe early treatment, and (4) that the costs of screening are proportional with the potential benefit. In addition, the Task Force included conditions to cover the entire human life span, from childhood to old age, and those where controversies, uncertainty, and variability in screening practices are commonly observed.

The CPG developers hope that preventive measures against occupational risks, MSKI including falls, low vitamin D, physical inactivity, and early identification of MSDs that include scoliosis, arthritis, osteoporosis, and sarcopenia may reduce the burden of MSDs and improve the overall health of Filipinos.

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2. Objective, Scope, Target Population, and Target Users

2.1. Objective

This CPG aims to provide evidence-based recommendations on the screening of asymptomatic, apparently healthy children and adults for MSDs and their risk factors, through a comprehensive evaluation of the benefits, harms, costs, acceptability, feasibility, and equity associated with screening.

2.2. Scope and Purpose

The guideline questions and recommendations cover the screening and risk assessment of the following: MSD in general, scoliosis, WRMSD, physical inactivity, risk for MSKI, low vitamin D, risk of falls, sarcopenia, and osteoporosis. Although evidence on linked management is cited, the guideline does not make any recommendations for treatment of MSD.

2.3. Target Population

All recommendations are intended for asymptomatic, apparently healthy individuals. The population of interest for the recommendation for scoliosis are children, while the recommendations for WRMSD, risk of falls, sarcopenia and osteoporosis are only applicable to adults.

2.4. Intended Users

This CPG will be used by the primary health care providers (general physicians and specialists, other health providers), academic medical institutions, labor force administrators, and patients on one end, and by regulatory agencies and policy makers in the Philippines government and private financial and health delivery institutions in the healthcare industry on the other.

2.5. Guideline Questions

1. Should we screen for **MSD** using pGALS or GALS among asymptomatic, apparently healthy children and adults?
2. Should we screen for **scoliosis** among asymptomatic, apparently healthy children?
3. Should we screen for **WRMSD** among asymptomatic, apparently healthy working adults?
4. Should we screen for **physical inactivity** among asymptomatic, apparently healthy children and adults?
5. Should we screen for **risk of MSKI** among asymptomatic, apparently healthy children and adults?

6. Should we screen for **low vitamin D** among asymptomatic, apparently healthy children and adults?
7. Should we screen for **predisposition to fall** among asymptomatic, apparently healthy adults?
8. Should we screen for **sarcopenia** among asymptomatic, apparently healthy adults?
9. Should we screen for **osteoporosis** among asymptomatic, apparently healthy adults?

3. CPG Development Methodology

The DOH outlined the guideline development process into four phases: (1) preparatory phase, (2) evidence synthesis, (3) conversion of the evidence to recommendations (EtD step), and (4) implementation and evaluation.¹

3.1. Organization of the Process

Convening the Steering Committee, Technical Working Group, Consensus Panel and COI Committee

In the preparatory phase, the Task Force Steering Committee (SC) determined the CPG objectives, scope, target audience, and clinical questions. The committee formed two other working groups, the technical working group (TWG) and the consensus panel (CP). The TWG consisted of evidence review experts (EREs) tasked to review previous CPG recommendations for similar clinical questions, appraise and summarize other existing evidence, and to draft an initial recommendation based on the collected evidence. Two evidence reviewers worked on each clinical question.

The CP was composed of multisectoral representatives of stakeholder groups with interest and expertise relevant to the clinical questions. To ensure fairness and transparency, the composition was guided by the DOH manual.¹ Content experts and other key stakeholders (such as policymakers, patient advocates, allied medical practitioners, and physicians from different settings [e.g., public primary care, private practice, occupational health]) were invited to nominate representatives to the CP. The invited stakeholder groups were as follows: Philippine Academy of Family Physicians, Philippine Academy of Physicians in School Health, Inc., Philippine Academy of Rehabilitation Medicine, Philippine College of Occupational Medicine, Philippine Orthopedics Association, Philippine Pediatric Society, Philippine Physical Therapy Association, Inc., Philippine Rheumatology Association, the Philippine Society of Geriatrics and Gerontology, the Department of Labor and Employment, and the Philippine Alliance of Patient Organizations.

The CP was tasked to: (1) provide inputs on the clinical questions, (2) rate the critical and important outcomes, (3) review the evidence summaries developed by the EREs, (4) discuss relevant considerations revolving around the recommendations, particularly on the aspects of feasibility, acceptability, and equity, and (5) finalize the direction, strength, and wording of the recommendation(s) for each clinical question during *en banc* meetings.

While the SC facilitated the entire CPG by formulating the clinical questions, forming the working groups, and guiding the TWG in its tasks, its members had no direct participation in assessing and synthesizing the evidence, generating the evidence summaries and evidence-based draft recommendations, and voting on the final recommendations during the *en banc* CP meeting.

Managing Conflicts of Interest

All individuals who participated in the CPG development underwent a review of conflicts of interest (COI) by the COI committee of the PHEX Central SC. This review was based on the Declaration of COI form and their curriculum vitae. Both financial and academic COI were evaluated. One representative from each stakeholder group/organization was chosen (from

the nominees) to be part of the CP based on the COI evaluation by the committee. Those with significant potential COI (Class D) were not allowed to participate. Those classified A were allowed to participate with no constraints. Class B had minor COIs that were broadcasted during the *en banc* meetings and were allowed to vote. Class C had manageable COIs needing major constraints, i.e., were allowed to participate in the discussions but not allowed to vote. All the members of the CP were classified A or B and were allowed to vote. The PHEX COI and central committees provided oversight on the management of COIs of the members of the SC and TWG. The summary of the COI evaluations is in Appendix 9.3.

Prioritizing the Clinical Questions

The SC chose to focus the screening questions on conditions that are quite common, may affect both asymptomatic, apparently healthy children and adults or large subgroups among either children or adults, and will therefore have a large potential burden on person and society. They also considered observed practice variations, especially those that have potential adverse consequences on health or resources. A third major consideration was the availability of diagnostic tests and effective treatment for early disease.

3.2. Creation of the Evidence Summaries

Search Methods and Strategies

The guideline and review questions were developed using the PICO (Population, Intervention, Comparator, and Outcome) format. To generate the needed evidence, the EREs performed a systematic search, without language restriction, through international databases (MEDLINE, EMBASE, Google Scholar) and local medical literature (electronic database-HERDIN, Philippine medical journals, convention proceedings) for data among asymptomatic apparently healthy children and adults (Population) who underwent or not screening for MSDs (Intervention and Comparison) to improve quality of life, reduce mortality, pain, disability, joint damage, and other diseases (Outcomes). A summary of the search strategies can be found in the Appendices.

The EREs also searched for information on the disease burden, cost effectiveness of screening and early treatment, recommendations of other groups, availability, and acceptability of the tests and of treatment, feasibility implementing the interventions, and the effects of screening on health equity.

Inclusion and Exclusion Criteria

The EREs searched for and appraised practice guidelines related to periodic health screening, including but not limited to those developed by the Canadian Task Force on Preventive Health Care, the USPSTF, the National Institute for Health and Care Excellence, and Philippine medical organizations. When a relevant CPG published within the last 5 years was deemed of good quality using the AGREE II tool, its evidence summaries were adapted and updated with recent evidence.

In the absence of relevant CPGs, the EREs generated de novo evidence summaries for each clinical question. Existing systematic reviews with or without meta-analyses that matched the prespecified PICO were prioritized and evaluated for possible adaptation. For questions on screening, the EREs searched for randomized trials of screening interventions that reported outcomes on benefit and/or harm. In the absence of direct evidence, quasi-randomized and observational studies were considered for inclusion. For diagnostic test accuracy, observational studies with the appropriate index test and reference standard that reported

diagnostic performance (e.g., sensitivity, specificity) or enough information to derive these (e.g., 2x2 table) were included.

Rating of Outcomes

The CP individually rated the importance of each outcome on a scale of 1 to 9 in reaching a recommendation for the guideline questions. Outcomes that averaged 7 to 9 were considered critical in decision-making, 4 to 6 were important but not critical in decision-making, and 1 to 3 were of limited importance. A maximum of 7 outcomes that were “critical” or “important” were included in evidence synthesis and determination of the certainty of evidence.

Study Quality Assessment and Certainty of Evidence

Relevant journal articles were critically appraised by two reviewers for directness, methodological validity, magnitude and precision of the results, and applicability. The certainty of the evidence for each outcome and the overall certainty of evidence for each question were assessed using the GRADE approach through the GradePRO software (Table 2).² Based on the evidence of net benefit of screening for MSDs on identified specific outcomes and the overall certainty of that evidence, a draft recommendation was made.

Table 2. Basis for assessing the quality of the evidence using the GRADE approach

Certainty of Evidence	Interpretation
High	We are very confident that the true effect lies close to that of the estimate of the effect
Moderate	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very Low	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect
Factors that lower quality of the evidence are:	
<ul style="list-style-type: none">● Risk of bias● Important inconsistency of results● Some uncertainty about directness● High probability of reporting bias● Sparse data/Imprecision● Publication bias	
Additional factors that may increase quality are:	
<ul style="list-style-type: none">● All plausible residual confounding, if present, would reduce the observed effect● Evidence of a dose-response gradient● Large effect	

Data Synthesis

RevMan and STATA were used for the quantitative synthesis of effect estimates for critical and important clinical outcomes. Data were summarized narratively when quantitative synthesis was not possible. The synthesized data were compiled in evidence summaries that were submitted to the CP before the online *en banc* meetings.

3.3. Formulation of the Recommendations

Evidence to Decision/Recommendation Framework

The evidence summaries and draft recommendations formulated by the ERE were presented to the CP for review and finalization during the *en banc* videoconference meetings. This process utilized the Evidence-to-Decision or EtD framework, wherein the panelists considered the evidence and its certainty while looking through equity, applicability, and feasibility lenses (Table 3) to generate the final recommendations.

To facilitate the discussions during the meetings, the CP members were given the evidence base and asked to fill out an online EtD form prior to the *en banc* meetings. The results of the EtD survey were presented after the evidence summary during the meeting.

Table 3. Detailed considerations based on the Evidence-to-Decision framework³

- | |
|---|
| <ol style="list-style-type: none">1. Is the problem a priority?2. How accurate is the test?3. How substantial are the desirable anticipated effects?4. How substantial are the undesirable anticipated effects?5. What is the certainty of the evidence of test accuracy?6. Is there important uncertainty about or variability in how much people value the main outcomes, including adverse effects and burden of the test and downstream outcomes of clinical management guided by the test results?7. Does the balance between desirable and undesirable effects favor the test or the comparison?8. How large are the resource requirements (costs)?9. What is the certainty of the evidence of resource requirements (costs)?10. Does the cost-effectiveness of the test favor the test or the comparison?11. What would be the impact on health equity?12. Is the test acceptable to key stakeholders?13. Is the test feasible to implement? |
|---|

Consensus Process

After discussion of all factors that should be considered when making the recommendation, the CP voted on the wording (whether for or against screening) and the strength of each recommendation during the online *en banc* meetings. A strong recommendation means that the CP is “confident that the desirable effects of adherence to a recommendation outweigh the undesirable effects.” When the trade-offs between benefit, harm and costs are uncertain—either because of the quality of the evidence or because evidence shows that the desirable and undesirable effects are closely balanced, a weak recommendation (or a suggestion) is warranted. Table 4 gives examples of scenarios resulting in weak or strong recommendations.⁴

A consensus decision was reached if at least 75% of the CP members voted in agreement to the recommendation.² If consensus was not reached, the meeting facilitator would initiate a discussion about the reasons for the disagreement, and another round of voting was conducted. For all the guideline questions in this CPG, consensus was reached after one or two rounds of voting.

Patients’ Views and Preferences

This guideline guaranteed that patients’ views and preferences were considered in all the recommendations by including studies about these in the evidence summary and by ensuring the participation of a patient representative from the Philippine Alliance of Patient Organization in all *en banc* meetings.

Table 4. Basis for determining strength of recommendation

Scenario	Recommendation
High certainty for large benefit and low risk of harm	Strong FOR intervention
Low certainty of benefit in a life-threatening situation, harms can be low or high	Strong FOR
High certainty for small benefit and high risk of harm and/or high cost	Strong AGAINST
Low certainty evidence suggests benefit and high certainty evidence suggests harm/very high cost	Strong AGAINST
Low certainty evidence suggests equivalence of two alternatives, high certainty evidence suggests harm in one alternative	Strong FOR the less harmful alternative
High certainty of modest benefits, low certainty evidence suggests possibility of catastrophic harm	Strong AGAINST
Low certainty of small/modest benefits that outweigh the risk of harm	Weak FOR
Low certainty of harm that outweigh the modest benefits	Weak AGAINST
Uncertainty or variability in values and preferences	Weak FOR or AGAINST
Uncertainty about whether the intervention represents a wise use of resources	Weak FOR or AGAINST

3.4. External Review

The CPG manuscript was externally reviewed by specialists in orthopedics, rheumatology, and rehabilitation medicine. They were asked to share their insights on the completeness and relevance of the evidence, the processes, clarity of the output (the recommendations and the manuscript), and the planned methods of dissemination of the CPG. In response to feedback from the external reviewers, the SC revised portions of the Methodology (description of the GRADE methodology, certainty of evidence, and strength of recommendation) and the consensus discussions to improve clarity.

3.5. Planning for Dissemination and Implementation

All recommendations will be incorporated in a web-based and mobile application that is user-friendly and accessible to the public through <https://phex.ph>. Upon entry of individual patient demographic data (e.g., age, sex, weight, height), into this application, the user can generate a list of the recommended screening strategies.

The evidence summaries and the full CPG manuscript will be posted online in the DOH website. The CPG will undergo quality screening by the DOH Evidence Generation and Management Division for recognition and implementation as a National Practice Guideline by DOH and the Philippine Health Insurance Corporation (PHIC).

An abridged manuscript of the CPG will be published in the Acta Medica Philippina. The CPG will also be published in the official websites of the participating organizations. The CPG will be presented to doctors and other health professionals through lectures, symposia, and small

group discussions during continuing medical education meetings of academic institutions and medical societies. The recommendations of the CPG will also be discussed in health forums disseminated through the radio, television, and social media.

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4. Recommendation and Evidence Summaries

4.1. Screening for musculoskeletal disease

RECOMMENDATIONS

1. Among asymptomatic, apparently healthy adults, we suggest screening for MSD using the Gait, Arms, Legs, and Spine (GALS) locomotor screen once a year.
(weak recommendation, very low certainty evidence)
2. Among asymptomatic, apparently healthy children, we suggest screening for MSD using the pediatric GALS (pGALS) locomotor screen once a year.
(weak recommendation, very low certainty evidence)

Justification and Considerations

The consensus panel recognized that:

- Early detection and treatment of MSD will result in good outcomes.
- Screening will likely detect MSDs that are common. This was shown in a small unpublished study in a local tertiary center where most of the conditions detected by pGALS were scoliosis and common deformities, while juvenile idiopathic arthritis was a rare find.
- GALS and pGALS are easy to perform (<5 minutes) when regularly practiced.

However:

- There is scarce information on which to base the decision. The evidence centered on (1) the benefit of preventing disease progression of rheumatoid arthritis when it is detected and treated early; (2) minimal harm (mild discomfort) with the use of pGALS; and (3) high sensitivity of the GALS and pGALS and thus potentially useful for screening.
- GALS and pGALS are not routinely used in the current primary care setting. For national implementation of the guideline, practitioners need to undergo training. Resources for training are available and accessible online but there is a need to verify that the tests are correctly done and practiced.

4.1.1. Key Findings

- There was no direct evidence on the impact of pGALS or GALS screening on clinical outcomes. Indirect evidence on its utility came from three cross-sectional studies on diagnostic accuracy, three cohort studies on safety, and three cross-sectional studies on early treatment of rheumatoid arthritis.
- Both GALS and pGALS had high sensitivity for detecting MSD (97.9% and 96.6%, respectively) but much lower specificity (37.7% and 6.8%, respectively).
- Early treatment due to early disease detection was associated with less radiographic progression of rheumatoid arthritis in adults. Most children experienced no or minimal discomfort with the pGALS examination.
- The certainty of evidence was downgraded for effectiveness outcomes due to indirectness and risk of bias (attrition and inadequate control for confounding). Overall certainty of evidence was very low across critical outcomes.

4.1.2. Burden of Disease

Disease Frequency

In the Philippines, musculoskeletal and connective tissue diseases account for 0.7% of mortalities and for 1 death per 100,000 children aged 15–19 years.¹ In a Filipino urban community, 16.3% of adults had musculoskeletal complaints and the most common rheumatic conditions were osteoarthritis and soft tissue rheumatism.²

Management of the Disease

The GALS locomotor screen uses three questions and a screening examination to identify musculoskeletal abnormalities in adults.³ The pGALS screen was developed for school-age children based on the GALS method.⁴ Both GALS and pGALS are examinations that are taught to medical students in the Philippines.⁵

4.1.3. Benefits and Harms of Screening

GALS

Across three observational studies (n=2026), earlier initiation of disease-modifying antirheumatic drugs (DMARDs) was associated with slower radiographic progression (Table 5).⁶⁻⁸ After 2 years of follow-up, there was a significantly greater radiographic progression among patients with delayed treatment (median difference of 7 points in Sharp score) compared to those with early DMARDs (median difference of 1 point, $p=0.03$).⁶ Similarly, a propensity score-adjusted analysis found that initiating DMARDs within 3 months of diagnosis was associated with less radiographic progression (marginal mean 0.8 units vs. 1.7 units, $p=0.033$).⁸ For every 5-year lag in DMARD initiation from symptom onset, the Sharp score increased by 0.38 points (95% CI 0.25, 0.50) on average, after adjusting for age, sex, ethnicity, socioeconomic status, DAS28-ESR (Disease Activity Score in 28 joints) and M-HAQ (modified Health Assessment) scores.⁷ There were no studies found that investigated the harms of GALS screening or its effect on disability or risk of injuries.

The certainty of evidence from the studies on efficacy of linked treatment was very low due to indirectness and serious risk of bias (failure to adjust for confounders and attrition bias from higher dropouts in the delayed treatment group).

pGALS

No evidence was found on the effect of pGALS screening on progression of joint disease, disability, and risk of injuries in children. The pGALS exam was well-tolerated by most participants based on the results of three cross-sectional studies (n=757). Most children experienced little or no discomfort (range 72–95%) during the examination (Table 5).⁹⁻¹¹ In one survey, 92% of parents also reported no or slight discomfort experienced by their children.⁹

The overall certainty of evidence for pGALS is very low across critical outcomes. The reasons for downgrading certainty were indirectness (participants came from tertiary hospitals and sports medicine clinics) and serious risk of bias (self-report, insufficient adjustment for confounders).

Table 5. Summary of findings: benefits and harms associated with GALS screen in adults and pGALS screen in children

Screening test (Outcome)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
GALS (Joint disease)	3 OS (n=2,026) ⁶⁻⁸	Earlier DMARD initiation was consistently associated with slower radiographic progression. Sharp score increased by 0.38 points [0.25 to 0.50] for each 5-year delay in DMARD initiation.	Earlier DMARD initiation was beneficial	Very Low
pGALS (Adverse events)	3 XS (n=757) ⁹⁻¹¹	Majority of children experienced little or no discomfort (range 72–95%).	Absence of harm	Very Low

CI confidence interval; DMARD disease-modifying antirheumatic drug; GALS Gait, Arms, Legs, and Spine screen; OS observational study; pGALS pediatric GALS screen; XS cross-sectional study

4.1.4. Diagnostic Performance of Screening Tests

GALS

Osteoarthritis and rheumatoid arthritis were the most frequently identified conditions using the GALS screen. GALS had a high pooled sensitivity (0.98 [95% CI 0.89, 1.00]; I²=0%) but low pooled specificity (0.38 [95% CI 0.10, 0.77]; I²=96%) (Table 6).¹²⁻¹³ The significant heterogeneity for specificity may be due to varying target conditions (i.e., MSD) and because of the variability in performance of GALS and the reference standard. A positive GALS screen increases the odds of MSD by 57%, while a negative result decreases the odds by 94% (positive likelihood ratio [LR] 1.57, negative LR 0.06). The certainty of evidence was very low due to significant heterogeneity and imprecision.

pGALS

Juvenile idiopathic arthritis and nonspecific joint pains were the most common inflammatory and non-inflammatory conditions detected using the pGALS screen. pGALS was highly sensitive (0.97 [95% CI 0.90, 0.99]) but had very low specificity (0.07 [95% CI 0.03, 0.14]) (Table 6).¹⁴ A positive pGALS result made an MSD only slightly more likely while a negative result reduced the odds by half (positive LR 1.04, negative LR 0.50).

Table 6. Summary of findings: diagnostic performance of GALS screen in adults and pGALS screen in children

Screening test (Sn/Sp)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
GALS (Sn)	2 XS (n=167) ^{12,13}	97.9% [88.5, 99.6]	High Sn	Moderate
GALS (Sp)	2 XS (n=222) ^{12,13}	37.7% [10.1, 76.5]	Low Sp	Very low
pGALS (Sn)	1 XS (n=87) ¹⁵	96.6% [90.3, 99.3]	High Sn	Moderate
pGALS (Sp)	1 XS (n=88) ¹⁵	6.8% [2.5, 14.3]	Low Sp	Moderate

CI confidence interval; GALS Gait, Arms, Legs, and Spine screen; pGALS pediatric GALS screen; Sn sensitivity; Sp specificity; XS cross-sectional study

4.1.5. Cost Implication

No cost-effectiveness studies for screening with pGALS or GALS were found. Performing pGALS or GALS entailed no additional direct cost to patients and to health professionals. However, primary care providers may need additional training on how to perform pGALS or GALS screening. Training will incur some cost, which may vary depending on the training setting.

4.1.6. Equity, Acceptability, and Feasibility

The average time to perform GALS or pGALS ranged from 2.49 to 4.26 minutes.^{9-11,13,15,16} Most parents (range 94–98.1%) and children (range 88.7–98%) felt that the time to perform pGALS was acceptable.^{9,10} While medical interns from the University of the Philippines College of Medicine were, on average, confident with the GALS method, only 21% reportedly used the GALS screen in their clinical encounters.⁵

4.1.7. Recommendations from Other Groups

No CPGs that considered pGALS or GALS to screen for MSD in asymptomatic, apparently healthy children and adults, respectively, were found.

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4.2. Screening for scoliosis

RECOMMENDATION

3. Among asymptomatic, apparently healthy children, we suggest against screening for scoliosis due to insufficient evidence.
(weak recommendation, very low certainty evidence)

Justification and Considerations

The consensus panel recognized that early detection of scoliosis during childhood is important to prevent or control its consequences throughout life such as back pain, psychological distress, and respiratory compromise.

However, there was not enough evidence of the net benefit of screening for scoliosis in asymptomatic, apparently healthy children on a nationwide scale.

4.2.1. Key Findings

- No direct evidence was found on the benefits and harms of screening versus no screening for adolescent idiopathic scoliosis (AIS); hence, indirect evidence on linked treatment (i.e., efficacy and safety) and diagnostic accuracy (i.e., sensitivity, specificity) of tests were sought. There were no studies identified comparing early versus delayed surgical treatment.
- One systematic review with two randomized controlled trials (RCTs), two controlled clinical trials (CCTs), and three observational studies were included assessing the benefits and safety of scoliosis-specific exercise and bracing in a screening relevant population (i.e., Cobb angle <50°). Results were conflicting in the two studies that evaluated exercise in scoliosis, while some benefit was identified with bracing showing hastening in curve progression to >50°. Quality of life and adverse events outcomes were not significant.
- The most sensitive tests when used alone are the scoliometer and Moire topography, but both sensitivity and specificity are increased with the use multiple tests: forward bend test (FBT) with scoliometer, then Moire topography.
- Overall certainty was very low due to issues on allocation concealment, non-blinding of participants, and heterogeneity.

4.2.2. Burden of Disease

Disease Frequency

Scoliosis refers to a heterogeneous group of conditions characterized by changes in the shape and position of the spine, thorax, and/or trunk, with a spinal curvature >10° using an anteroposterior view on radiography. Etiology is either idiopathic, congenital, or neuromuscular, with idiopathic scoliosis accounting for up to 80% of cases.^{1,2} Ninety percent of all idiopathic scoliosis cases occur during adolescence.³ The minority are infantile or juvenile depending on the age at diagnosis and are considered separately from the adolescent type because of the difference in the clinical course.^{4,5} AIS affects 2–3% of the global population.^{5,6} Approximately 10% of AIS patients require treatment, about 0.1% require surgical intervention.⁶ The condition affects females more than males at a ratio of 1.5:1.^{3,7}

The angle of scoliosis is a determinant of the outcomes of patients diagnosed with scoliosis. More severe deformities can cause psychosocial distress and contribute to physical problems such as back pain and impairment of cardiorespiratory functions. Patients with curves >50° will progress into adulthood, and patients with curves >100° are at an increased risk of cor pulmonale and death.^{2,3,8}

Management of the Disease

Management of scoliosis may be conservative or surgical depending on the severity of the condition. Conservative treatment involves observation, physiotherapeutic scoliosis-specific exercises, special inpatient rehabilitation, and bracing. Brace treatment is recommended for curvatures 20–30°, and surgical intervention is recommended for patients presenting with rapid curve progression. Those with curves >50° are more likely to be symptomatic and associated with a higher risk of progression, neurologic deficits, or pulmonary compromise.^{2,5}

The following tools (Table 7) may be used to screen for scoliosis.

Table 7. Commonly used tools in screening for scoliosis

Screening test	Description
FBT	The child is asked to bend forward at the waist until the spine is parallel to the horizontal plane and the examiner checks for asymmetries on the back.
Scoliometer	This is a handheld instrument placed on the child's spine while on a forward bend at 90° to measure the angle of trunk rotation. 5–7° angle of trunk rotation is the recommended threshold for radiographic evaluation.
Humpometer	Moveable strips are placed and locked into place along the child's back perpendicular to the spine. Contour lines are transferred to a graphing paper and any back deformity is measured. Five or more millimeters of back deformity indicates a positive result.
Moire topography	Moire fringes, a device that projects contour lines, is used and the examiner takes a picture of the projection and takes note of the number of asymmetric contour lines. ≥2 asymmetric Moire fringes will usually require radiographic evaluation.

FBT Forward bend test

4.2.3. Benefits and Harms of Screening

No direct evidence addressing the benefits and harms of screening compared to no screening for AIS was available. Instead, a systematic review published in 2018⁵ was used and its evidence on linked treatment and health outcomes was evaluated.

Physiotherapeutic Scoliosis-Specific Exercise

Data on the benefits of scoliosis-specific exercise is limited. A CCT (n=74) documented a clinically insignificant improvement of -0.33° in the Cobb angles of participants in the intervention group (versus +1.12° in the control group).⁹ In contrast, an RCT (n=110) recorded a change of -5.3° in the intervention group and +1.7° in the control group with the curves remaining stable in the control group during follow up.¹⁰

Only one RCT reported minor adverse events, with comparable results for the intervention and control groups.¹⁰ The only documented adverse event was transient pain (11/55 in the experimental group and 14/55 in the control group). No serious adverse events were recorded.^{5,8,10}

Bracing

Bracing provided benefit on curve progression, specifically in inhibiting curve progression >5° and up to >50°, with two trials (n=310) terminated early due to perceived benefit favoring bracing (Table 8).^{5,8} The effect estimates were not pooled due to heterogeneity in the type and duration of bracing. The BrAIST Trial (n=242) evaluated quality of life using the Pediatric Quality of Life Inventory (PedsQL), which did not show statistically significant differences between the intervention and control groups ($p=0.80$) at baseline and on follow up ($p=0.97$).⁵

Based on one study involving adolescents (n=242), documented harms of bracing included skin problems under the brace and body pains not associated with the scoliosis. Both were more apparent in braced individuals compared to controls, although this finding was not statistically significant. Anxiety and depression were similar in both the intervention and control groups.^{5,8} Overall certainty of evidence was very low due to high risk of bias (issues with allocation concealment and blinding), indirectness, and heterogeneity.

Table 8. Summary of findings: benefits of bracing

Outcomes	No. of Studies (No. of Participants)	Intervention	Control	Interpretation	Certainty of Evidence
Curve progression <6°	1 RCT, 1 CCT, 2 cohort (N=409) ¹¹⁻¹⁵	28–81.3%	0–56.3%	Favors control	Very Low
Curve progression >5°	1 RCT, 1 CCT, 1 cohort (N=345) ¹¹⁻¹³	34.4–71.4%	51–100%	Favors bracing	Very Low
Curve progression >10°	1 CCT, 1 cohort (N=101) ^{12,14,15}	18–52.4%	28.1–50%	-	Very Low
Curve progression >50°	1 RCT, 2 CCT, 1 cohort (N=411) ^{11,12,14-16}	3.1–28%	6.3–52%	Favors bracing	Very Low

CCT controlled cohort trial, RCT randomized controlled trial

4.2.4. Diagnostic Performance of Screening

The systematic review used for this recommendation included seven screening programs (observational cohort) for adolescents (n=447,243). However, only three (n=311,024)¹⁷⁻¹⁹ had followed up on screen-negative children and were able to provide data for sensitivity and specificity. The screening programs used the tests indicated in Table 7 with radiography as the gold standard.

The most sensitive tests when used alone were the scoliometer (100%) and Moire topography (93.8%), but both sensitivity and specificity were increased with the use multiple tests: FBT with scoliometer, then Moire topography (sensitivity 93%, specificity 99.2%) (Table 9). Overall certainty of the evidence was very low due to the high risk of bias, inconsistency from the heterogeneity of screeners and tests, and imprecision from incomplete data in four studies. The heterogeneity prevented direct comparison and pooling of data.

Table 9. Summary of findings: diagnostic accuracy of screening for adolescent idiopathic scoliosis

Screening test	No. of Studies (No. of Participants)	Sn [95% CI]	Sp [95% CI]	Certainty of Evidence
FBT	1 OS (n=2,700) ¹⁹	84.4 [57.2, 94.7]	95.2 [94.3, 95.9]	Very Low
Humpometer	1 OS (n=2,700) ¹⁹	90.6 [75.0, 98.0]	80.7 [79.1, 82.1]	Very Low
Scoliometer	1 OS (n=2,700) ¹⁹	100 [84.2, 100]	85.4 [84, 86.7]	Very Low
Moire topography	1 OS (n=2,700) ¹⁹	93.8 [79.2, 99.2]	78.5 [76.9, 80.0]	Very Low
FBT with scoliometer	1 OS (n=2,242) ¹⁷	71.1 [54, 84.6]	97.1 [96.3, 97.7]	Very Low
FBT with scoliometer, then Moire topography	1 OS (n=306,082) ¹⁸	93.8 [93.3, 94.3]	99.2 [99.2, 99.2]	Very Low

CI confidence interval; FBT forward bend test; OS observational study; Sn sensitivity; Sp specificity

4.2.5. Cost Implication

Three studies on the cost-effectiveness of screening for scoliosis were identified (Table 10). Analyses in Turkey and Singapore concluded that screening for scoliosis is cost effective, but these were not based on quality-adjusted life years (QALYs) or DALYs.^{20,21} The study conducted in Turkey describes the low cost of screening for scoliosis at USD 0.47 per child screened, with consequent brace therapy priced at USD 1,302.50 and surgical correction at USD 9,000.00. It was surmised that the savings in treatment costs if children are braced early would be cost effective. However, this cost effectiveness study did not consider the cost for those

who failed bracing and eventually underwent surgery.²¹ Similarly, in Singapore, the net cost for scoliosis screening is negative (SGD -295,093.98) when using a best-case and worst-case scenario for the sensitivity analysis. Lastly, the study conducted in Italy proposed the use of a two-step screening procedure as the most cost-effective method (initial screening by a school physician followed by a referral to an orthopedic surgeon) with a reasonable specificity of first-step filtering by school physicians using FBT of 97.8%.²²

Table 10. Summary of studies evaluating cost-effectiveness of scoliosis screening

Setting	Screening done	Cost-effective	Limitations/Considerations
Singapore ²⁰	FBT + scoliometer	Yes; Net cost: (-) SGD 295,093.98	<ul style="list-style-type: none"> Assumptions were made in the comparison of screening vs. no screening, using “best case” and “worst case” scenarios Health effects not measured in QALYs or DALYs
Turkey ²¹	FBT only	Yes Screening per child: USD 0.47 Bracing: USD 1,302.50 Surgery: USD 9,000.00	<ul style="list-style-type: none"> Low burden of disease (0.25% of screened adolescents) Did not include costs for children who underwent both bracing (failed) and surgical correction No computation of net program costs Health effects not measured in QALYs or DALYs
Italy ²²	Two groups: A – school physician (FBT) + orthopedic surgeon B – orthopedic surgeon	Yes (for group A)	<ul style="list-style-type: none"> Actual screening test done by orthopedic surgeon prior to a radiograph was not explicitly stated Comparison was not screening vs. no screening No data on net cost, QALYs or DALYs

DALY disability-adjusted life years, FBT forward bend test, QALY quality-adjusted life years

No local data evaluating the cost-effectiveness of scoliosis screening were found. Local costs of screening and treatment are summarized below in Table 11 and Table 12.

Table 11. Costs of screening and diagnosis for scoliosis*

Diagnostic tool	Cost
Thoracolumbar x-ray	PHP 550.00
Chest x-ray	PHP 1,000.00 (regular price), PHP 200.00 (indigent price)
Orthopedic assessment	PHP 2,000.00

*Prices obtained from the Philippine Orthopedic Center (tel. no. 02-8711-4276) and PEAK physical therapy and scoliosis center (mobile no. 0917-845-1610)

Table 12. Cost of available treatment for scoliosis^{23*}

Treatment/Intervention	Cost
Spinal Brace	Hard Brace: PHP 50,000.00 Dynamic Brace: PHP 105,000.00
Physiotherapy Scoliosis-Specific Exercise	PHP 2,000.00/session
Spinal Fusion Surgery	Procedure*: PHP 400,000.00 Titanium Plate Screw: PHP 57,750.00 Titanium Screw: PHP 7,350.00 Short Mesh: PHP 63,000.00 Medium Mesh: PHP 84,000.00 Long Mesh: PHP 136,500.00

*Based on a private institution, prices may vary depending on surgical team and hospital

4.2.6. Equity, Acceptability, and Feasibility

In a 2006 cross-sectional study, 94.8% of families were supportive of scoliosis screening at school.²⁴ Local data for acceptability, feasibility, and patient values and preference were not found.

4.2.7. Recommendations from Other Groups

Views on screening across medical societies are conflicting. The United Kingdom National Screening Committee and the USPSTF recommend against scoliosis screening due to insufficient evidence.^{5,8,25} Other societies recommend for screening based on expert opinion and consensus.^{2,26,27}

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4.3. Screening for work-related musculoskeletal disorders

RECOMMENDATION

4. Among asymptomatic, apparently healthy working adults, we suggest screening for the risk of work-related musculoskeletal disorders.
(weak recommendation, low certainty evidence)

Justification and Considerations

The consensus panel recognized that screening for WRMSD will promote prevention of diseases and result in overall good health for workers. However, they also realized the following limitations in enforcing nationwide screening, which resulted in a suggestion (i.e., not a strong recommendation) for screening:

- The evidence was limited to office workers, kitchen workers, and hospital orderlies.
- There was no screening tool for risk of WRMSD that encompassed the entire population of workers. Ergonomic risk assessment and intervention by a trained ergonomist are job-specific.
- The Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA) are tools commonly used by occupational medicine physicians in the Philippines and are found to correlate with WRMSD but were not the screening tools used in the cited studies of the evidence summary.
- The frequency of screening will depend on the type and years of work done, the hazards associated with an occupation, and the level of risk identified.
- Occupational medicine physicians in the Philippines are trained to do risk assessment and to apply different levels of disease control measures. However, they do not cover all industries and may be resource-limited.
- Specialists on ergonomic risk assessment and intervention are limited in the Philippines. Given the burden of WRMSD, there is a need to train health care practitioners in this field.

4.3.1. Key Findings

- There were eight RCTs and one non-randomized trial that investigated the impact of screening and of intervention on the occurrence of WRMSD.
- One RCT (n=741) demonstrated that the use of a questionnaire to screen for symptoms and ergonomic or work-related risk factors followed by interventions resulted in similar or fewer neck, upper back, and shoulder symptoms, and similar or fewer sick leaves among office workers.
- On the other hand, eight studies (n=5,530) showed that ergonomic risk assessment coupled with corresponding workstation adjustments resulted in fewer reports of arm pain, and similar or fewer reports of neck, wrist/hand, and upper back pain. Its effect on symptoms in the shoulders, forearm, lower back, hip/thigh, knee, and ankle/feet were inconclusive, and there were similar or more sick leaves. Subgroup analysis by job type showed inconsistent results. There was significant benefit in reducing arm and low back pain among hospital orderlies.
- None of the included studies reported any instance of harm as a result of screening and subsequent intervention.
- The overall certainty of the evidence is deemed to be low due to risk of bias (possible detection bias) and imprecision. The evidence was limited to office workers, kitchen workers, and hospital orderlies.

4.3.2. Burden of Disease

Disease Frequency

MSDs represent the majority of reported occupational diseases in the Philippines. The most common are back pain (32.8%), neck-shoulder pain (11.4%), carpal tunnel syndrome (5.6%), and shoulder tendinitis (5.0%).¹ WRMSD can result in absenteeism, disability, significant expenses, and in reduced productivity and quality of life.²

Management of the Disease

Addressing WRMSD begins with formulating an evaluation plan and prevention program. Interventions may include engineering controls (e.g., ergonomic workplace redesign), administrative controls (e.g., work schedule and workload adjustment), individual approaches (e.g., exercise and rehabilitation), or a combination of approaches.² The following tools could be used to screen for WRMSD (Table 13).

Table 13. Commonly used tools in screening for work-related musculoskeletal disorders

Screening tool	Description
RSI QuickScan questionnaire ^{3,4}	An internet-based tool designed to predict future arm, shoulder, and neck symptoms in a population of computer workers that considers previous symptoms and risk factors (work posture and movement, job decision latitude, relation with management and colleagues, work pace and load, work environment factors, and furniture). Validated tool used primarily in the Netherlands.
Ergonomic computer workstation evaluation ⁵	Used for computer workers; assesses an individual's position and posture in relation to the seat, keyboard/input device, monitor and other accessories, and general ergonomics

Screening tool	Description
Other risk assessment tools	REBA, ⁶ RULA, ⁷ NERPA

NERPA Novel Ergonomic Postural Assessment; REBA Rapid Entire Body Assessment; RULA Rapid Upper Limb Assessment

4.3.3. Benefits and Harms of Screening

The included studies evaluated the outcomes of screening plus a tailored intervention compared to a control group that may or may not have been screened but did not receive tailored intervention. The equivalence margin was set at a risk ratio (RR) of 0.90–1.10. If the 95% confidence intervals of the effect estimates fall within this range, the effects of the two interventions being compared are similar or equivalent.

None of the included studies reported any instance of harm experienced by participants as a result of screening and ergonomic adjustments.

Questionnaire-based Intervention among Office Workers

One RCT screened all participants using the validated RSI QuickScan questionnaire.⁸ Participants in the intervention group received feedback on their risk profile, advice on risk reduction, and tailored intervention (this may include workstation inspection, eyesight check, occupational health physician consult, and educational program for 2–32 hours). The participants in the usual care group (i.e., control) received general and limited advice regardless of their risk category.

In this study, the difference in occurrence of elbow, forearm, wrist, and hand symptoms was inconclusive (24% vs. 24%; RR 0.92 [95% CI 0.56, 1.44]). However, the prevalence of neck, upper back and shoulder symptoms in the intervention group was similar or lower than the usual care group (31% vs. 38%; RR 0.85 [95% CI 0.65, 1.07]). The median total symptom score was the same in both groups at the end of 6 months follow-up (6.0 from a baseline of 7.0, out of a maximum of 44). Moreover, the intervention resulted in a similar or lower proportion of participants with at least 1 day of sick leave (49.0% vs. 55.1%; RR 0.89 [95% CI 0.78, 1.02]), and at least 7 days of sick leave (20.0% vs. 23.9%; RR 0.84 [95% CI 0.64, 1.10]) compared to usual care. The study did not evaluate quality of life, disability, and mortality as outcomes. The certainty of evidence for these outcomes was low due to lack of blinding, indirectness, and imprecision. The results of this study are summarized in Table 14.

Table 14. Summary of findings: questionnaire-based intervention versus none among office workers (1 RCT, n=741)⁸

Outcomes	RR [95% CI]	Interpretation*	Certainty of Evidence
Elbow, forearm, wrist, and hand symptoms	0.92 [0.56, 1.44]	Inconclusive	Low
Neck, upper back, and shoulder symptoms	0.85 [0.65, 1.07]	As good as or better	Low
At least one day of sick leave	0.89 [0.78, 1.02]	As good as or better	Low
At least seven days of sick leave	0.84 [0.64, 1.10]	As good as or better	Low

RR risk ratio

*An assessment of “as good as or better” or “as good as or worse” may also be interpreted as inconclusive.

Ergonomic Risk Assessment among Workers

Eight studies (seven RCTs, one non-randomized trial) screened participants using ergonomic risk assessment, and implemented workstation adjustments under the guidance of a trained ergonomist.^{9–16} For office workers, workstation modifications included height adjustment of the

table, monitor, and chair; placement of a foot rest; and repositioning of the mouse and keyboard.⁹ For kitchen workers, interventions were made for tasks that were physically strenuous, involved repeated movements, or a risk of sudden overloading.⁹ Among hospital orderlies, participants were observed while performing tasks in their work stations and were given advice for improvement from ergonomists.¹⁰ In five studies, there was education on ergonomics provided to the intervention group.⁹⁻¹³ The control group did not undergo screening and intervention.

Overall population

Ergonomic risk assessment and intervention resulted in fewer complaints of arm pain (19% vs. 40%; RR 0.48 [95% CI 0.30, 0.75]; $I^2=63\%$). There were also similar or fewer complaints of neck pain (12.3% vs. 12.7%; RR 0.97 [95% CI 0.86, 1.10]), wrist-hand pain (25.6% vs. 24.8%; RR 0.94 [95% CI 0.80, 1.10]), and upper back pain (32% vs. 52%; RR 0.62 [95% CI 0.38, 1.00]). Comparisons for other region-specific symptoms were inconclusive. In contrast, the number of participants with sick leave (21.3% vs. 14.1%; RR 1.51 [95% CI: 0.99, 2.31]) was similar or higher than the control. Table 15 summarizes the findings from the on ergonomic risk assessment.

Table 15. Summary of findings: ergonomic risk assessment and intervention versus none among working adults (the overall population)

Outcomes	No. of Studies (No. of Participants)	RR [95% CI]	Interpretation*	Certainty of Evidence
Neck pain	5 RCTs (n=4,179) ⁹⁻¹³	0.97 [0.86, 1.10]	As good as or better	Moderate
Shoulder pain	4 RCTs (n=1,132) ⁹⁻¹²	0.98 [0.83, 1.16]	Inconclusive	Moderate
Arm pain	2 RCTs (n=210) ^{10,11}	0.48 [0.30, 0.75]	Beneficial	Low
Forearm pain	2 RCTs (n=532) ^{9,11}	0.99 [0.83, 1.17]	Inconclusive	Moderate
Wrist-hand pain	4 RCTs (n=1,246) ^{9,12}	0.94 [0.80, 1.10]	As good as or better	Moderate
Lower back pain	3 RCTs(n=3,569) ^{9,10,13}	0.90 [0.69, 1.17]	Inconclusive	Very low
Upper back pain	1 RCT (n=100) ¹⁰	0.62 [0.38, 1.00]	As good as or better	Low
Hip-thigh pain	2 RCTs (n=522) ^{9,10}	1.02 [0.80, 1.30]	Inconclusive	Low
Knee pain	2 RCTs (n=522) ^{9,10}	1.08 [0.87, 1.35]	Inconclusive	Low
Ankle-feet pain	2 RCTs (n=522) ^{9,10}	1.04 [0.82, 1.32]	Inconclusive	Very low
Sick leave	1 RCT (n=422) ⁹	1.51 [0.99, 2.31]	Inconclusive	Low

RCT randomized controlled trial, RR risk ratio

*An assessment of "as good as or better" or "as good as or worse" may also be interpreted as inconclusive

Because of the inherent differences in activities performed by different types of workers, a subgroup analysis based on job type was performed and is discussed below. Table 16 summarizes the results according to job type, while Table 17 presents a summary stratified according to symptom severity for office workers.

Two RCTs on workplace adaptation alone (i.e., without new ergonomic furniture) showed similar or fewer complaints of wrist and hand pain (5.1% vs. 7.5%; RR 0.62 [95% CI 0.36, 1.07]), and inconclusive differences in symptoms in the neck (16.0% vs. 19.5%; RR 0.76 [95% CI 0.47, 1.21]), shoulders (15.3% vs. 17.9%; RR 0.79 [95% CI 0.50, 1.25]), arms (20.0% vs. 27.3%; RR 0.73 [95% CI 0.37, 1.45]), and forearms (18.2% vs. 23.6%; RR 0.77 [95% CI 0.37, 1.60]).^{11,12}

In terms of the severity of symptoms, the intervention group had similar or less intense pain in the hip/thigh (standardized mean difference [SMD] -0.74 [95% CI -1.45, -0.02]), upper back (SMD -0.60 [95% CI -1.30, 0.10]), and neck (SMD -0.56 [95% CI -1.15, 0.04]).^{14,15} The

difference in pain intensity was inconclusive in the shoulder (SMD -0.29 [95%CI -0.88, 0.29]), wrist and hand (SMD -0.37 [95% CI -0.96, 0.21]), elbow (SMD -0.24 [95% CI -0.93, 0.45]), lower back (SMD -0.49 [95% CI -1.18, 0.21]), knee (SMD -0.27 [95% CI -0.96, 0.42]), and foot and ankle (SMD -0.45 [95% CI -1.15, 0.24]). The difference in pain frequency was likewise inconclusive in the neck (SMD -0.75 [95% CI -1.89, 0.39]), shoulder (SMD -0.68 [95% CI -1.82, 0.45]), and wrist and hand (SMD -0.61 [95% CI -1.74, 0.51]).

A controlled before-and-after (i.e., non-randomized) study evaluated work performance as self-reported productivity and the number of days of sick leave.¹⁶ The intervention was ergonomic workstation adjustments with new ergonomic furniture in the workplace. An average of 2.3% improvement in self-reported productivity ($p<0.05$) in the intervention group was observed, but there was no improvement in sick leaves (odds ratio [OR] 1.1; $p>0.05$).¹³

None of the abovementioned studies evaluated quality of life, disability, and mortality as outcomes.

Kitchen staff

There was similar or higher prevalence of pain in the neck (7.2% vs. 6.7%; RR 1.07 [95% CI 0.94, 1.21]) and ankle/feet (3.6% vs. 2.9%, RR 1.22 [95% CI 0.93, 1.62]), and participants with sick leave (21.3% vs. 14.1%; RR 1.51 [95% CI 0.99, 2.31]).¹⁴ The differences in pain symptoms were inconclusive in these areas: shoulder (43.1% vs. 42.2%; RR 1.02 [95% CI 0.82, 1.27]), forearm (55.1% vs. 54.4%; RR 1.01 [95% CI 0.85, 1.21]), wrist/hand (55.1% vs. 54.4%; RR 1.01 [95% CI 0.85, 1.21]), lower back (52.8% vs. 53.9%; RR 0.98 [95% CI 0.82, 1.17]), hip/thigh (23.6% vs. 21.8%; RR 1.08 [95% CI 0.76, 1.54]), and knee (34.7% vs. 34.0%; RR 1.02 [95% CI 0.78, 1.33]).

Hospital orderlies

Ergonomic risk assessment and intervention resulted in fewer complaints of arm (18% vs. 54%; RR 0.33 [95% CI 0.17, 0.64]) and low back pain (38% vs. 72%; RR 0.53 [95% CI 0.36, 0.78]).¹⁵ There were also similar or fewer complaints of upper back as well as ankle/feet pain (32% vs. 52%; RR 0.62 [95% CI 0.38, 1.00]). The differences in pain symptoms were inconclusive in the neck (42% vs. 42%; RR 1.00 [95% CI 0.63, 1.59]), shoulder (60% vs. 50%; RR 1.20 [95% CI 0.84, 1.72]), wrist/hand (36% vs. 38%; RR 0.95 [95% CI 0.57, 1.58]), hip/thigh (62% vs. 66%; RR 0.94 [95% CI 0.70, 1.26]), and knee (54% vs. 42%; RR 1.29 [95% CI 0.85, 1.95]).

Asymptomatic workers

Two studies performed a secondary analysis among participants who were asymptomatic at baseline. The first was a controlled before-and-after study among office workers showing that ergonomic risk assessment and intervention program “did not significantly impact” the development of any pain symptoms compared to no intervention.¹³ The second study was an RCT that evaluated a mixed population of railway, airline, university, hospital, and steel company workers.¹⁶ The physical workload of the participants varied, with 30–40% engaged in moderate to heavy physical work. Among participants initially asymptomatic at baseline, the odds of developing new-onset low back pain were similar or increased with the intervention (OR 1.23 [95% CI 0.97, 1.57]), while the odds of developing neck pain were inconclusive (OR 1.01 [95% CI 0.74, 1.40]).

Table 16. Summary of findings: ergonomic risk assessment versus none among working adults by job type

Outcomes	No. of Studies (No. of Participants)	RR [95% CI]	Interpretation*	Certainty of Evidence
Office workers				
Neck pain	2 RCTs (n=610) ^{11,12}	0.76 [0.47, 1.21]	Inconclusive	Low
Shoulder pain	2 RCTs (n=610) ^{11,12}	0.79 [0.50, 1.25]	Inconclusive	Low
Arm pain	1 RCT (n=110) ¹¹	0.73 [0.37, 1.45]	Inconclusive	Low
Forearm pain	1 RCT (n=110) ¹¹	0.77 [0.37, 1.60]	Inconclusive	Low
Wrist-hand pain	2 RCTs (n=724) ^{11,12}	0.62 [0.36, 1.07]	As good as or better	Low
Kitchen workers				
Neck pain	1 RCT (n=422) ⁹	1.07 [0.94, 1.21]	As good as or worse	Moderate
Shoulder pain	1 RCT (n=422) ⁹	1.02 [0.82, 1.27]	Inconclusive	Low
Forearm pain	1 RCT (n=422) ⁹	1.01 [0.85, 1.21]	Inconclusive	Moderate
Wrist-hand pain	1 RCT (n=422) ⁹	1.01 [0.85, 1.21]	Inconclusive	Moderate
Lower back pain	1 RCT (n=422) ⁹	0.98 [0.82, 1.17]	Inconclusive	Moderate
Hip-thigh pain	1 RCT (n=422) ⁹	1.08 [0.76, 1.54]	Inconclusive	Low
Knee pain	1 RCT (n=422) ⁹	1.02 [0.78, 1.33]	Inconclusive	Low
Ankle-feet pain	1 RCT (n=422) ⁹	1.22 [0.93, 1.62]	As good as or worse	Low
Sick leave	1 RCT (n=422) ⁹	1.51 [0.99, 2.31]	As good as or worse	Low
Hospital orderlies				
Neck pain	1 RCT (n=100) ¹⁰	1.00 [0.63, 1.59]	Inconclusive	Low
Shoulder pain	1 RCT (n=100) ¹⁰	1.20 [0.84, 1.72]	Inconclusive	Low
Arm pain	1 RCT (n=100) ¹⁰	0.33 [0.17, 0.64]	Beneficial	Moderate
Wrist-hand pain	1 RCT (n=100) ¹⁰	0.95 [0.57, 1.58]	Inconclusive	Low
Lower back pain	1 RCT (n=100) ¹⁰	0.53 [0.36, 0.78]	Beneficial	Moderate
Upper back pain	1 RCT (n=100) ¹⁰	0.62 [0.38, 1.00]	As good as or better	Low
Hip-thigh pain	1 RCT (n=100) ¹⁰	0.94 [0.70, 1.26]	Inconclusive	Low
Knee pain	1 RCT (n=100) ¹⁰	1.29 [0.85, 1.95]	Inconclusive	Low
Ankle-feet pain	1 RCT (n=100) ¹⁰	0.62 [0.38, 1.00]	As good as or better	Low

RCT randomized controlled trial, RR risk ratio

*An assessment of "as good as or better" or "as good as or worse" may also be interpreted as inconclusive

Table 17. Summary of findings: ergonomic risk assessment versus none among office workers by severity of symptoms

Outcomes	No. of Studies (No. of Participants)	SMD [95% CI]	Interpretation*	Certainty of Evidence
Frequency				
Neck pain	1 RCT (n=13) ¹⁴	SMD -0.75 [-1.89, 0.39]	Inconclusive	Low
Shoulder pain	1 RCT (n=13) ¹⁴	SMD -0.68 [-1.82, 0.45]	Inconclusive	Low
Wrist-hand pain	1 RCT (n=13) ¹⁴	SMD -0.61 [-1.74, 0.51]	Inconclusive	Low
Intensity				
Neck pain	2 RCTs (n=46) ^{14,15}	SMD -0.56 [-1.15, 0.04]	As good as or better	Low
Shoulder pain	2 RCTs (n=46) ^{14,15}	SMD -0.29 [-0.88, 0.29]	Inconclusive	Low
Wrist-hand pain	2 RCTs (n=46) ^{14,15}	SMD -0.37 [-0.96, 0.21]	Inconclusive	Low
Upper back pain	1 RCT (n=33) ¹⁵	SMD -0.60 [-1.30, 0.10]	As good as or better	Low
Elbow pain	1 RCT (n=33) ¹⁵	SMD -0.24 [-0.93, 0.45]	Inconclusive	Low

Outcomes	No. of Studies (No. of Participants)	SMD [95% CI]	Interpretation*	Certainty of Evidence
Lower back pain	1 RCT (n=33) ¹⁵	SMD -0.49 [-1.18, 0.21]	Inconclusive	Low
Hip-thigh pain	1 RCT (n=33) ¹⁵	SMD -0.74 [-1.45, -0.02]	As good as or better	Low
Knee pain	1 RCT (n=33) ¹⁵	SMD -0.27 [-0.96, 0.42]	Inconclusive	Low
Foot ankle pain	1 RCT (n=33) ¹⁵	SMD -0.45 [-1.15, 0.24]	Inconclusive	Low

RCT randomized controlled trial, SMD standardized mean difference

*An assessment of “as good as or better” or “as good as or worse” may also be interpreted as inconclusive

4.3.4. Prognostic Performance of Screening Tests

RSI QuickScan Questionnaire

A high risk for a particular domain of the RSI QuickScan Questionnaire was defined as a score of $\geq 61\%$.^{3,4} Having a high-risk assessment on four risk factor domains predicted future arm, shoulder, and neck symptoms at 6 months (OR 1.50 [95% CI 1.25, 1.79]), 12 months (OR 1.82 [95%CI 1.47, 2.26]), 18 months (OR 1.75 [95% CI 1.31, 2.33]), and 24 months (OR 2.06 [95% CI 1.31, 3.25]). Having previous symptoms was also predictive of the same outcome at 6 months (OR 6.63 [95% CI 5.61, 7.83]), 12 months (OR 4.49 [95% CI 3.72, 5.41]), 18 months (OR 4.05 [95% CI 3.24, 5.06]), and 24 months (OR 4.71 [95% CI 3.43, 6.48]).

Ergonomic Computer Workstation Evaluation

One example of an ergonomic workstation evaluation is the Occupational Safety and Health Administration (OSHA) Ergonomic Computer Workstation Evaluation Checklist, wherein workers with better compliance to listed recommendations were shown to have fewer musculoskeletal complaints in the neck, shoulders, hands/wrists, and back.⁵

Other Risk Assessment Tools

Using the General Nordic Questionnaire to identify MSD, the REBA, RULA, and NERPA were helpful in predicting the presence of MSDs with correlation values of 0.764, 0.723, and 0.689, respectively ($p<0.05$).¹⁷ Agreement rates between different risk assessment methods vary in literature.¹⁸

4.3.5. Cost Implication

No local economic evaluations on screening for WRMSD or risk assessment have been performed. In an RCT conducted in the Netherlands, a participatory ergonomics program resulted in higher healthcare costs and productivity losses compared to the control group.¹⁹ In the Philippines, employers can reach out to the Occupational Safety and Health Center under the Department of Labor and Employment for “safety and health audits” at no cost to the employer.

4.3.6. Equity, Acceptability, and Feasibility

There were no studies on patient’s values and preferences on screening for WRMSD and its effect on equity. A few studies have successfully performed musculoskeletal risk assessment in various occupations in the Philippines with good compliance among participants.²⁰⁻²² However, there is no published local data on the implementation of recommended interventions or on an observed impact on WRMSD.

In the Integrated Survey on Labor and Employment conducted from 2015–2016 by the Philippine Statistics Authority, 30.8% of respondents reported having an ergonomics

intervention in the workplace. There was no information on the quality and oversight of these interventions. Having a workplace ergonomics intervention was also found to be associated with more reports of musculoskeletal complaints and disorders (OR 1.4 [95% CI 1.20, 1.55])²³; whether detection bias was present or other unrecognized factors were in play is unclear. Access to experts in ergonomic assessment and intervention may be limited in some regions in the country.

4.3.7. Recommendations from Other Groups

Multiple groups in other countries recommended employers to perform risk assessment for WRMSD, and to implement interventions to mitigate the identified risks.^{24,25} Interventions with high certainty of evidence for effectiveness in preventing/reducing musculoskeletal pain include strength training and adjustment of table height, while certainty of evidence for stretching was moderate.²⁴ The groups also provided guidance on how risk assessment should be performed, and sample checklists for office and non-office settings.

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4.4. Screening for physical inactivity

RECOMMENDATIONS

5. Among asymptomatic, apparently healthy adults, we recommend screening for inadequate physical activity using the Physical Activity Vital Sign questionnaire (PAVS) at least annually.
(strong recommendation, very low certainty evidence)
6. Among asymptomatic, apparently healthy adolescents, we suggest screening for inadequate physical activity using either the Global School-based Student Health survey (GSHS) or the Physical Activity Questionnaire for Older Children or Adolescents (PAQ-C) at least annually.
(weak recommendation, very low certainty evidence)
7. Among asymptomatic, apparently healthy children, we suggest against screening for inadequate physical activity due to insufficient evidence.
(weak recommendation, very low certainty evidence)

Justification and Considerations

There is a global initiative to promote adequate physical activity among persons of all ages to prevent and resolve the adverse consequences of inactivity.

- However, among asymptomatic, apparently healthy children <9 years old, there was no evidence of significant net benefit of screening for physical inactivity and there was no validated tool for large-scale screening. By suggesting against screening, the panel gives leeway for practitioners working in high-resource settings to discuss screening for select children with their concerned families and/or schools.
- Among adolescents, the value of screening is well recognized. The World Health Organization (WHO)-endorsed GSHS questionnaire, that assesses other health risk behaviors (substance use, unintentional injuries, violence, risky sexual behaviors) in addition to physical activity, may require consent of their parents or legal guardians due to the sensitive nature of select items in this questionnaire. Seeking parental consent in schools prior to health examinations or procedures is already commonly practiced in schools. The pediatrician in the panel mentioned that consent for questionnaires was no longer obtained during individual consultations since the parents implicitly consent to evaluations done to the child during clinic visits. Both the GSHS and the PAQ-C need to be translated and validated in the local setting, but the English version can be used in schools.
- Despite the very low certainty of evidence, the recommendation for screening among adults is strong because of the increasing disease burden of obesity and the simplicity of the screening tool. Use of the PAVS questionnaire does not entail additional cost, it is easy to use, and can be used even in rural areas. However, PAVS is in English and will need to be translated and validated to be used by Filipinos who are not well versed in English.
- At least annual screening was recommended for adolescents and adults due to the increasing prevalence of obesity. Screening may also serve to remind and encourage individuals (including adults) to become more physically active.
- There are updated recommended interventions for physical inactivity among Filipinos.

4.4.1. Key Findings

- There was no available evidence on the effectiveness and safety of screening for physical inactivity on the clinical outcomes of interest. However, there are data on the clinical outcomes of increased physical activity among asymptomatic apparently healthy children and adults from eight Cochrane systematic reviews (CSR).
- Among overweight/obese children and adolescents, increased physical activity was associated with improved BMI across all ages, and with improved quality of life, mean cognitive and executive function scores (4 CSRs, n=50,758; very low certainty of evidence).
- Among apparently healthy asymptomatic adults, increasing physical activity to recommended levels led to reduced risks for CVDs (2 CSRs, n=3,445,112; low certainty of evidence). Among community-dwelling adults ≥65 years old, exercise reduced the risk of falling (1 systematic review, n=7,818; low certainty of evidence).
- There is weak agreement between the WHO-endorsed GSHS, the PAQ-C and physical activity levels measured through accelerometry among healthy asymptomatic children (13 observational studies, n=2,057; very low certainty of evidence). Among asymptomatic healthy adults in the primary care setting, there is moderate agreement between the PAVS Questionnaire and accelerometry (2 observational studies, n=314; very low certainty of evidence).

4.4.2. Burden of Disease

Physical inactivity is defined as having <150 minutes of moderate activity per week or its equivalent. Studies showed that individuals with physical activity above this threshold had higher levels of health-related fitness and decreased risk of developing disabling medical conditions, based on age-specific prevalence of insufficient physical activity.¹ Insufficient physical activity is the fourth leading risk factor for mortality, leading to approximately 3.2 million deaths and 32.1 million DALYs. The risk of all-cause mortality among people without sufficient physical activity is 20–30% higher compared to those engaging in moderate-intensity physical activity for ≥30 minutes on most days of the week.¹

According to the National Center for Chronic Disease Prevention and Health Promotion, about 1 in 2 adults and 4 in 5 high school students do not get enough aerobic physical activity.² In the U.S., this amounts to approximately USD 117 billion in annual healthcare costs related to low physical activity.² Similarly, according to the 2022 Philippine Report Card on Physical Activity for Children and Adolescents, only 15.4% meet the global physical activity recommendation in the Philippines.³ The overall local prevalence of physical inactivity among adults was 93.4%, ranking second globally in the 2019 WHO report.⁴

Management of the Disease

Several techniques and tools, both subjective and objective, are available to assess physical activity in the context of research in the general population.^{5,6} Subjective or report-based measures include self-report diaries and questionnaires that provide information about physical activity levels and the context of physical activity behaviors. Some of the common physical activity questionnaires for children and adolescents and for adults are summarized in Table 18.⁶⁻⁹

The WHO 2018 Global Action Plan on Physical Activity involving all stakeholders aims for a 15% reduction in physical inactivity by 2030. It developed the Global Physical Activity Questionnaire (GPAQ) for adults and a questionnaire module incorporated into GSHS for children. However, there has been no instrument developed to assess physical activity among children under the age of 10 years.¹⁰ The Philippine Guidelines on Periodic Health Examination (Lifestyle Advice) published in 2021 adapted the WHO Guidelines on Physical Activity and Sedentary Behavior.¹¹

Table 18. Commonly used self-report questionnaires to assess physical activity among children and adolescents and for adults⁶⁻⁹

Questionnaire	Measurement
Children and Adolescents	
PAQ-C/PAQ-A	7-day physical activity levels, including leisure and sports time for children and adolescents aged 9–14 years old
YRBS*	Physical activity during school and leisure time, strength exercises and sports within the past week or year for adolescents aged 10–21 years old
THS*	7-day MVPA for adolescents aged 14–17 years old
GSHS*	Physical activity during school and leisure time, strength exercises and sports within the past week or year for adolescents aged 10–17 years old
Adults	
MAQ	Measures leisure, television and computer use within the past week/habitually
PWMAQ	Measures leisure, television, computer use and disability-related inactivity within the past week and/or year
RPAQ	Measures physical activity during leisure, occupational, transport, and home settings
IPAQ	Measures vigorous physical activity, moderate physical activity, walking and sitting within the past week/habitually
GPAQ	Measures physical activity during work, transport, and leisure time, and time spent in sedentary behavior within the past week
PAVS	Measures moderate to vigorous physical activity within the past week

GPAQ Global Physical Activity Questionnaire; GSHS Global school-based student health survey; IPAQ International Physical Activity Questionnaire; MAQ Modifiable Activity Questionnaire; MVPA moderate-to-vigorous physical activity; PAQ-A/PAQ-C Physical Activity Questionnaire for older children or adolescents; PAVS Physical Activity Vital Sign Questionnaire; PWMAQ Previous Week Modifiable Activity Questionnaire; RPAQ Recent Physical Activity Questionnaire; THS Teen Health Survey; YRBS Youth Risk Behavior Surveillance

*Monitors various types of health-risk behaviors that contribute to the leading causes of death and disability among the youth including unintentional injuries, violence, risky sexual behaviors related to unintended pregnancy and sexually transmitted diseases, substance use (alcohol, cigarettes, recreational drugs), unhealthy diet, and physical inactivity¹⁰

4.4.3. Benefits and Harms of Screening

There were no studies found that focused on the outcomes of interest among healthy, asymptomatic adults and children who were screened for physical inactivity. Indirect studies that determined the effectiveness of exercise or physical activity in improving health outcomes and the validity of tools for assessment of physical activity among the included studies were reviewed (Table 19).

Effects of Increased Physical Activity on Overweight or Obese Children and Young Adults

Children (preschool-aged up to 6 years old)

Among overweight or obese preschool children up to 6 years of age, increased physical activity (defined as activity sets with goals for calories) was compared with no active intervention.¹² Outcomes were measured using BMI Z-score (representing a measure of weight adjusted for height), sex, and age relative to a reference distribution. Based on pooled data from four RCTs (n=202), there was a greater reduction in BMI Z-score in the intervention group at the end of 12–18 months, as shown by a follow-up mean difference (MD) of -0.4 units (95% CI -0.6, -0.2; $p=0.0001$). Health-related quality of life (HRQOL) and self-esteem were measured by the DUX-25, and they were found to be associated with physical activity. Increased physical activity was associated with an increase in the median score of +5 in the intervention group versus -5 in the control group, with higher scores indicating better quality of life. The certainty of evidence was downgraded to low for change in weight due to imprecision (small magnitude of the number of included studies and sample size) and indirectness. The evidence for HRQOL was further downgraded to very low due to imprecision, indirectness, and risk of bias (lack of blinding of the participants and outcome assessors).

Children and Adolescents (6–18 years old)

Among children and young adults aged 6–18 years (n=2,774), increased physical activity (defined as supervised physical activity for at least 3 times per week, at least 60 minutes of moderate-to-vigorous physical activity [MVPA]), together with social support, nutrition education, and behavior modification, resulted in a change in BMI of MD -1.18 kg/m² (95% CI -1.67, -0.69; $p=0.0001$).^{13,14} Using validated self-reported measures, physical activity was associated with an improvement in the reported HRQOL in this age group (n=972) with SMD 0.44 (95% CI 0.09, 0.79; $p=0.01$).¹³ Lastly, physical activity interventions led to improvement in problem-solving and general school achievement.¹⁵ The certainty of evidence was low for change in weight and cognitive function due to follow-up inconsistency and imprecision, respectively, and indirectness for both outcomes. The certainty of evidence for HRQOL was further downgraded to very low due to inconsistency, indirectness, and risk of bias.

Effects of Increased Physical Activity on Apparently Healthy Adults

Peri- and post-menopausal women

Vasomotor symptoms (defined as hot flashes and/or night sweats) were evaluated among peri- and post-menopausal women through self-reporting. Upon comparing exercise versus no active treatment (n=454), the difference between groups in the frequency or intensity of vasomotor symptoms was inconclusive (SMD -0.10 [95% CI -0.33, 0.13]; $p=0.40$).⁹⁵ A systematic review of RCTs and non-RCTs among post-menopausal women also evaluated the effect of exercise on bone mineral density (BMD) of the lumbar spine, femoral neck and total hip, comparing at least one exercise group to sedentary/habitual lifestyle (without exercise).¹⁷ Pooled estimates showed that exercise interventions resulted in a significant improvement in BMD of the lumbar spine (SMD 0.54 [95% CI 0.22, 0.87]), femoral neck (SMD 0.22 [95% CI 0.07, 0.38]), and total hip (SMD 0.48 [95% CI 0.22, 0.75]).¹⁷ The certainty of evidence was downgraded to very low for both vasomotor symptoms and improvement in BMD due to risk of bias (i.e., recruitment, method of determining menopausal status and characteristics of included women varied), indirectness, and imprecision.

Community-dwelling apparently healthy adults (≥ 65 years old)

Long-term effects of increased physical activity on preventing falls through exercise interventions were evaluated among community-dwelling, healthy, asymptomatic older adults

aged ≥65 years old. The overall pooled effect estimates of exercise on rate of falling beyond a 12-month follow-up and of risk of falling were RR 0.79 (95% CI 0.71, 0.88) and RR 0.83 (95% CI 0.76, 0.92), respectively. Fall prevention exercise programs had sustained long-term effects on the number of people falling and the number of falls for up to 2 years after an exercise intervention.¹⁸ Subgroup analysis of peri- and post-menopausal women still favors exercise for rate of falling (RR 0.79 [95% CI 0.67, 0.93]) and risk of falling (RR 0.84 [95% CI 0.70, 0.99]). The certainty of evidence for falls was downgraded to low due to indirectness and risk of bias.

Apparently healthy adults

Two CSRs used a continuous metric (i.e., MET - hours per week) to make comparable results across disease domains.^{19,20} This allowed the estimation of a risk ratio associated with a unit increase in physical activity at any activity level and the exploration of the dose-response relationship between physical activity and cardiovascular or metabolic outcomes. One CSR showed that increasing physical activity from being inactive to achieving the recommended physical activity level (i.e., 150 minutes of moderate-intensity aerobic activity per week) was associated with lower risk of mortality due to CVD (RR 0.77 [95% CI 0.71, 0.84]), CVD incidence (RR 0.83 [95% CI 0.77, 0.89]), and incidence of type 2 diabetes mellitus (T2DM) (RR 0.74 [95% CI 0.72, 0.77]), after adjustment for body weight.¹⁹ The certainty of evidence was downgraded to moderate for CVD incidence and T2DM incidence due to indirectness, while certainty of evidence was further downgraded to low for CVD mortality due to imprecision.

Table 19. Summary of findings: effects of increased physical activity on various clinical outcomes among different subpopulations

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Overweight/Obese Children: Aged <6 years old				
Change in BMI Z score (12–18 mos)	4 RCTs (n=202)	MD -0.38 [-0.58, -0.19]	Improves weight loss	Low
HRQOL* (12 mos)	1 RCT (n=40)	Change in median of total score: +5 in IG vs. -5 in CG Change in median of 1 of 4 domains (physical functioning): +8 in IG vs. -4 in CG*	Improves HRQOL	Very Low
Overweight/Obese Children and Young Adults: Aged 6–18 years old				
Change in weight in BMI (6–24 mos)	28 RCTs (n=2,774)	MD -1.18 [-1.67, -0.69]	Improves weight loss	Low
HRQOL* (6–24 mos)	7 RCTs (n=972)	MD 0.44 [0.09, 0.79]	Improves HRQOL	Very Low
Cognitive function (18 mos)	1 RCT (n=116)	Mean composite executive function score in IG was 5 points higher (0.68–9.32) vs. CG	Improves cognitive function	Low
Peri- and Post- Menopausal Women				
Vasomotor symptoms (3–24 mos)	3 RCTs (n=454)	MD -0.10 [-0.33, 0.13]	Inconclusive	Very Low
BMD (8–24 mos)	17 RCT/non RCTs (n=740)	LS: MD 0.54 [0.22, 0.87] FN: MD 0.22 [0.07, 0.38] TH: MD 0.48 [0.22, 0.75]	Improves BMD	Very Low

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Community dwelling adults ≥65 years old				
Incidence of falls (after 12 mos)	24 studies (RCTs, cohorts; n=7,818)	RR 0.83 [0.76, 0.92]	Beneficial	Low
Healthy, Asymptomatic Adults both young and old				
CVD mortality (M 12.3 yrs.)	14 RCTs (n=39,708)	RR 0.77 [0.71, 0.84]	Beneficial	Low
CVD incidence (M 12.3 yrs)	5 RCTs (n=6,945)	RR 0.83 [0.77, 0.89]	Beneficial	Moderate
T2DM incidence (M 12.3 yrs)	3 RCTs (n=19,417)	RR 0.74 [0.72, 0.77]	Beneficial	Moderate

BMD bone mineral density; BMI body mass index; CG control group; CVD cardiovascular disease; FN femoral neck; HRQOL health-related quality of life; IG intervention group; LS lumbar spine; M mean; MD mean difference; PA physical activity; RCT randomized controlled trial; RR risk ratio; SMD standardized mean difference; T2DM type 2 diabetes mellitus; TH total hip

*Higher scores indicate better quality of life

4.4.4. Diagnostic Performance of Screening Tests

Measuring Physical Activity in Children and Adolescents

Children typically exhibit intense but sporadic bursts of physical activity, and this varies across age, cognition, and ability to sustain attention.²¹ Self-report measures that require habitual monitoring of activities, understanding questions, and accurately recalling activities are difficult to implement among children and may lead to erroneous estimation of physical activity levels. Accelerometer technology allows for a more feasible and accurate measurement of physical activity levels in this population. However, it is time- and cost-intensive and difficult to administer in a large-scale population. Moreover, due to physical constraints, some specific activities (e.g., swimming or bicycle activities) may be difficult to assess.²¹

PAQ-C, YRBS and THS were found to have at least a fair methodological quality, a positive evidence-rating, and a higher level of construct validity. The pooled correlation between PAQ-C and MVPA scores was significant but low ($r=0.34$ [95% CI 0.29, 0.39]; $p<0.001$). This indicates PAQ-C has moderate convergent validity, but it is lower than the acceptable standard ($r>0.5$) when compared with the accelerometer. Thus, no clear picture can be drawn regarding physical activity levels when the PAQ-C was used (Table 20).²² There were no studies found that evaluated the agreement of YRBS and THS questionnaires with physical activity.

The reliability and validity of the WHO-recommended GSHS to measure 24-hour movement behaviors (MVPA; sedentary behavior in the form of recreational screen time; and sleep) among adolescents aged 12–15 years old in comparison to an accelerometer was studied. The study found a weak positive correlation for determining MVPA between GSHS and accelerometer in males ($r=0.18$) and females ($r=0.27$).²³

The certainty of evidence for this outcome was downgraded to very low due to risk of bias, indirectness, and imprecision.

Measuring Physical Activity in Adults

Adults are more likely to demonstrate a consistent and steady physical activity (e.g., walking), while the elderly often have physical restrictions that narrow the scope and type of physical activity.²¹ Pedometers that tend to underestimate step counts at slow activity speeds may not

accurately measure physical activity for the sedentary adult or the elderly age group. Accelerometers that include minute-by-minute online monitoring, capturing intensity levels, and providing accuracy with static and dynamic behaviors are used in larger studies to compute physical activity among adults.²⁴⁻²⁶

The correlations of the questionnaires in Table 18 with accelerometry-determined MVPA are shown in Table 20. In a study published in 2019 among African-American adults, accelerometry was compared to three self-reported questionnaires of physical activity: IPAQ - short version (IPAQ-S), RPAQ, and the Behavioral Risk Factor Surveillance System (BRFSS).²⁷ The Cohen's κ coefficients demonstrated poor agreement among the questionnaires and accelerometer-assessed MVPA per day for classifying persons as having met aerobic physical activity guidelines of ≥ 150 minutes of MVPA per week (IPAQ-S: $\kappa=0.054$ [95% CI -0.038, 0.140]; BRFSS: $\kappa=0.107$ [95% CI 0.027, 0.189], RPAQ: $\kappa=0.136$ [95% CI 0.058, 0.216]). Crosstabs showed that 47.5% of participants were classified the same by both the IPAQ-S and 50.0% for RPAQ compared to accelerometry, showing poor correlation between IPAQ-S and accelerometer-assessed physical activity.

In another study of healthy adults, the WHO-endorsed GPAQ was compared to accelerometer data in measuring and assessing change in physical activity and sedentary behavior. Comparing data from the two instruments showed that the median minutes of MVPA measured by the GPAQ was 30 minutes compared to 56 minutes measured by the accelerometer ($p=0.073$). A moderate level of agreement between the GPAQ and accelerometer data for MVPA was observed for criterion validity ($r=0.484$; $p<0.005$). However, for sedentary behavior, the median minutes of being sedentary was 300 mins/day as measured by the GPAQ and 696 mins/day based on the accelerometer. This difference was significant for the overall group ($p=0.0001$). Hence, GPAQ appears to be more appropriate for assessing the effectiveness of interventions rather than screening for sedentary behavior.²⁸

The PWMAQ assesses historical leisure physical activity, current (past-year and past-week) leisure and occupational physical activity, and physical inactivity levels. Findings suggest that the correlations between the leisure estimate from the PWMAQ and accumulated minutes spent in moderate-lifestyle-intensity physical activity were moderate to weak (adjusted $r=0.25$ and 0.37 for time-matched and averaged accelerometer data, respectively).²⁹

Another study on healthy adults compared two self-report questionnaires (PAVS and the Speedy Nutrition and Physical Activity Assessment [SNAP]) with accelerometer.³⁰ Kappa statistics indicated that the PAVS agreed moderately with identifying if participants met or did not meet physical activity recommendations ($\kappa=0.56$, $p<0.001$), whereas SNAP agreed poorly ($\kappa=0.12$, $p<0.05$). The PAVS strongly identified those who were insufficiently active (i.e., 91% of the time). Because of the particularly high specificity of PAVS with accelerometry, there is a higher chance that those who self-reported <5 days on the first question of the PAVS were, in fact, not sufficiently active.

A study compared the concurrent validity of PAVS with the lengthier MAQ in the primary health care setting to determine whether patients achieved recommended levels of activity.³¹ PAVS agreed strongly with MAQ in identifying patients who were insufficiently active 89.6% of the time. PAVS demonstrated moderate agreement for correctly identifying patients as meeting or not meeting PA guideline recommendations when accounting for agreement occurring by chance ($\kappa=0.55$, $p<0.001$), and it also correlated strongly with MAQ for assessing weekly minutes of activity ($r=0.71$, $p<0.001$).³¹⁻³³ These studies demonstrated good agreement in identifying patients who did not meet physical activity guideline recommendations.

The certainty of evidence for this outcome was downgraded to very low due to risk of bias, indirectness, and imprecision.

Table 20. Agreement of physical activity questionnaires with accelerometry

Screening tool	No. of Studies (No. of Participants)	r [95% CI]	Interpretation	Certainty of Evidence
Children and Adolescents				
PAQ-C	13 OS (n=1,937)	0.34 [0.29, 0.39]	Weak agreement	Very Low
GSHS	1 OS (n=120)	0.18 (males), 0.27 (females) [0.1, 0.3]	Weak agreement	Very Low
Adults				
IPAQ-S	1 OS (n=274)	0.19 [0.05, 0.35]	Weak agreement	Very Low
RPAQ	1 OS (n=274)	0.09 [0, 0.22]	No agreement	Very Low
GPAQ	1 OS (n=101)	0.19	Weak agreement	Very Low
PWMAQ	1 OS (n=64)	0.37	Weak agreement	Very Low
PAVS	1 OS (n=45)	0.52 [0.04, 0.89]	Moderate agreement	Very Low
MAQ*	1 OS (n=269)	0.71	Moderate agreement	Very Low

GSHS Global school-based student health survey; GPAQ Global Physical Activity Questionnaire; IPAQ-S International Physical Activity Questionnaire – Short version; MAQ Modifiable Activity Questionnaire; PAQ-C Physical Activity Questionnaire for older children; PAVS Physical Activity Vital Sign Questionnaire; PWMAQ Previous Week Modifiable Activity Questionnaire; RPAQ Recent Physical Activity Questionnaire

*No studies versus accelerometer; comparison made with PAVS

4.4.5. Cost Implication

A conservative estimate of physical inactivity costs on health-care systems was USD 53.7 billion worldwide in 2013.³⁴ In 2022, the WHO highlighted that the economic burden of physical inactivity was significant and that the cost of treating new cases of preventable NCDs would reach nearly USD 300 billion by 2030 (around a USD 27 billion increase annually).³⁵ These estimates from both high- and low-income countries indicate that up to 3% of health expenditures are related to physical inactivity, with the estimates deemed conservative since mental health and MSDs were excluded.^{34,35}

Accelerometers used to measure MVPA are currently available for personal use from USD 54.95–189.95 (PHP 2,983.00–10,312.00) and can last up to a year before the battery needs to be changed.³⁶ Pedometers and heart rate monitors are often incorporated in smart watches, which are priced from PHP 7,999.00–27,025.00.³⁷ A study published in 2011 that evaluated the cost-effectiveness of physical activity interventions found that the most cost-effective strategies were point-of-decision prompts (e.g., signs to prompt stair use) with a median cost of USD 0.07/MET-hour/day/person, adding only a minimum of 0.2% on the recommended physical activity, as well as school-based physical activity interventions targeting children and adolescents with a median of USD 0.42/MET-hour/day/person, generating an average of 16% of recommended physical activity.³⁸

4.4.6. Equity, Acceptability, and Feasibility

Four in 10 Filipino adults were insufficiently physically active.³⁹ Physical inactivity was more common among females (52.9%), those residing in urban areas (47.0%), and those belonging to the richest wealth quintile (51.9%). Half of adults in Central Luzon (52.2%), CALABARZON (50.7%), and in Davao (50.6%) have low physical activity, while adults in Western Visayas

(25.8%) were the most active. More adults spent less time in leisure-related physical activity (94.8%) compared to travel-related (72.1%) and work-related (65.1%) activities.

A recent study provided an in-depth analysis on the scope and implications of physical activity-related policies in the Philippines.⁴⁰ Aside from physical activity for sports development, there is now greater emphasis on physical activity for health, particularly for the prevention of NCDs, for universal health care, for health promotion and for physical fitness. However, some Filipino youth, such as non-athletes and out-of-school youth, were found to be overlooked. Most of these policies were centered on participation in organized or competitive sports, with only sports-inclined or athletes benefiting from them. Policies specific to children and adolescents are also set in schools or training centers, potentially leaving behind 5.5% of Filipinos aged 5–17 years who are not attending school. There are also no policies for promoting physical activity among children in the early years (younger than 5 years) despite physical activity being crucial for their development. As the rest of the policies are not specific to any population group, it is difficult to determine the extent to which the Filipino may be benefitting from these policies.³⁹ Finally, no policy in the Philippines to date explicitly addresses the physical inactivity behaviors of Filipinos, and there is the need to expand the scope of its policies to include screening and reducing sedentary behavior.

4.4.7. Recommendations from Other Groups

There are no recommendations from other groups regarding screening for physical inactivity. The Philippine Guidelines on Periodic Health Examination,¹¹ WHO guidelines on physical activity and sedentary behavior,¹⁰ the American Heart Association,⁴¹ the Physical Activity Guidelines for Americans,⁴² and the DOH and Philippine National Guidelines on Physical Activity⁴³ have their respective recommendations on physical activity for the healthy, asymptomatic population.

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4.5. Screening for risk of musculoskeletal injuries

RECOMMENDATION

8. Among asymptomatic, apparently healthy children and adults, we suggest against screening for risk of musculoskeletal injuries.
(weak recommendation, very low certainty evidence)

Justification and Considerations

The consensus panel recognized that while there is a need to increase the physical activity of most of the population, it is also important to prevent MSK injuries because they can lead to permanent disability and a huge burden to the individual and to society.

Screening for risk of MSK injuries will facilitate interventions for at-risk individuals. This is already practiced for organized sports, especially during competitions. However, there was insufficient evidence on the benefits and harm of screening for MSKI. The predictive accuracy of screening tests for MSKI among athletes were poor. The suggestion against routine screening leaves room for those involved in organized sports activities to continue their screening activities while we await more robust evidence to justify screening for the general population.

4.5.1. Key Findings

- There are currently no direct evidence or studies evaluating the effectiveness of screening versus no screening for MSKI risk in lowering MSKI or its complications among apparently healthy children and adults. In lieu of this, the evidence for this guideline question was based on observational studies included in 33 systematic reviews that assessed the measurement properties of various movement screening tests or physical performance tests (PPTs) or estimated the degree of association between these PPTs or risk factors and injury.
- The following PPTs were included in this review: Functional Movement Screen (FMS), Star Excursion Balance Test (SEBT), Y-Balance Test (YBT), Landing Error Scoring System (LESS), various lower extremity tests, and Closed Kinetic Chain Upper Extremity Stability Test (CKCUEST). Some tests showed no association at all (hop tests; high certainty), inconclusive/conflicting findings across studies (YBT, LESS, CKCUEST; very low to low certainty), weak association (FMS for male athletes or military; low certainty), or weak to possibly strong association (SEBT for basketball players; moderate certainty). None of these tests were found to be sensitive and specific enough for differentiating high-risk from low-risk individuals using the indicated cut-off scores. Reliability was determined to be high for the specified movement screening tests.
- The following factors have all been linked to an increased risk of MSKI: low knee extension strength and low hip adduction velocity in adult runners; physical maturation status, poor balance scores, knee hypertension, and hip strength ratio in high school athletes; increasing age, and previous injury in male professional football players.
- There has been research towards risk screening algorithms that incorporate movement screening tests with risk variables. In one prospective cohort study, the Move2Perform algorithm, which integrates injury history with FMS and YBT scores, moderately to strongly predicts non-contact injury among collegiate athletes. Another cohort study found that an algorithm composed of smoking history, injury recurrence, pain on FMS, and dorsiflexion asymmetry moderately to strongly predicts MSKI among male elite soldiers, and that these were the four best predictors of MSKI in this group.
- One observational study evaluated the effect of integrated neuromuscular training (INT) for badminton players screened for MSKI risk using FMS (n=38). No injuries were reported for both high- and low-risk groups. Data from trials on preventive injury programs (e.g., multicomponent exercise-based programs, balance training, plyometrics, etc.) show benefit for reducing incidence of MSKIs; however, none of these interventions were specifically applied to individuals who underwent MSKI screening.
- The overall certainty of evidence regarding the desirable and undesirable effects of MSKI screening using PPTs, risk factors, or screening algorithms for apparently healthy Filipino children and adults is very low. Studies are still needed to demonstrate a strong relationship between any screening test and risk of MSKI, especially in the general population. Cut-off values must then be determined to classify individuals as having high or low risk of injury. Finally, the efficacy of the resulting interventions given to screen-positive individuals must be evaluated.

4.5.2. Burden of Disease

Disease Frequency

Epidemiological research on MSKI specific to low- to middle-income countries such as the Philippines is sparse, but best available estimates of overall MSKI incidence range from 779 to 1,574 per 100,000 person-years.¹

The incidence and patterns of MSKI sustained during sports activities vary depending on the specific type of sport and population (e.g., women vs. men, elite vs. non-elite athletes, adolescent vs. adults). In children and adolescent athletes, injury type and body area injury location differ significantly by sport participation level, age group, and level of maturation.² In adults, some sports were associated with higher rates of injury (per 100,000; cycling: 126, basketball: 61, soccer: 23), where 70–90% of cases occurred among men.³ The incidence rates (per 100,000) for the most common MSKI in adults are as follows: ankle sprains (429.4), distal radial fractures (212), finger fractures (117.1), hip fractures (112.9), first-time patellar dislocations (32.8), anterior cruciate ligament (ACL) injury (17.5), and Achilles injury (13.7).⁴ These injuries come with substantial treatment costs and, if left untreated, may lead to chronic pain and disability.

Management of the Disease

Screening for risk of MSKI in children and adolescents is commonly required in many schools prior to participation in organized sports. In adults planning to engage in exercise programs, physical activities, or organized sports activities, clearance from a physician is typically obtained to identify injury risk or presence of disease.⁵ MSKI screening is one part of a bigger pre-participation physical evaluation (PPE), which includes a targeted medical and family history and physical examination, with particular emphasis on cardiovascular and musculoskeletal systems. Despite the widespread use of MSKI risk screening, its efficacy in reducing injuries and improving overall clinical outcomes across different populations remains unclear.⁶ There is also considerable variability in MSKI screening practices among physicians.⁷ Table 21 presents a summary of the physical performance tests (PPTs) used for MSKI risk assessment that were the subject of this evidence review.

Table 21. Commonly used tools in screening for risk of musculoskeletal injuries included in the evidence review

Screening tool	Description
FMS ^{TM8}	A battery of seven movement tasks (deep squat, hurdle step, in-line lunge, shoulder mobility, active straight leg raise, trunk stability push-up, rotary stability test) and three additional clearing tasks (shoulder clearing, extension clearing, flexion clearing). Each movement task is scored on an ordinal scale that ranges from 0–3 (0—with pain; 1—unable to perform movement; 2—performs movement but with compensation; 3—performs movement without compensation). Total scores may range from 0–21. A cut-off score of ≤14 has been proposed as the optimal threshold for injury prediction.
LESS ⁹	Assesses jump-landing biomechanics of a person during a bilateral drop vertical jump task. It intends to identify the risk of non-contact injuries in athletes involved in sports with a lot of jumping and landing (e.g., basketball). The person is instructed to jump forward with both feet and to make contact beyond the target line. A maximum score of 19 can be attained, with lower scores indicating less “errors” or better biomechanics. A cut-off score of <5 errors has been proposed to classify athletes who are at low risk for injury.
SEBT ¹⁰	Measures dynamic balance. It involves a series of single-limb squats, with one-leg maintaining balance and the other leg trying to extend as far as possible in eight different directions (anterior, anteromedial, medial, posteromedial, posterior, posterolateral, lateral, and anterolateral). The maximum distance reached without violations is compared for both limbs. Reductions in individual or composite reach distances as well as asymmetries indicate poor dynamic control and increased injury risk.

Screening tool	Description
YBT-LQ	A simplified version of the SEBT that involves testing three reach directions. It also measures dynamic neuromuscular control and stability but uses a standardized testing kit and protocol to improve reliability and testing speed. An upper quarter YBT has also been developed to assess unilateral upper extremity function in a closed chain position.
CKCUEST ¹¹	One of the existing PPTs for the upper extremity. In this test, the person is asked to perform as many alternating cross-over touches as possible for 15 seconds from a push-up position with hands 36 inches apart. The average number of touches within two to three trials is recorded. Lower touches imply poorer performance and possibly higher injury risk.
Other lower extremity tests	One-leg hop for distance, 6-meter timed hop, and crossover hop

CKCUEST Closed Kinetic Chain Upper Extremity Stability Test; FMS Functional Movement Screen; LESS Landing Error Scoring System; SEBT Star Excursion Balance Test; YBT-LQ Y-Balance Test Lower Quarter

4.5.3. Benefits and Harms of Screening

There was no direct evidence on the benefits and harms of screening versus no screening for MSKI among apparently healthy children and adults. The included studies did not assess the adverse effects associated with the use of MSKI risk screening or risk factor assessment.

Data on a linked intervention such as integrated neuromuscular training (INT) found that of the high-risk (n=22) and low-risk (n=16) athletes identified via FMS, no injuries or overuse syndromes developed within the 8-week study period.¹² Physical fitness parameters, FMS scores, and badminton-related abilities improved significantly in both the high-risk and low-risk groups after INT. The certainty of evidence that INT is effective and safe compared to no treatment among individuals high-risk for MSKI is very low due to limitations of an observational study design (no control group) and indirectness (experienced badminton players only).

Although data from systematic reviews show reduction in incidence of injuries with various preventive exercise programs, none of these interventions were specifically applied to individuals who underwent MSKI screening.¹³⁻²²

4.5.4 Diagnostic Performance of Screening Tests

There was no direct evidence on the diagnostic performance of the PPTs. The evidence used were from observational studies that assessed the measurement properties of various PPTs (predictive accuracy, reliability), or estimated the degree of association between these PPTs or risk factors and injury. The data are summarized under Tables 22 and 23.

Functional Movement Screen

Five systematic reviews showed possible association of FMS scores with MSKI risk in various populations.²³⁻²⁸ A meta-analysis of 20 observational studies (n=7,983) showed a small degree of association with injury (RR 1.51 [95% CI 1.35, 1.69]; I²=47%) among participants with a high-risk classification. Subgroup analysis revealed that FMS had a stronger association with injury in military men (12 studies, n=6,850; RR 1.59 [95% CI 1.39, 1.81]) compared to athletes (9 studies, n=1,132; RR 1.41 [95% CI 1.15, 1.73]).²⁵ Overall, the certainty of evidence for this outcome was downgraded to low because of serious risk of bias and serious inconsistency due to the varying cut-off values and injury definitions.

Pooled data from six observational studies on sporting participants or military showed that FMS scores had low sensitivity (0.24 [95% CI 0.15, 0.36]) but high specificity (0.85 [95% CI 0.77, 0.91]) for predicting future injuries.²⁷ No consistent cut-off FMS score or reference standard definition was specified. In another observational study involving young, physically active people (n=123; mean age 23.5 years; ≥3 days a week of vigorous exercise or ≥7 days of walking with moderate-vigorous exercise) who did not have sport experiences or injury history, an FMS score of 14 showed moderate sensitivity (0.68 [95% CI 0.46, 0.85]) and moderate specificity (0.74 [95% CI 0.65, 0.83]) for 6 months.²⁹ Other systematic reviews (without meta-analysis) investigated the association of FMS scores with injury in other populations. Evidence was conflicting for at-risk active females, with 5 of 10 studies using a cut-off of ≤14 or ≤15, showing small association with injury.²⁴ FMS was not predictive of injury when applied among dancers and soccer players.^{23,26,30} The certainty of evidence for sensitivity is low (inconsistency and high risk of bias), and for specificity is moderate (risk of bias).

A meta-analysis of seven observational studies showed high inter-rater reliability (pooled intraclass correlation [ICC] 0.84 [95% CI 0.64, 0.94]) and high intra-rater reliability (ICC 0.87 [95% CI 0.79, 0.92]).⁸ Reliability ratings were more stable when FMS was rated live compared to video recordings; however, of its seven subtests, three (hurdle step, in-line lunge, rotary stability) showed conflicting reliability data.²⁸ The certainty of evidence for reliability is moderate due to risk of bias.

Landing Error Scoring System

Two observational studies evaluated the association of LESS scores with MSKI: one study was among college/youth athletes (n=92; p=0.32) and another in high school soccer players with contact ACL injury (n=34; p=0.83). The certainty of evidence for this outcome is low and was downgraded due to serious risk of bias, imprecision, and inconsistency.

One prospective cohort study involving youth soccer players (n=829) showed that a LESS score of 5 errors yielded high sensitivity (0.86 [95% CI 0.42, 0.99]) but moderate specificity (0.64 [95% CI 0.62, 0.67]) for predicting non-contact ACL injury.^{9,26,31-33} Although the study had a low risk of bias, the certainty of evidence for high sensitivity was downgraded to moderate due to imprecision from the wide confidence intervals.

LESS showed good to excellent intra-rater (7 studies, n=159; ICC range 0.82–0.99) and interrater (5 studies, n=99; ICC range 0.83–0.92) reliability. Test-retest reliability was also good based on one study (ICC 0.81; no 95% CI reported).³³ The certainty of evidence is high; however, tested populations were limited to healthy military men, athletes, or recreationally active young adults aged 15 to 28 years old.

Star Excursion Balance Test

One high quality study on high school basketball players (n=289) showed strong association between SEBT components and the occurrence of injury in the lower extremity.^{10,31,34} A normalized composite right reach distance of ≤94% on the SEBT predicted lower extremity injury at the end of the season (OR 3.0 [95% CI 1.50, 6.10]).³¹ This effect was more evident in female basketball players (OR 6.5 [95% CI 2.40, 17.5]). An anterior reach distance of >4 centimeters was also predictive of injury (OR 2.70 [95% CI 1.40, 5.30]), especially in boys (OR 3.0 [95% CI 1.10, 7.70]). Certainty of evidence is moderate and was downgraded due to indirectness in the target population (i.e., limited to basketball players only).

Four observational studies provided moderate certainty evidence on the reliability of SEBT.¹⁰ The intraclass correlation for intra-rater and interrater reliability ranged from 0.67–0.96, and

from 0.81–0.93. Consistency of ratings improved when raters and players were trained on testing procedures and were asked to perform four to six practice trials before recording. Test-retest reliability was high (ICC range 0.84–0.92). The certainty of evidence for reliability is high except for intra-rater reliability, which is moderate due to imprecision from wide confidence intervals.

Y-Balance Test Lower Quarter

Six studies (n=557) provided conflicting evidence on the utility of YBT scores for predicting injury. Results could not be summarized in a meta-analysis since the definitions for test positivity and enrolled participants were heterogeneous. Two of these six studies concluded that there was no association between YBT and injury among collegiate athletes engaging in various sports (e.g., volleyball, track, lacrosse, soccer). Four studies noted positive associations. A study among soccer players found that below average scores in each reach direction were associated with injury (OR 3.86 [95% CI 1.46, 10.95]).³⁵ In another study, anterior reach scores were associated with ankle sprain injury in male athletes in various sports (OR 3.64 [95% CI 1.83, 7.23]).³⁶ A third study found that anterior asymmetry of >4 centimeters was associated with non-contact injury (OR 2.33 [95% CI 1.15, 4.76]).³⁷ Finally, a study among football players reported that a composite YBT score of 89.6% was associated with lower extremity injury (OR 3.5 [95% CI 2.4, 5.3]).³⁸ The certainty of evidence for this outcome is low due to inconsistency and risk of bias issues.

Ten observational studies (n=467) showed that the YBT had moderate to excellent reliability.³⁹ Intraclass correlation values ranged from 0.57–0.82 for intra-rater reliability in adolescents and from 0.85–0.91 in adults; 0.81–1.00 for interrater reliability; and 0.63–0.93 for test-retest reliability. Less reliable scores were obtained for adolescents as more balance issues were noted in that population. Certainty of evidence for reliability is moderate due to the inconsistency in estimates in different populations.

Closed Kinetic Chain Upper Extremity Stability Test

One observational study on preseason testing of college football players (n=26) found that, at a cut-off score of <21 touches, CKCUEST showed a sensitivity of 0.79 (95% CI 0.57, 0.91) and a specificity of 0.83 (95% CI 0.44, 0.97) for predicting shoulder injury after the season.⁴⁰ This study had high risk of bias due to the inclusion of previously injured athletes, which might have raised the test's sensitivity. In contrast, another high-quality prospective cohort study involving college student athletes (n=141) found low sensitivity 0.09 and high specificity 0.70 for predicting injury after 9 months using CKCUEST.⁴¹ Overall, the certainty of evidence for this outcome is very low due to serious imprecision (wide confidence intervals), serious risk of bias (selection bias from including previously injured athletes), and inconsistency.

CKCUEST showed good to excellent test-retest reliability (ICC 0.85–0.96 across various types of participants) based on moderate certainty evidence from one study (n=108).¹¹ In this study, three touches were established as the number of touches corresponding to a minimum detectable change in scores.

Other Lower Extremity Tests

There is high certainty of evidence from one cohort study (n=123) that the one-leg hop or vertical hop test is not a significant predictor of lower extremity injury among female soccer players.⁴² Other risk factors were identified as better predictors of injury, such as increased general joint laxity (OR 4.3; $p<0.001$), age >25 years (OR 3.7; $p=0.01$), or high performance in the functional test square-hop (OR 4.3; $p=0.002$).

Based on two systematic reviews, there is limited evidence on the measurement properties of screening tests for lower extremities in athletes.^{34,43} Of the various knee tests, only the following had published data on measurement properties: (a) one-leg hop for distance, (b) 6-meter timed hop, and (c) crossover hop. The one-leg hop distance was the most studied knee test, showing moderate responsiveness for tracking rehabilitation progress in patients after ACL reconstruction, good discriminant validity for differentiating athletes with ankle instability, but unknown reliability. For hip tests, only the medial hop test can be used as it was shown to discriminate between painful and non-painful hip in dancers.

Risk factors and screening algorithms

Subgroup 1: Adult non-elite runners

A systematic review of 100 biomechanical and MSK risk factors for runners found that those who developed injuries significantly differed from those who did not in terms of knee extension strength and hip adduction velocity.⁴⁴ Pooled effect estimates for knee extension strength were expressed as SMDs since the studies varied in how they measured the risk factor (i.e., three studies measured knee extension strength during maximal voluntary isometric contraction, while one study used maximal isokinetic contraction). For hip adduction velocity, both the weighted mean difference (WMD) and the Cohen's *d* effect size were used since the included studies used similar measurement techniques.

Four studies including runners (n=594; 299 injured, 271 female) showed that significantly less knee extension strength was associated with running-related injuries but with a trivial effect size (SMD -0.19 [95% CI -0.36, -0.02]; $I^2=0\%$; $p=0.03$).⁴⁵⁻⁴⁸ Two studies involving runners (n=253; 89 injured, 105 female) showed that a significantly lower hip adduction velocity during the stance phase of running was present in runners who later developed injury (WMD 12.80°/s [95% CI -25.22, -0.38; $p=0.04$]).^{45,49} The corresponding effect size for this WMD was small ($d=0.32$). The certainty of evidence for this outcome was moderate. The included studies lacked control for confounding factors, and missing information regarding how multiple injuries were analyzed increased the risk of bias.

Subgroup 2: High school athletes

A systematic review of nine observational studies identified seven risk factors for lower extremity injury in high school athletes (n=1,558).⁵⁰ Physical maturation status (i.e., age <14, age at peak height velocity) ($p=0.05$) and poor balance scores (OR 3.0 [95% CI 1.5, 6.1]) were predictive of overall injury risk. Knee hyperextension (OR 5.0 [95% CI 1.2, 18.4]) was predictive of ACL injuries. Hip external:internal rotator strength ratio predicted patellofemoral pain syndrome ($p=0.02$), while foot posture index predicted ankle sprain ($r=20.339$; $p=0.008$). Certainty of evidence regarding these risk factors was low; majority (7 out of 9) had either poor or fair methodological quality and samples were heterogeneous.

Subgroup 3: College athletes

The 'Move2Perform' screening algorithm, consisting of the FMS, YBT, previous injury history, and presence of pain on FMS clearing tests, was tested among collegiate athletes playing various sports (n=183).⁵¹ Subjects were considered high risk for non-contact injury if they had (a) previous injury history, (b) YBT composite score <89.6%, (c) YBT asymmetry >4 centimeters in anterior reach direction, (d) FMS composite score <14, (e) FMS asymmetry on any five bilateral FMS tests, and (f) pain during any of the three FMS clearing tests. Athletes classified as high risk were 3.4 times more likely to get injured (95% CI 2.0, 6.0). Certainty of evidence was moderate due to selection bias and narrow definitions for injury.

Subgroup 4: Elite soldiers

A prospective cohort study evaluated the ability of a screening algorithm to predict MSKI after 1 year among elite male U.S rangers 18–45 years old (n=188).⁵² Screening involved a combination of (a) self-report survey on lifestyle and injury history, (b) functional movement tests (FMS, YBT, triple cross-over hop, closed chain dorsiflexion ROM), and (c) Army Physical Fitness Test (sit-ups, push-ups, 2-mile run time). Four variables were identified as significant predictors of comprehensive injuries: smoking history (OR 5.0 [95% CI 1.3, 18.3]), injury recurrence ≥3.5 times (OR 5.5 [95% CI 1.5, 20.1]), dorsiflexion asymmetry ≥6.5° (OR 4.1 [95% CI 1.4, 11.7]), and pain on ≥1 FMS clearing tests (OR 2.3 [95% CI 0.7, 7.2]). Using an equation containing these 4 factors, a total score of ≥47.4 was associated with an injury OR of 4.3 (95% CI 2.0, 9.2).

$$Z = -0.698977 + (2.555436 * \text{current smoker}) + (0.101818 * \text{ankle dorsiflexion: asymmetry}) + (0.514342 * \text{pain provocation: FMS clearing}) + (0.089464 * \text{injury recurrence})$$

Subgroup 5: Male professional football players

Based on a 2017 systematic review on risk factors for male professional football players (n=5,496) aged 16–40 years old, very low certainty evidence suggested that only non-modifiable factors of age (OR range 1.40–1.78; per 1-year increase) and previous injury (OR range 0.15–11.60) were associated with hamstring injury. Medical screening tests were not predictive of injury.⁵³

Table 22. Summary of findings: predictive accuracy and reliability of movement screening tests

Screening test	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Association with MSKI^a				
FMS	20 OS (n=7,983)	RR 1.51 [1.34, 1.69]	Weak	Low
LESS	2 OS (n=126)	Mean LESS scores: injured vs. uninjured soccer players (5.8 vs. 5.5; p=0.83) and college/high school athletes (5.0 vs. 5.5; p=0.32)	No association	Very Low
SEBT	1 OS (n=289)	OR 3.0 [1.50, 6.10]	Weak to strong ^a	Moderate
YBT	6 OS (n=557)	Cannot be pooled due to heterogeneity: (a) Below average scores in each reach direction (OR 3.86 [1.46, 10.95]) in soccer players; (b) Anterior reach scores and ankle sprain injury in male athletes in various sports (OR 3.64 [1.83, 7.23]); (c) Anterior asymmetry >4cm and non-contact injury (OR 2.33 [1.15, 4.76]); (d) Composite YBT score of 89.6% and LE injury in football players (OR 3.5 [2.4, 5.3])	Inconclusive ^a	Low
Hop test	1 OS (n=123)	No association between one-leg hop or vertical hop test for predicting lower extremity injury in female soccer players	No association	High
Sensitivity and specificity of tests in predicting MSKI				
FMS	7 OS (n=1,852) Athlete: n=1729 Non-sport: n=123	Athlete: Sn 0.24 [0.15, 0.36] Non-sport: Sn 0.68 [0.45, 0.85]	Low to moderate	Low
		Athlete: Sp 0.85 [0.77, 0.91] Non-sport: Sp 0.74 [0.65, 0.83]	Moderate to high	Moderate
LESS	1 OS (n=829)	Sn 0.86 [0.42, 0.99]	Low to high	Low

Screening test	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
		Sp 0.64 [0.62, 0.67]	Moderate	High
CKCUEST	2 OS (n=167)	Sn range 0.09–0.79	Low to moderate	Very Low
		Sp range 0.70–0.83	Moderate to high	Low
Reliability^b				
FMS	7 OS (n=186)	Intra-rater ICC 0.87 [0.79, 0.92]	Good to excellent	Moderate
		Inter-rater ICC 0.84 [0.64, 0.94]	Moderate to excellent	Moderate
LESS	7 OS (n=159)	Intra-rater ICC range 0.82–0.99	Good to excellent	High
	5 OS (n=99)	Inter-rater ICC range 0.83–0.92	Good to excellent	High
	1 OS (n=13)	Test-retest reliability ICC 0.81	Good	High
SEBT	3 OS (n=50)	Intra-rater ICC range 0.67–0.96	High	High
		Inter-rater ICC range 0.81–0.93	High	High
	1 OS (n=22)	Test-retest ICC 0.84–0.92	High	High
YBT	10 OS (n=467)	Intra-rater ICC (adolescents) 0.57–0.82, (adults) 0.85–0.91	Moderate to good Good to excellent	Moderate
		Inter-rater ICC range 0.81–1.00	Good to excellent	High
		Test-retest ICC range 0.63–0.93	Moderate to excellent	High
CKCUEST	1 OS (n=108)	Test-retest ICC 0.83 to 0.96	Good to excellent	High

CI confidence interval; CKCUEST Closed Kinetic Chain Upper Extremity Stability Test; FMS Functional Movement Screen; ICC intraclass correlation coefficient; LESS Landing Error Scoring System; OR odds ratio; OS observational study; RR risk ratio, SEBT Star Excursion Balance Test; Sn sensitivity; Sp specificity; YBT Y-Balance Test

^aMagnitude of association or effect: OR <1.5 weak, OR 1.6–5.0 moderate, OR >5 strong⁵⁴

^bICC for reliability estimates: ICC <0.5 poor, ICC 0.5–0.75 moderate, ICC 0.75–0.9 good, ICC >0.90 excellent⁵⁵

Table 23. Summary of findings: association of risk factors or screening algorithms and musculoskeletal injuries according to population and type or site of injury

Risk factor	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation ^{a,b}	Certainty of Evidence
Adult non-elite runners (Running-related or lower extremity injuries)				
Low knee extension strength	4 OS (n=594)	SMD -0.19 [-0.36, -0.02]	Weak	Moderate
Low hip adduction velocity	2 OS (n=253)	Cohen's $d=0.32$ WMD -12.80 [-25.22, -0.38]	Weak	Moderate
High school athletes (Lower extremity)				
Physical maturation status (age <14, age at peak height velocity)	7 OS (n=159)	No ORs reported; $p=0.05$	Weak to strong	Moderate
Poor balance scores		OR 3.0 [1.5, 6.1]		
Knee hyperextension		OR 5.0 [1.2, 18.4]		
Hip external/internal rotator strength ratio		No ORs reported; $p=0.02$		
College athletes (Overall)				
High risk on Move2Perform Screening Algorithm (injury history + FMS + YBT) ^c	1 OS (n=183)	OR 3.40 [2.0, 6.0]	Moderate to strong	Moderate
Elite soldiers (Overall)				
Smoking history	1 OS (n=188)	OR 5.0 [1.3, 18.3]		Moderate

Risk factor	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation ^{a,b}	Certainty of Evidence
Injury recurrence ≥3.5 times		OR 5.5 [1.5, 20.1]	Moderate to strong	
Dorsiflexion asymmetry ≥6.5°		OR 4.1 [1.4, 11.7]		
Pain on ≥1 FMS clearing tests		OR 2.3 [0.7, 7.2]		
Score of ≥47.4 in a prediction model containing these 4 variables		OR 4.3 [2.0, 9.2]		
Male professional football players (Hamstring)				
Increasing age (per 1 yr)	9 OS (n=5,496)	OR range 1.40–1.78	Weak to moderate	Very low
Previous injury		OR range 0.15–11.60	Weak to strong	

CI confidence interval; FMS Functional Movement Screen; OR odds ratio; OS observational study; SMD standard mean difference; WMD weighted mean difference; YBT Y-Balance Test

^aMagnitude of standardized effects (SMD or Cohen's *d* effect sizes): <0.20 trivial; 0.20–0.59 small; 0.60–1.19 moderate; >1.20 large⁴⁴

^bMagnitude of association or effect: OR <1.5 weak, OR 1.6–5.0 moderate, OR >5 strong⁵⁴

^cSubjects were considered 'high risk' for non-contact injury if they had (a) previous injury history, (b) YBT composite score < 89.6%, (c) YBT asymmetry > 4cm in anterior reach direction, (d) FMS composite score < 14, (e) FMS asymmetry on any 5 bilateral FMS tests, and (f) pain during any of the 3 FMS clearing test

4.5.5. Cost Implication

There are no published studies on the resources required and cost-effectiveness of MSKI screening. Although most of these tests require minimal to no equipment, some tests (e.g., FMS™) may come at a substantial cost (cost of testing kits, cost of required training for test administrators). The current cost of the FMS™ Test Kit is USD 219.95 (PHP ~12,000.00) while the YBT Kit is priced much higher at USD 269.95 (PHP ~14,700.00).⁵⁶

4.5.6. Equity, Acceptability, and Feasibility

Very few studies investigated the acceptability, feasibility, equity implications, or patient's values towards MSKI screening tests. FMS was feasible to perform in a variety of populations, including among adults with intellectual disability, military recruits, and older active adults.^{57–59} Another study showed that YBT was feasible to administer among first to fifth grade children.⁶⁰

4.5.7. Recommendations from Other Groups

The American College of Sports Medicine and at least five other medical associations in the United States published consensus statements regarding PPEs.⁶¹ Four functional movement tests were included as part of the musculoskeletal examination component: (a) double-leg squat test, (b) single-leg squat test, (c) box drop, and (d) step drop test. However, no clear basis can be found to support the choice of these tests. The guidance further states that the PPE should be ideally conducted in the medical home by the athlete's primary care provider (i.e., MD, DO, nurse practitioner, or trained physician assistant) 6 weeks before the first preseason practice.

The 2021 Philippine Guidelines on Periodic Health Examination (PHEx) – Lifestyle Advice⁶² has recently issued recommendations supporting an increase in physical activity among individuals of all ages. The recommendations were adapted from the WHO Guidelines on

Physical Activity and Sedentary Behavior 2020, which covers both pediatric and adult populations. All recommendations were *strong* recommendations based on moderate certainty of evidence:

- Vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone, should be incorporated at least 3 days a week.
- Adults should replace sedentary time with physical activity of any intensity.
- Adults should aim to do more than the recommended levels of moderate-to-vigorous intensity physical activity to help reduce detrimental effects of high levels of sedentary behavior on health.
- Adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate-and vigorous-intensity activity throughout the week for substantial health benefits.

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4.6. Screening for low vitamin D

RECOMMENDATIONS

9. Among asymptomatic, apparently healthy infants, children, and adults, we recommend against screening for low vitamin D.
(strong recommendation, very low certainty evidence)

Justification and Considerations

The consensus panel considered the following when formulating this recommendation:

- Despite the very low certainty of evidence, a strong recommendation against screening was made due to the high cost of the screening test and the demonstrated potential harms and absence of clear benefit of vitamin D supplementation among deficient individuals.
- There was no data presented on standardization of vitamin D testing in the Philippines. The availability, accessibility and usefulness of the screening test is unknown.
- Programs that improve nutrition and education, directed to individuals with low socioeconomic status who are at higher risk of vitamin D deficiency, may be more worthwhile than doing costly screening.

4.6.1. Key Findings

- There was no direct evidence supporting screening for low vitamin D levels among asymptomatic apparently healthy children and adults. The reviewers sought indirect evidence on the efficacy and safety of linked treatments, which were obtained from 39 RCTs on vitamin D supplementation among asymptomatic apparently healthy children and adults with low vitamin D (N=18,748).
- Among infants aged 0–11 months with low vitamin D, those who received vitamin D supplementation appeared to have lower weight and higher events of pneumonia when compared to controls. The effect estimates for all-cause mortality and height were inconclusive.
- Among children aged 2–16 years with low vitamin D, the effect of vitamin D supplementation on height, weight, BMI, and occurrence of hypercalciuria events was inconclusive.
- Among adults aged ≥18 years with low vitamin D, the effect of vitamin D supplementation on falls, fractures, all-cause mortality, and serious events was inconclusive, while the effect on adverse events was similar or lower when compared to controls.
- Among older adults aged ≥50 years with low vitamin D, vitamin D supplementation appeared to reduce the number of fall events but increase the number of fracture events when compared to controls. Evidence for all-cause mortality and hypercalcemia was inconclusive.
- The overall certainty of evidence across all outcomes was very low due to serious risk of bias, indirectness, inconsistency, and imprecision.

4.6.2. Burden of Disease

Disease Frequency

Vitamin D (or calciferol) is an essential nutrient for normal bone development and maintenance.^{1,2} Low levels of vitamin D can lead to various health problems, including rickets in children, as well as osteoporosis and increased risk for falls and fractures in adults.² Vitamin D deficiency is conventionally defined as having serum 25-hydroxyvitamin(OH)D concentrations below 30 ng/mL (or 75 nmol/L).¹ Decreased dietary intake and decreased sun exposure are some of the most common causes of vitamin D deficiency.² Populations at risk for vitamin D deficiency include breastfed infants, older adults, people with limited sun exposure, people with dark skin, people with fat malabsorption, and people who are obese.³

Vitamin D deficiency is prevalent in both developed and developing countries with an estimated global prevalence of up to one billion cases.^{2,3} In the Philippines, the 2013 National Nutrition Survey (NNS) reported a high prevalence of low vitamin D among adults: 54% (n=755) in the National Capital Region, 44% (n=260) in Cebu, and 29% (n=170) in Davao.⁴ The succeeding NNS in 2018 reported that the overall prevalence of low vitamin D among Filipino children aged 6–12 years was 60.6% (n=478), with the National Capital Region having the highest proportion of low vitamin D (88%, n=117) compared to other areas.⁵ A study in 2012 among high school students (aged 11–18 years) in Quezon City determined that 21% (n=20) of participants had vitamin D insufficiency, while another 21% (n=20) had vitamin D

deficiency.⁶ In a recent study among infants aged 6 months and below in Quezon City, 10% (n=13) of infants had vitamin D insufficiency while 77% (n=101) had vitamin D deficiency.⁷

Management of the Disease

Vitamin D deficiency is treated using vitamin D2 or D3 supplementation.⁸ Vitamin fortification of dairy products, edible oils, and flour is also considered a form of intervention.¹

4.6.3. Benefits and Harms of Screening

There were no studies found that directly addressed the effects of screening for low vitamin D levels on the clinical outcomes of interest. The included studies reported the effects of vitamin D supplementation among asymptomatic healthy infants, children, and adults, most of whom were vitamin D deficient (Table 24).

Infants with Low Vitamin D (Aged 0–11 Months)

Among healthy term-born breastfed infants aged 0–11 months with low vitamin D who received vitamin D2 supplementation (400 IU/day) versus placebo, the mean differences in height (MD -0.50 cm [95% CI: -1.80, 0.80]) and weight (MD -0.18 kg [95% CI: -0.77, 0.41]) were inconclusive.⁹ The certainty of evidence was very low due to serious risk of bias, indirectness, and imprecision.

The risk ratio for all-cause mortality among vitamin D-deficient infants who received high-dose (100,000 IU every 3 months) vitamin D3 supplementation compared to placebo was inconclusive (RR 1.43 [95% CI: 0.54, 3.74]).¹⁰ The certainty of evidence was low due to serious indirectness and imprecision.

The findings were inconclusive for the mean difference in height (MD 0.10 cm [95% CI: -0.61, 0.81]) of infants who received high-dose (50,000 IU single dose) versus low-dose (400 IU/day) vitamin D3 supplementation.¹¹ The weight of infants who received high-dose vitamin D3 was significantly lower than those who received low dose (MD -0.43 kg [95% CI: -0.82, -0.04]), suggesting harm. The certainty of evidence was low due to serious indirectness and imprecision.

The risk for developing pneumonia as confirmed by chest X-ray among infants with low vitamin D suggests that high-dose vitamin D3 supplementation (100,000 IU every 3 months) may be as good as or worse than placebo (RR 1.06 [95% CI: 0.90, 1.24]).¹⁰ The certainty of evidence was moderate and was downgraded due to indirectness.

Children with Low Vitamin D (Aged 2–16 Years)

This population of vitamin D-deficient children were given supplementation either as an 800 IU pill or as 300 IU-fortified food or milk, which were then compared with no supplementation. The pooled mean differences in height (MD 1.24 cm [95% CI -0.80, 3.29]), in weight (MD -0.01 kg [95% CI -2.97, 2.95]), and in BMI (MD -0.18 kg/m² [95% CI -1.04, 0.69]) for this group were inconclusive.¹² The certainty of evidence was low due to serious indirectness and imprecision.

The relative risk for developing hypercalciuria among vitamin D-deficient children receiving high-dose (\geq 1,000 IU/day) compared to low-dose (600 IU/day) vitamin D3 supplementation was RR 2.59 (95% CI 0.12, 53.88).¹³ The results were inconclusive and had very low certainty due to very serious imprecision (low event rates).

Adults with Low Vitamin D (Aged ≥ 18 Years)

When comparing vitamin D supplementation (≥ 400 IU/day) to placebo, the risk ratios for all-cause mortality (RR 0.14 [95% CI 0.02, 1.22]), for fractures after 1 year (RR 1.09 [95% CI 0.19, 6.17]), and for fractures after 3 years (RR 0.96 [95% CI 0.61, 1.51]) were inconclusive for adults with low vitamin D.¹⁴ The certainty of evidence for all-cause mortality and for fractures after 1 year was low due to serious indirectness and imprecision resulting from low event rates. Moderate certainty evidence suggests that vitamin D supplementation may be as good as or worse than placebo in preventing falls among adults after 3 years (RR 1.06 [95% CI 0.94, 1.18]).¹⁵

The relative risk for developing serious adverse events among vitamin D-deficient adults suggests that vitamin D supplementation (≥ 400 IU/day) may be as good as or worse than placebo (RR 1.36 [95% CI 0.87, 2.14]).¹⁴ Serious adverse events included hospitalization, pneumonia, and congestive heart failure. Four of nine RCTs reported no serious adverse events in either group. In contrast, the risk ratio for adverse events suggests that vitamin D may be as good as or better than placebo among adults with low vitamin D (RR 0.68 [95% CI 0.46, 1.00]). Common adverse events included abdominal discomfort, nausea, and headache. Five of 10 RCTs reported no adverse events in either group. The certainty of evidence for both safety outcomes was low due to serious indirectness and imprecision.

Older Adults with Low Vitamin D (Aged ≥ 50 years)

The risk for fractures between 3–12 months of vitamin D supplementation (≥ 200 IU/day) compared to placebo/no treatment was inconclusive (RR 0.27 [95% CI 0.07, 1.11]) for older adults with low vitamin D.¹⁶ For longer follow-up periods of 2–5 years, vitamin D may be as good as or worse than placebo/no treatment in preventing falls in this population group (RR 1.12 [95% CI 0.99, 1.26]). The certainty of evidence ranged from low to moderate and was downgraded due to serious indirectness and imprecision. The risk for falls between 5–9 months suggests that vitamin D may be as good as or better than placebo/no treatment for older adults (RR 0.86 [95% CI: 0.63, 1.17]).¹⁷ Based on one RCT with low certainty evidence, vitamin D supplementation may be beneficial in preventing falls after 2 years among older adults (RR 0.33 [95% CI: 0.19, 0.58]).

One RCT compared high-dose ($\geq 1,000$ IU/day) versus low-dose (200 IU/day) vitamin D3 supplementation among older adults with low vitamin D.¹⁵ The risk for all-cause mortality among older adults receiving a high dose compared to a low dose was inconclusive (RR 0.87 [95% CI 0.36, 2.1]). The proportion of older adults who had at least one fracture in the high-dose group (11%) was significantly higher than that of the low-dose group (6%), suggesting no benefit with supplementation (RR 1.80 [95% CI 1.07, 3.03]). The certainty of evidence for these two outcomes was low due to serious indirectness and imprecision. The risk ratio for falls was comparable in the two groups based on moderate certainty evidence (RR 1.00 [95% CI: 0.89, 1.13]).

Among older adults with low vitamin D, the relative risk for developing hypercalcemia after receiving high-dose ($\geq 1,000$ IU/day) compared to low-dose (200 IU/day) vitamin D supplementation was RR 2.91 (95% CI 0.12, 71.29).¹⁵ The effect estimates were inconclusive and had very low certainty due to very serious imprecision and serious indirectness.

Table 24. Summary of findings: vitamin D supplementation among asymptomatic children and adults with low vitamin D

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence	
Asymptomatic Infants with Low Vitamin D (aged 0–11 months)					
Vitamin D2 (400 IU/day) versus placebo					
Height (cm) (6 mos)	1 RCT (n=46) ⁹	MD -0.50 [-1.80, 0.80]	Inconclusive	Very low	
Weight (kg) (6 mos)		MD -0.18 [-0.77, 0.41]	Inconclusive	Very low	
High-dose vitamin D3 (100,000 IU every 3 months) versus placebo					
All-cause mortality (18 mos)	1 RCT (n=3,046) ¹⁰	RR 1.43 [0.54, 3.74]	Inconclusive	Low	
Pneumonia (18 mos)		RR 1.06 [0.90, 1.24]	As good as or worse	Moderate	
High-dose vitamin D3 (50,000 IU single dose) versus low-dose vitamin D3 (400 IU/day)					
Height (cm) (24 mos)	1 RCT (n=70) ¹¹	MD 0.10 [-0.61, 0.81]	Inconclusive	Low	
Weight (kg) (24 mos)		MD -0.43 [-0.82, -0.04]	Harmful	Low	
Asymptomatic Children with Low Vitamin D (aged 2–16 years)					
Vitamin D3 (800 IU/day) versus placebo					
Height (cm) (2–6 mos)	2 RCTs (n=348) ¹²	MD 1.24 [-0.80, 3.29]	Inconclusive	Low	
Weight (kg) (2–6 mos)		MD -0.01 [-2.97, 2.95]	Inconclusive	Low	
BMI (kg/m ²) (2–6 mos)		MD -0.18 [-1.04, 0.69]	Inconclusive	Low	
High-dose vitamin D3 (≥1,000 IU/day) versus low-dose vitamin D3 (600 IU/day)					
Hypercalciuria (6 mos)	1 RCT (n=1,008) ¹³	RR 2.59 [0.12, 53.88]	Inconclusive	Very low	
Asymptomatic Adults with Low Vitamin D (aged ≥18 years)					
Vitamin D (≥400 IU/day) versus placebo					
All-cause mortality (6–12 mos)	3 RCTs (n=629) ¹⁴	RR 0.14 [0.02, 1.22]	Inconclusive	Low	
Fractures (3–12 mos)	3 RCTs (n=537) ¹⁴	RR 1.09 [0.19, 6.17]	Inconclusive	Very low	
Fractures (3 yrs)	1 RCT (n=1,270) ¹⁴	RR 0.96 [0.61, 1.51]	Inconclusive	Low	
Falls (1 yr)	2 RCTs (n=405) ¹⁴	RR 1.17 [0.76, 1.79]	Inconclusive	Low	
Falls (3 yrs)	1 RCT (n=1,256) ¹⁴	RR 1.06 [0.94, 1.18]	Inconclusive	Moderate	
SAEs (2–12 mos)	9 RCTs (n=2,147) ¹⁴	RR 1.36 [0.87, 2.14]	Inconclusive	Low	
AEs (2–12 mos)	10 RCTs (n=1,203) ¹⁴	RR 0.68 [0.46, 1.00]	As good as or better	Low	
Asymptomatic Older Adults with Low Vitamin D (aged ≥50 years)					
Vitamin D (≥200 IU/day) versus placebo or no treatment					
Fractures (3–12 mos)	3 RCTs (n=289) ¹⁶	RR 0.27 [0.07, 1.11]	Inconclusive	Low	
Fractures (2–5 yrs)	3 RCTs (n=7,511) ¹⁶	RR 1.12 [0.99, 1.26]	As good as or worse	Moderate	
Falls (5–9 mos)	6 RCTs (n=1,039) ¹⁷	RR 0.86 [0.63, 1.17]	Inconclusive	Very low	
Falls (2 yrs)	1 RCT (n=96) ¹⁷	RR 0.33 [0.19, 0.58]	Beneficial	Low	
High-dose vitamin D3 (≥1,000 IU/day) versus low-dose vitamin D3 (200 IU/day)					
All-cause mortality (2 yrs)	1 RCT (n=688) ¹⁵	RR 0.87 [0.36, 2.12]	Inconclusive	Low	
Fractures (2 yrs)		RR 1.80 [1.07, 3.03]	Favors low-dose	Low	

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
			vitamin D3	
Falls (2 yrs)		RR 1.00 [0.89, 1.13]	Inconclusive	Moderate
Hypercalcemia (2 yrs)		RR 2.91 [0.12, 71.29]	Inconclusive	Very low

AE adverse event; BMI body mass index; CI confidence interval; MD mean difference; RCT randomized controlled trial; RR risk ratio; SAE serious adverse event

4.6.4. Diagnostic Performance of Screening Tests

Prediction Models for Risk of Vitamin D Deficiency

Clinical prediction rules are used to identify adults at risk for vitamin D deficiency. In 2014, two prediction models were developed for determining serum 25(OH)D concentrations of <50 nmol/L (insufficiency) and <30 nmol/L (deficiency) among older European adults.¹⁸ The first model, with a cutoff score of 58 (range of total risk score: 8–97), predicted <50 nmol/L concentrations with 61% sensitivity and 82% specificity. This model (<50 nmol/L) consisted of 13 predictors: older age, sex (female), BMI (>30), smoking, alcohol consumption (<13 drinks/week), season, no vitamin supplement use, no bicycling, no sporting, no gardening, medication use, poor appetite, and without a partner. The second model had a cutoff score of 110 (range of total risk score: 6–204), and it predicted <30 nmol/L concentrations with 61% sensitivity and 84% specificity. This model (<30 nmol/L) included 10 predictors: older age, smoking, alcohol consumption (<13 drinks/week), season, no vitamin supplement use, no bicycling, no gardening, medication use, limitations in the use of own or public transportation, and the inability to remember the present year. It should be noted that only the first model underwent external validation among the older Dutch population. The predictive ability of the two models among Filipinos with low vitamin D has not yet been established.

4.6.5. Cost Implication

The annual costs of vitamin D screening and supplementation range from PHP 1,600.00–3,460.00 (Table 25). No local economic evaluation studies on vitamin D screening and supplementation were found.

Table 25. Costs of tests and treatments associated with vitamin D deficiency^{19,20}

Procedures/Medications	Unit Cost	Annual Cost
Serum vitamin D test	PHP 1,600.00	PHP 1,600.00
Vitamin D3 (400 IU), 100 soft gels	4 x PHP 440.00	PHP 1,760.00
Vitamin D3 (1,000 IU), 100 tablets	4 x PHP 595.00	PHP 2,380.00
Vitamin D3 (2,000 IU), 90 tablets	4 x PHP 645.00	PHP 2,580.00
Vitamin D3 (5,000 IU), 90 tablets	4 x PHP 865.00	PHP 3,460.00

A cost-effectiveness study compared vitamin D screening with universal supplementation for preventing falls among community-dwelling older American adults.²¹ Both population screening and universal supplementation were cost-effective strategies in preventing falls among women (net monetary benefit [NMB]: USD 59.00 vs. USD 71.00, respectively) and men (NMB: USD 114.00 vs. USD 120.00, respectively) aged 65 years. Among those aged 80 years, population screening was more cost effective than universal supplementation in women

(NMB: USD 563.00 vs. USD 428.00, respectively) and men (NMB: USD 703.00 vs. USD 571.00, respectively).

Two econometric evaluation studies in Europe reported that vitamin D supplementation was cost-effective in reducing mortality among older adults.^{22,23} Results from economic evaluation studies in developed countries suggest that vitamin D screening and supplementation may be cost-effective in preventing falls and reducing mortality among older adults.

4.6.6. Equity, Acceptability, and Feasibility

The reviewers did not find any study on patients' values and preferences, or on equity, acceptability, and feasibility of vitamin D screening. One prospective cohort study measured the association between 25(OH)D serum concentrations and HRQOL of Filipino adults (aged 18–59 years) with low vitamin D levels (<30 ng/mL) and were prescribed with vitamin D supplementation for 8 weeks.²⁴ The study found that the HRQOL scores of participants after supplementation (median: 75; interquartile range [IQR]: 8.5) were significantly higher than their baseline scores (median: 35; IQR: 10).

4.6.7. Recommendations from Other Groups

The USPSTF concluded that there was insufficient evidence to recommend for or against vitamin D screening among asymptomatic adults.²⁵ They also stated that no society or group recommended population-based screening for vitamin D deficiency. The American Society for Clinical Pathology recommended against population-based vitamin D screening.²⁶ The Endocrine Society recommended screening in individuals who are at risk for vitamin D deficiency, but recommended against screening in individuals who are not at risk.⁸

Among Filipino children, vitamin D supplementation is currently not included in the Micronutrient Supplementation Program of the DOH, which focuses on Vitamin A, iron, and iodine.²⁷ For pregnant adolescents and adult women, the DOH recommends including 200 mg of vitamin D in their multiple micronutrient supplements.²⁸

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4.7. Screening for risk of falls

RECOMMENDATIONS

10. Among asymptomatic, apparently healthy older adults ≥ 60 years old, we recommend screening for fall risks.
(strong recommendation, low certainty evidence)
11. Among asymptomatic, apparently healthy adults < 60 years old, we suggest against screening for fall risks due to insufficient evidence.
(weak recommendation, low certainty evidence)

Justification and Considerations

The consensus panel considered the following when formulating this recommendation:

- Screening for the predisposition to fall serves as a preventive strategy for falls.
- The recommendation to screen for fall risk among adults ≥ 60 years was strong because of direct evidence on the significant benefits and minimal harms with screening. Even if the certainty of evidence is low, there is no significant additional cost involved with screening, and the screening tests are simple and relatively easy to do. Moreover, the interventions for individuals detected to have a high risk of falling (exercises, activity modification) are not harmful, are feasible and already part of the usual health interventions for the elderly. On the other hand, the downstream effects of falls (including fragility fractures) in older adults are disabling and life-threatening, and their treatment involves high cost.
- The panel opted not to recommend a particular test but instead offered a list of tests that the guideline users can choose from. The Timed Up and Go (TUG), Get Up and Go (GUG), and the Berg Balance Scale (BBS) were mentioned as commonly used tests in geriatrics practice but are not routinely done by all practitioners.
- For adults < 60 years old, the suggestion was not to routinely screen for risk of falls due to scarcity of data in this age group. This leaves room for discussion between the primary care physician and individual patients regarding possible screening.

4.7.1. Key Findings

- There is a reduction in recurrent falls when fall risk evaluation instead of usual care is done among community-dwelling healthy older adults aged ≥60 years, based on low-certainty evidence from 16 RCTs.
- There is a decreased risk of recurrent falls for older adults aged ≥60 years compared to older adults aged ≥70 years when screening was done. This evidence was derived from nine RCTs and is of moderate certainty.
- There is less fear of falling among older adults in the fall risk evaluation group. This evidence is of moderate certainty.
- The effect of screening for falls is inconclusive in terms of reducing fall-related fractures, hospitalization, quality of life, disability, and mortality among the older adult population.

4.7.2. Burden of Disease

A fall is defined as “an unexpected event in which the individual comes to rest on the ground, floor, or lower level.”¹ Falls are recognized as a major cause of mortality and morbidity in older adults worldwide.²⁻⁴ They are associated with non-fatal or fatal injuries such as fractures, and with a decrease in the ability of the elderly to perform activities of daily living (ADL).²

A systematic review in 2022 reported that the global prevalence of falls was 26.5%.¹ Varying rates of population aging and fall incidence occur in different settings.^{1,5} In the Philippines, the prevalence of falls in a cohort of older Filipinos living in a community was 23.5% (n=626).⁶ In a nursing home in Rizal and in the outpatient department of the Philippine General Hospital, 32.1% (n=156) of Filipino adults aged ≥60 years had falls within 10 months of follow-up in 2005.⁷ A more recent study shows a relatively low fall incidence (0.02%; n=25,849) among patients admitted to the same tertiary hospital in 2010.⁸ Significant risk factors of falls among the Filipino elderly were a history of falls (RR 3.64 [95% CI 1.98, 6.70]), visual impairment (RR 2.64 [95% CI 1.30, 5.37]), and the presence of more than three chronic diseases (RR 1.70 [95% CI 1.04, 2.8]).⁷

The tools summarized in Table 26 are commonly used to assess risk for falls.

Table 26. Commonly used tools in assessing risk of falls

Screening Tool	Description	Remarks
BBS ⁹⁻¹¹	<ul style="list-style-type: none">• Balance test with a series of 14 motor tasks that evaluate a person’s balance in static and dynamic positions¹²• Tasks include moving from sitting to standing, turning 360° and standing on one leg.• Each task is scored from 0 (inability to perform) to 4 (safe and secure performance of task) for a maximum score of 56¹³• Can be administered by any individual in healthcare who has been trained• Test takes around 15–20 minute to complete• Scoring: Total score <45 is associated with higher risk of falls; An individual with history of falls and a total score <51 is highly predictive of falls	<ul style="list-style-type: none">• Studies have varied conclusions regarding usefulness of BBS as a falls assessment tool¹²• Cheap/free (scale can be downloaded online)¹³• Requires stopwatch, measuring step, a chair, a step, an object that can be picked up• Easy to administer

Screening Tool	Description	Remarks
TUG ^{11,14}	<ul style="list-style-type: none"> • Consists of a combination from a chair and walking 3m, turning and returning to sitting (timed)¹⁵ • Scoring: TUG >12.3: Sensitivity of 83.3%, specificity of 96.6% when used in community dwelling adults¹² 	<ul style="list-style-type: none"> • Simple • Easy to administer • Cheap • Most frequently reported assessment in predicting fall¹² • Has more value in lower functioning older people in predicting falls¹⁶ • Requires stopwatch, one chair with armrest, measuring tape (to mark 3 meters)
GUG ¹⁷	<ul style="list-style-type: none"> • Asks the patients to stand up from a chair, walk a short distance, turn around, return, and sit down again¹⁸ • Patient will be observed for any deviation from a confident and normal performance • Scoring: 1 – normal, 2 – very slightly abnormal, 3 – mildly abnormal, 4-moderately abnormal, 5 – severely abnormal • Score of ≥ 3 means the adult is at risk of falling 	<ul style="list-style-type: none"> • Simple • Easy to administer • Cheap • Limited validity and reliability studies

BBS Berg Balance Scale; GUG Get Up and Go; TUG Timed Up and Go

4.7.3. Benefits and Harms of Screening

Recurrent Falls

There was a reduction in the risk of recurrent falls (RR 0.87 [95% CI 0.76, 0.99]; $I^2=63\%$) in older adults who had fall risk evaluation and intervention instead of usual care based on 16 RCTs (n=7,204).^{9-11,19-32} The certainty of evidence was low due to serious risk of bias and inconsistency. Subgroup analysis by age was done to reduce heterogeneity. When the intervention was conducted among adults aged ≥ 60 years, there was a decrease in risk of recurrent falls (RR 0.84 [95% CI 0.74, 0.96]; $I^2=39\%$). However, when conducted among those aged ≥ 70 years, the effect of screening on recurrent falls was inconclusive. The certainty of evidence was very low due to serious risk of bias, inconsistency, and imprecision.

Fall-related Fractures

The effect of fall risk assessment versus usual care on fall-related fractures was inconclusive (RR 1.04 [95% CI 0.83, 1.30]; $I^2=38\%$) based on low certainty of evidence (serious risk of bias, imprecision).^{9,10,14,17,22,29,30,33-37}

Hospitalization

The effect of fall risk screening on the risk of hospitalization was inconclusive (RR 0.90 [95% CI 0.80, 1.01]; $I^2=52\%$), based on low certainty of evidence (serious risk of bias, imprecision).^{9,17,23,26,27,32,35,36,38-44}

Health-related Quality of Life

The effect of fall interventions on the older adult's reported HRQOL was inconclusive.^{20-22,34,42,44,45} Since the outcome measures for this particular outcome varied across studies, the SF-36 scale (0 worst to 100 best) was used to convert SMD to MD, and the result indicated a mean difference of 11.84 (95% CI -0.12, 30.8).⁴⁶ The study outcome measures commonly used were the Falls Handicap Inventory, Falls Efficacy Scale, Geriatric Depression Scale, and EQ-5D scores. The certainty of evidence was low because of serious risk of bias and imprecision.

Mortality

All studies that reported mortality considered it a source of attrition rather than a primary endpoint and did not relate to falls.^{10,14,17,20,21,24,26,27,33,35,38-41,43,47,48} The deaths in the fall risk screening intervention group were 7.3% (n=9,607) compared to 7.7% (n=9,806) in the usual care group (RR 0.95 [95% CI 0.81, 1.11]). The effect of screening on mortality was thus inconclusive.

Fear of Falling

There was a 53% decrease in fear of falling among those who underwent screening intervention for falls compared with those who did not (RR 0.47 [95% CI 0.39, 0.56]; I²=0%).^{26,37} The two trials used a self-report questionnaire to determine the proportion of older adults with or without fear of falling. The certainty of evidence was moderate due some risk of bias.

One RCT utilized the Activities-Specific Balance Confidence Score, ranging from 0 (no confidence) to 100% (complete confidence). Results showed a higher mean confidence score of 61% in the intervention group compared to 53% in the control group.³³

Disability

Three studies compared the Barthel Index score of the screening intervention group and usual care group.^{20,29,34} Higher scores (maximum of 100) indicated functional independence in ADL and mobility. However, the studies were not pooled due to insufficient data in one RCT and high heterogeneity of the two trials (MD 0.53 [95% CI -0.94, 2.00]; I²=94%). In the two trials, the difference in Barthel Index between groups was inconclusive (β -0.17 [95% CI -1.31, 0.97]; MD 0.20 [95% CI -0.27, 0.67]).^{29,34} However, one study showed that the fall risk assessment group had higher Barthel Index scores (MD 1.30 [95% CI 0.69, 1.91]). The certainty of evidence was low due to serious risk of bias and inconsistency.

Adverse Events

Three RCTs reported adverse events that may have been related to the exercise interventions. Two participants in one trial with exercises reported back pain that resolved after program modification.²² In another trial, 10 participants reported musculoskeletal symptoms that were not clearly described in the study.⁴³ One noted that there had been no adverse events.²⁶

Table 27. Summary of findings: effects of fall risk evaluation and intervention versus usual care

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Recurrent falls (12–24 mos)	16 RCTS (n=7,204)	RR 0.87 [0.76, 0.99]	Benefit	Low
Recurrent falls, ≥60 yrs	9 RCTS (n=5,355)	RR 0.84 [0.74, 0.96]	Benefit	Moderate
Recurrent falls, ≥70 yrs	6 RCTs (n=1,521)	RR 0.85 [0.62, 1.16]	Inconclusive	Very Low
Fractures (6–48 mos)	12 RCTs (n=16,289)	RR 1.04 [0.83, 1.30]	Inconclusive	Low
Hospitalization (12–36 mos)	15 RCTs (n=5,827)	RR 0.90 [0.80, 1.01]	Inconclusive	Low
HRQOL (12–36 mos)	7 RCTs (n=2,348)	MD 11.84 [-0.12, 30.8]	Inconclusive	Low
Fear of falling (12–14 mos)	2 RCTs (n=844)	RR 0.47 [0.39, 0.56]	Benefit	Moderate
Disability (12 mos)	3 RCTs (n=818)	MD 1.30 [0.69, 1.91] MD 0.20 [-0.27, 0.67] β -0.17 [-1.31, 0.97]	Inconclusive	Low
Mortality (12–24 mos)	17 RCTs (n=19,413)	RR 0.95 [0.81, 1.11]	Inconclusive	Low

β regression coefficient; HRQOL health-related quality of life; MD mean difference; RCT randomized controlled trial; RR risk ratio

4.7.4. Diagnostic Performance of Screening Tests

Due to the direct evidence collected on the prespecified outcomes, data on diagnostic accuracy of screening for risk of falls was not included in this evidence summary.

4.7.5. Cost Implication

There are no cost-effectiveness studies on falls and fall risks among older adults in the country. Economic evaluations in other countries considered healthcare costs (professional fees, hospital admissions, admissions to nursing facilities, medications, home modifications), but did not include productivity losses. In the Netherlands, the average time to complete a comprehensive fall assessment per participant was 150 minutes.²¹ This involved a multidisciplinary team composed of a geriatrician, a geriatric nurse, a rehabilitation physician, and an occupational therapist doing a detailed assessment and making recommendations. The study showed that this multidisciplinary intervention was not cost-effective compared with the usual care.²¹ This trial was judged to have an unclear risk of selection bias (randomization, allocation concealment) and a high risk of attrition bias.

Other considerations include the treatment costs of fall-related concerns such as fractures (i.e., sector costs, patient/family costs, and productivity losses), health sector costs (i.e., diagnostic and laboratory fees, use of facilities, cost of surgery, and physicians' fees, or other sector costs (i.e., amount paid or given by third parties to each patient's treatment costs, primarily to pay the services). Table 28 shows some of the treatment costs and health sector costs.

One study enrolled 118 patients with acute fragility fractures in 2017 at the Philippine General Hospital to determine the significant contributions to treatment costs.⁴⁸ The range of treatment cost for these fractures was from PHP 126,349.02–147,749.44. Hospital sector cost contributed to nearly half of this treatment cost (46.12%). The average out-of-pocket expenses of patients was PHP 36,333.55, while their productivity loss was PHP 8,592.00. The average other sector costs of patients were PHP 27,820.86.⁴⁸ These analyses focused on surgical intervention and did not include post-surgery rehabilitation services.

Table 28. Costs of surgical and rehabilitation procedures^{49,50}

Service	Government Hospitals Rate (2022)
Laboratory services	PHP 65.00–900.00
Surgical fees	PHP 187,091.34–387,550.00
Cast application	PHP 5,000.00–8,000.00
Rehabilitation consultation services	PHP 50.00
Therapy sessions	PHP 360.00–450.00/session

4.7.6. Equity, Acceptability, and Feasibility

There are no local studies on the acceptability, feasibility, and impact on health equity of fall risk evaluation or screening programs in the community.

4.7.7. Recommendations from Other Groups

Medical groups in areas with high fall incidence and an increased number of older adults recommend having interventions designed to decrease fall rates and fall-related injuries among community-dwelling adults with increased fall risk.^{51,52}

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4.8. Screening for sarcopenia

RECOMMENDATIONS

12. Among asymptomatic apparently healthy adults ≥ 60 years old, we recommend screening for sarcopenia using a combination of tools (SARC-Calf with or without grip strength assessment) annually or after the occurrence of a major health event (fall, fracture, hospital admission).
(strong recommendation, very low certainty evidence)
13. Among asymptomatic, apparently healthy adults < 60 years old, we suggest against screening for sarcopenia due to insufficient evidence.
(weak recommendation, very low certainty evidence)

Justification and Considerations

The strong recommendation for sarcopenia screening among individuals ≥ 60 years old is based on the following:

- The burden of sarcopenia is high in the Philippines.
- Sarcopenia usually coexists with other geriatric syndromes such as osteoporosis and risk for falls that portend poor health outcomes.
- Simple screening tools with adequate accuracy are available. However, the recommended tool, the SARC-Calf, may need to be translated in Filipino and other dialects. Since this tool is not routinely used in practice, primary healthcare providers will need training on its use.
- Grip strength may be used for screening, subject to availability of the hand dynamometer and training on its use.
- Identifying individuals with sarcopenia and those at risk among older adults may increase their chances of maintaining job productivity.
- The suggestion against screening for sarcopenia among individuals < 60 years old keeps the option to screen open for primary care providers and patients who agree on this plan of action after discussion of its advantages and disadvantages.

4.8.1. Key Findings

- The guideline question used evidence from 110 studies on the diagnostic accuracy of sarcopenia screening tests (n=22), five studies on the association of screening with clinical outcomes (four on SARC-F, one on Ishii score), and one RCT (SPRINTT) comparing the effects of an early multicomponent intervention against a healthy aging lifestyle educational program for sarcopenic participants identified through screening.
- The diagnostic performance of screening tests (Ishii score, calf circumference [CC], Yubi-wakka test, Mini-Sarcopenia Risk Assessment [MSRA-5 & MSRA-7] SARC-F, and SARC-F with calf circumference (SARC-Calf) varied greatly. The Ishii score had the best sensitivity and specificity. SARC-F was more specific but less sensitive than MSRA-7. CC measurements had moderate sensitivity and specificity. The Yubi-wakka test was as sensitive as CC but less specific. Diagnostic accuracy was influenced by sex, setting (community vs. hospital), and measurement technique (e.g., CC). The certainty of evidence for the obtained sensitivity and specificity estimates was low to very low.
- A positive SARC-F screening result SARC-F (score ≥ 4) had a moderate association with all-cause and CVD-specific mortality, but only a small association with hospitalization and cancer-specific mortality. It was also linked with significantly lower quality of life ratings and high depression scores. The Ishii score was associated with higher mortality at 3 years.
- Among patients screened positive for sarcopenia, a multi-component intervention involving moderate physical activity, nutritional interventions, and technological support led to lower mobility disability rates compared to health or lifestyle education programs without increasing the risk of serious adverse events among patients who have been initially screened for sarcopenia and underwent confirmatory testing. The certainty of evidence for efficacy and safety was low.

4.8.2 Burden of Disease

Disease Frequency

Sarcopenia is a muscle disease common in older adults characterized by an “age-related loss of skeletal muscle function and muscle mass.”¹⁻³ It is a progressive and generalized disorder associated with increased risk for adverse outcomes such as falls, fractures, physical disability, and death.³ Sarcopenia was formally recognized as a disease entity in 2016 after the WHO’s assignment of an ICD-10-CM (M62.84) code.⁴ Although there is no universal operational definition for sarcopenia, a working definition was proposed in 2010 by the European Working Group on Sarcopenia in Older People (EWGSOP) and was updated in 2019 (EWGSOP2).³ To confirm sarcopenia, EWGSOP2 requires the following:

- a. **Low muscle strength:** handgrip strength <27 kg for men or <17 kg for women, timed chair stand test >15 seconds for five rises;
- b. **Low muscle quantity/appendicular skeletal muscle mass:** <20 kg for men or <15 kg for women; assessed either by dual-energy X-ray absorptiometry (DXA), bioelectrical impedance analysis (BIA), magnetic resonance imaging (MRI), or computed tomography (CT);
- c. **Low physical performance:** Gait speed ≤ 0.8 m/s, Short Physical Performance Battery (SPPB) ≥ 8 , TUG for ≥ 20 seconds, or 400-meter walk test for ≥ 6 minutes

A similar diagnostic algorithm was proposed in 2014 and revised in 2019 by Asian Working Group for Sarcopenia (AWGS) for East and Southeast Asians owing to their anthropometric and cultural or lifestyle-related differences from Western counterparts.¹ The algorithm specified the following criteria:

- a. **Low muscle strength:** Handgrip strength <28 kg for men or <18 kg for women
- b. **Low physical performance:** 6-meter walk <1.0 m/s, 5-time chair stand test ≥12 seconds, or SPPB ≤9
- c. **Low appendicular skeletal muscle mass:** DXA: men <7.0 kg/m², women <5.4 kg/m²; or BIA: men <7.0 kg/m², women <5.7 kg/m²

Sarcopenia is probable if only either low strength or physical performance is present; confirmed if either is present together with low muscle mass; and severe if all three are present.¹

The prevalence of sarcopenia ranges between 6–22% in adults aged ≥65 years, with estimates varying depending on the healthcare setting (i.e., higher for hospitalized versus community) or the diagnostic criteria used.² In studies that used AWGS 2014 criteria, sarcopenia prevalence ranged from 7.3–12%, with male predominance (5.1–21% versus 4.1–16.3% in women).¹ Findings from the Longitudinal Study of Ageing and Health in the Philippines (LSAHP), the first nationally representative panel study on aging in the country involving older adults (n=4,442; ≥60 years), estimated the prevalence of sarcopenia at 9.0% and severe sarcopenia at 6.4% using AWGS 2019 criteria.⁵ More male Filipinos were sarcopenic (15.2% vs. 4.7% in women) or severely sarcopenic (10.5% vs. 3.6% women). The prevalence of sarcopenia increased dramatically with age: 60–69 years = 6.7% (3.6% severe), 70–79 years = 12% (10.1% severe), ≥80 years = 16.6% (16.3% severe).⁵

Management of the Disease

Screening for sarcopenia may facilitate early identification of patients at risk for the disease and possibly prevent further deterioration in function and overall health. Several tools that are widely available, user-friendly, non-invasive, and cheap are currently available, such as the SARC-F questionnaire, calf circumference (CC) measurement, and prediction equations (e.g., Ishii score) (Table 29).^{6,7} However, it is unclear which of these existing screening tests is best to use, especially in the Philippine setting. The impact of sarcopenia screening in improving clinical outcomes also needs to be determined.

Table 29. Commonly used tools in screening for sarcopenia

Screening test	Description
SARC-F	<ul style="list-style-type: none"> • A self-reported questionnaire on Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls; most validated and adapted screening survey for sarcopenia • Scoring per component: 0=no difficulty, 1=some, 2=a lot; cutoff: ≥4.
CC	<ul style="list-style-type: none"> • Maximum circumference of non-contracted calf muscle measured using a non-elastic tape; varying measurement techniques: position-based (standing versus sitting) or laterality (left or right calf, or average of both) • Cutoff: <34 cm for males and <33 cm for females (by the AWGS 2019 criteria)
SARC-Calf	<ul style="list-style-type: none"> • Combination of the SARC-F and CC measurements
MSRA-7, MSRA-5	<ul style="list-style-type: none"> • A self-reported questionnaire consisting of five/seven yes or no questions regarding age, hospitalization, activity, regular meals, weight loss, and protein and dairy intake. • Scoring per question: 0–15 points; cutoff: ≤45 total score indicating
Yubi-wakka	<ul style="list-style-type: none"> • Self-screening test is an alternative for CC measurement; making a ring with index fingers and thumbs of both hands and then gently circling the thickest part of non-dominant calf of the leg while it is bent in a 90° angle. • Scoring: “bigger”, “just fits”, or “smaller” than the circumference made by the adjoined fingers. Sarcopenia is considered positive for “just fits” or “smaller” results

Screening test	Description
Ishii score	<ul style="list-style-type: none"> A predictive model containing age, grip strength, and CC measurement. <ul style="list-style-type: none"> Men: $[0.62 \times (\text{age} - 64)] - [3.09 \times (\text{grip strength} - 50)] - [4.64 \times (\text{CC} - 42)]$; cutoff ≥ 105 Women: $[0.80 \times (\text{age} - 64)] - [5.09 \times (\text{grip strength} - 34)] - [3.28 \times (\text{CC} - 42)]$; cutoff ≥ 120

CC calf circumference; MSRA Mini Sarcopenia Risk Assessment; SARC-F Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls; SARC-CalF SARC-F with calf circumference

4.8.3. Benefits and Harms of Screening

Association of a Positive Screening Result with Adverse Clinical Outcomes

SARC-F

Five observational studies involving healthy, community-dwelling adults ($n=73,852$) showed that a screen-positive result (i.e., score ≥ 4) with the SARC-F was associated with a fourfold increase in odds of mortality after a 4- to 6.8-year follow-up (OR 4.55 [95% CI 3.67, 5.64], $I^2=87\%$) (Table 30).⁸⁻¹² Lower odds were reported in one study composed of late middle-aged African American adults (OR 1.82 [95% CI 1.15, 2.86]).⁸

Similarly, positive SARC-F results were associated with increased cancer-related (OR 1.76 [95% CI 1.61, 1.93], $n=71,276$) and CVD-related deaths (OR 4.33 [95% CI 4.04, 4.64]; $n=71,276$) (Table 30).⁹ SARC-F-positive individuals also had a significantly greater odds of being hospitalized (OR 1.91 [95% CI 1.01, 3.60]) but not emergency care use (OR 1.41 [95% CI 0.74, 2.69]).¹⁰ Their quality of life scores were lower (MD 3.6 [95% CI 2.04, 5.16]), while their depression scores were higher (MD 1.39 [95% CI 0.36, 2.42]).¹⁰ These outcomes were measured 4 years after screening.

The overall certainty of evidence ranges from low (all-cause mortality, emergency care, hospitalization) to moderate (other outcomes) due to serious indirectness in the target population or risk of bias in outcome ascertainment.

Ishii score

One study involving hospitalized Chinese adults ($n=380$) found that those who were positive for sarcopenia with the Ishii test had higher odds of mortality after 3 years compared to the mortality of screen-negative patients (OR 1.83 [95% CI 0.97, 3.45]) (Table 30).¹¹ The certainty of evidence for this estimate is very low due to serious risk of bias (no adjustment for confounders), indirectness (hospitalized individuals, not Filipino), and imprecision (wide confidence intervals).

Table 30. Summary of findings: effects of a positive screen for sarcopenia on adverse outcomes among healthy adults

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Ishii score				
All-cause mortality (3 yrs)	1 OS ($n=380$)	OR 1.83 [0.97, 3.45]	Small association	Very low
SARC-F				
All-cause mortality (4–6.8 yrs)	3 OS ($n=73,855$)	OR 4.55 [3.67, 5.64]	Moderate association	Low
Cancer-specific mortality (6.8 yrs)	1 OS ($n=71,276$)	OR 1.76 [1.61, 1.93]	Small association	Moderate
CVD-specific mortality (6.8 yrs)	1 OS ($n=71,276$)	OR 4.33 [4.03, 4.64]	Moderate association	Moderate

Outcomes (Duration of follow-up)	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Emergency care use (4 yrs)	1 OS (n=670)	OR 1.41 [0.74, 2.69]	No association	Low
Hospitalization (4 yrs)	1 OS (n=670)	OR 1.91 [1.01, 3.69]	Small association	Low
QOL scores (4 yrs)	1 OS (n=670)	MD -3.60 [2.04, 5.16]	Significantly lower QOL scores for screen-positive	Moderate
Depression scores (4 yrs)	1 OS (n=670)	MD 1.39 [0.36, 2.42]	Significantly higher depression scores for screen-positive	Moderate

CI confidence interval; CVD cardiovascular disease; MD mean difference; OR odds ratio; OS observational study; QOL quality of life; Sn sensitivity; Sp specificity

False Negative Rates

False negative rates could result in a missed case, subsequently incurring higher healthcare cost due to the complications associated with sarcopenia. Based on the specificity data, false negative rates of sarcopenia screening tests ranged from 0.12–0.50 (Table 31). There is very low certainty of evidence for this outcome.

Table 31. False negative rates of screening tests for sarcopenia

Screening test	False negative rate [95% CI]
SARC-F	0.13 [0.09, 0.17]
SARC-Calf	0.12 [0.04, 0.21]
MSRA-7	0.44 [0.31, 0.59]
MSRA-5	0.36 [0.30, 0.42]
CC	0.31 [0.25, 0.37]
Yubi-wakka	0.50 [0.46, 0.54]
Ishii score	0.17 [0.11, 0.25]

CC calf circumference; MSRA Mini Sarcopenia Risk Assessment; SARC-Calf SARC-F with calf circumference

Multicomponent Intervention versus Health Education

In the SPRINTT trial, patients in the multicomponent intervention arm exhibited lower mobility disability rates compared to controls (46.8% vs. 52.7%; hazard ratio [HR] 0.78 [95% CI 0.67, 0.92]).¹³ Persistent mobility disability was less common in the treatment group, but the difference was inconclusive (21.0% vs. 25.0%; HR 0.79 [95% CI 0.5, 1.10]).

In terms of safety, 55.7% (337/605) in the treatment group and 49.5% (297/600) in the control group experienced at least one adverse event (RR 1.13 [95% CI 1.01, 1.25]). The difference in terms of serious adverse events was inconclusive (39.2% treatment vs. 36.0% control; RR 1.09 [95% CI 0.94, 1.26]).¹³

The certainty of evidence regarding efficacy and safety outcomes is low, with downgrading due to very serious indirectness (European population, all confirmed sarcopenia patients).

4.8.4. Diagnostic Performance of Screening Tests

SARC-F

The diagnostic accuracy of SARC-F and its modified versions was assessed in four systematic reviews.¹⁴⁻¹⁷ The systematic review by Voelker was the most extensive (29 studies) and updated among the four; hence, its findings were used as the main evidence base for this outcome.¹⁵

There were 21,855 individuals screened (20–3,997 per study). The average age was 63.3 ± 14.6 years (range 43.4–93.7 years) and most were females (61.3%). Population subgroups included community-dwelling older adults ($n=18,957$; 16 studies), geriatric inpatients ($n=1,598$; 5 studies), geriatric outpatients ($n=802$; 5 studies), nursing home residents ($n=357$; 2 studies), and long-term care residents ($n=141$; 1 study). The studies were conducted in Asia (15 studies), Europe (8 studies), South America (3 studies), and North America (3 studies). The gold standard for sarcopenia diagnosis were based on the recommendations of the EWGSOP or EWGSOP2 (17 studies), AWGS (13 studies), IWGS (8 studies), or FNIH (7 studies). The pooled prevalence of sarcopenia was 10.4% across studies that used AWGS.

Using the AWGS as the reference standard with a cut-off point of ≥ 4 , SARC-F showed poor overall sensitivity (0.29 [95% CI 0.20, 0.38], $I^2=95.2\%$) but high specificity (0.87 [95% CI 0.83, 0.91], $I^2=98\%$) (Table 32). Subgroup analysis for sexes (Table 33) showed that SARC-F may be more sensitive but less specific when used in women. In terms of care settings, SARC-F was less sensitive but more specific when used in community-dwelling than in outpatients or hospitalized inpatients. The overall certainty of evidence for these estimates is low due to serious inconsistency and indirectness.

SARC-CalF

Seven studies evaluated SARC-CalF.¹⁵ Using the AWGS criteria as a reference standard with a cutoff score of ≥ 11 , SARC-CalF exhibited poor to moderate sensitivity (0.54 [95% CI 0.39, 0.69], $I^2=81.4\%$) and high specificity (0.88 [95% CI 0.79, 0.96], $I^2=95.8\%$) (Table 32). Subgroup analysis showed higher diagnostic accuracy for SARC-CalF among community-dwelling older adults compared to those who were hospitalized, while higher sensitivity was noted for women over men (Table 33). The certainty of evidence regarding diagnostic accuracy of SARC-CalF is very low due to risk of bias, indirectness, and inconsistency.

Mini Sarcopenia Risk Assessment (MSRA-7 and MSRA-5)

MSRA-7 showed moderate sensitivity (0.74 [95% CI 0.66, 0.80], $I^2=52.7\%$) and poor to moderate specificity (0.56 [95% CI 0.41, 0.69], $I^2=95.8\%$) (Table 31).¹⁸⁻²¹ One study in China showed significantly higher specificity estimates (0.72 [95% CI 0.66, 0.76]), a finding that might be attributed to the lower sarcopenia prevalence (15.9%) in their cohort compared to the three other studies (range: 22.7–51.0%). MSRA-5 showed better accuracy than MSRA-7, with a sensitivity of 0.75 (95% CI 0.60, 0.86; $I^2=85.4\%$) and specificity of 0.64 (95% CI 0.58, 0.70; $I^2=72\%$) (Table 32).^{18,20,21} Subgroup analysis yielded higher sensitivity for community-dwellers than those in hospital outpatients or nursing home residents (Table 33). Specificity estimates were roughly similar regardless of setting. The certainty of estimates for diagnostic accuracy of MSRA-7 and MSRA-5 is very low.

Calf Circumference

CC measurements showed moderate to high sensitivity (0.79 [95% CI 0.75, 0.83], $I^2=45.5\%$) and moderate specificity (0.69 [95% CI 0.63, 0.75], $I^2=93.2\%$) (Table 32). Higher sensitivity and lower specificity were observed for women (Table 33). There was significant heterogeneity among studies that may be due to testing position, disease prevalence, or reference standard

used. Exploratory analysis of eight studies by measurement position showed higher sensitivity and specificity for sitting compared to standing. However, two studies^{22,23} that specifically tested different CC measurement positions concluded that standing yielded more accurate results. The certainty of estimates for diagnostic accuracy of CC is very low due to serious inconsistency/heterogeneity, serious imprecision, and risk of bias issues (6/11 with high risk for selection bias).

Yubi-wakka/Finger-ring Test

The finger-ring test showed moderate to high sensitivity (0.81 [95% CI 0.67, 0.90], $I^2=89.4\%$), but poor to moderate specificity (0.50 [95% CI 0.46, 0.54], $I^2=80.6\%$) (Table 32). Relatively similar sensitivity estimates were obtained for men and women, but test specificity was slightly higher in men (Table 33). The overall certainty of evidence regarding the diagnostic accuracy estimates for the Yubi-wakka test was downgraded to very low due to serious indirectness, inconsistency, and imprecision.

Ishii score

Ishii score showed moderate to high sensitivity (0.81 [95% CI 0.69, 0.89], $I^2=91.3\%$) and specificity (0.83 [95% CI 0.75, 0.89], $I^2=93.9\%$) (Table 32).²⁴⁻²⁸ The test appeared to be more sensitive in men but had higher specificity in women. Results remained heterogeneous even after subgroup analysis for sex, suggesting the influence of other factors (Table 33). In terms of care setting, the test was more sensitive but less specific when used in hospitalized patients or nursing home residents than in community-dwelling adults. The prevalence of sarcopenia ranged from 25–60% in hospitalized or nursing home residents, and 5.7–22% in community-dwellers. Although all included studies had low risk of bias, the overall certainty of evidence regarding the diagnostic accuracy estimates for Ishii score was downgraded to very low due to serious indirectness, inconsistency, and imprecision.

Table 32. Summary of findings: diagnostic accuracy of sarcopenia screening among healthy adults

Screening tools	No. of Studies (No. of Participants)	Sn/Sp [95% CI]	Interpretation	Certainty of Evidence
SARC-F	13 studies (n=10,096)	Sn 0.29 [0.20, 0.38]	Poor	Low
		Sp 0.87 [0.83, 0.91]	High	Low
SARC-Calf	4 studies (n=1,089)	Sn 0.54 [0.39, 0.69]	Poor to moderate	Very low
		Sp 0.88 [0.79, 0.96]	High	Very low
MSRA-7	3 studies (n=944)	Sn 0.74 [0.66, 0.80]	Moderate	Very low
		Sp 0.56 [0.41, 0.69]	Poor to moderate	Very low
MSRA-5	4 studies (n=1,121)	Sn 0.75 [0.60, 0.86]	Moderate to high	Very low
		Sp 0.64 [0.58, 0.70]	Moderate	Very low
CC	11 studies (n=5,522)	Sn 0.79 [0.75, 0.83]	Moderate to high	Very low
		Sp 0.69 [0.63, 0.75]	Moderate	Very low
Yubi-wakka / finger-ring	3 studies (n=2,638)	Sn 0.81 [0.67, 0.90]	Moderate to high	Very low
		Sp 0.50 [0.46, 0.54]	Poor to moderate	Very low
Ishii score	5 studies (n=3,563)	Sn 0.81 [0.69, 0.89]	Moderate to high	Very low
		Sp 0.83 [0.75, 0.89]	Moderate to high	Very low

CC calf circumference; CI confidence interval; MSRA Mini Sarcopenia Risk Assessment; SARC-Calf SARC-F with calf circumference; Sn sensitivity; Sp specificity

Table 33. Subgroup analysis for diagnostic accuracy of sarcopenia screening tests

Subgroup	Sn	95% CI	I²	Sp	95% CI	I²
SARC-F	0.29	0.20, 0.38	95.2%	0.87	0.83, 0.91	98%
By sex						
Men	0.09	-0.04, 0.20	58%	0.98	0.96, 1.01	40.3%
Women	0.19	0.09, 0.29	86.6%	0.93	0.90, 0.96	95.2%
By care setting						
Community	0.18	0.09, 0.26	90.2%	0.93	0.90, 0.96	95.4%
Outpatients	0.32	0.09, 0.54	0%	0.74	0.66, 0.83	0%
Hospitalized in-patients	0.50	0.38, 0.63	92.3%	0.78	0.73, 0.83	97.8%
SARC-Calf	0.54	0.39, 0.69	81.4%	0.88	0.79, 0.96	95.8%
By sex						
Men	0.57	0.42, 0.73	0%	-	-	-
Women	0.47	0.24, 0.71	0%	-	-	-
By care setting						
Community	0.61	0.48, 0.74	N/A	0.95	0.92, 0.97	N/A
Outpatients	0.21	0.01, 0.41	N/A	0.98	0.96, 1.00	N/A
Hospitalized in-patients	0.71	0.56, 0.77	N/A	0.70	0.64, 0.77	N/A
MSRA-7	0.74	0.66, 0.80	52.7%	0.56	0.41, 0.69	95.8%
By care setting						
Community	0.74	0.63, 0.83	76.1%	0.62	0.46, 0.75	95.4%
Hospitalized	0.72	0.60, 0.83	0%	0.43	0.36, 0.50	0%
MSRA-5	0.75	0.60, 0.86	85.4%	0.64	0.58, 0.70	72%
By care setting						
Community	0.85	0.76, 0.91	60.5%	0.66	0.59, 0.73	81.4%
Hospitalized	0.61	0.53, 0.68	0%	0.62	0.53, 0.70	76.9%
CC	0.79	0.75, 0.83	45.5%	0.69	0.63, 0.75	93.2%
By sex						
Men	0.76	0.70, 0.81	0%	0.73	0.65, 0.80	81.7%
Women	0.84	0.80, 0.87	0%	0.69	0.61, 0.75	88.1%
By measurement technique						
Sitting	0.80	0.74, 0.85	0%	0.71	0.65, 0.77	89.9%
Standing	0.78	0.72, 0.83	64.7%	0.65	0.60, 0.70	88.1%
Yubi-wakka test	0.81	0.67, 0.90	89.4%	0.50	0.46, 0.52	80.6%
By sex						
Men	0.81	0.72, 0.88	33.4%	0.53	0.50, 0.56	90.1%
Women	0.82	0.56, 0.94	90.1%	0.50	0.44, 0.55	77.6%
Ishii score	0.81	0.69, 0.89	91.3%	0.83	0.75, 0.89	93.9%
By sex						
Men	0.85	0.72, 0.93	85.5%	0.74	0.55, 0.86	88.1%
Women	0.88	0.78, 0.94	90.4%	0.78	0.64, 0.88	91.8%
By care setting						
Hospitalized / nursing home	0.88	0.74, 0.94	N/A	0.72	0.62, 0.80	N/A
Community	0.75	0.61, 0.85	N/A	0.88	0.84, 0.91	N/A

CC calf circumference; CI confidence interval; MSRA Mini Sarcopenia Risk Assessment; SARC-Calf SARC-F with calf circumference; Sn sensitivity; Sp specificity

4.8.5. Cost Implication

The existing sarcopenia tools have minimal to no cost since most are simple questionnaires or anthropometric measurements. Some tests that require equipment (e.g., dynamometer for grip strength testing required for Ishii score calculation) may come at a significant cost.

One systematic review of 14 studies found that sarcopenia was associated with significantly higher health care costs, but its true economic burden was difficult to estimate due to the heterogeneity between studies (case definitions, cost analysis settings, methodological biases).²⁹ Based on a retrospective cohort study of adults in the United States (n=4,011), the average estimated cost of hospitalizations due to sarcopenia was USD 260.00 per person. Average costs were higher in the ≥65-year-old age group (USD 375.00) than in the 40- to 64-year-old group (USD 204.00).³⁰ Sarcopenia increased hospitalization costs by 58.5% and 34% for patients aged <65 years and ≥65 years, respectively.³¹

Only one study has investigated the cost-effectiveness of various sarcopenia screening strategies (MSRA, SARC-F, EWGSOP, SARSA-Mod) compared to no screening. In Iran, base case analysis showed that the EWGSOP strategy (which includes DXA bone densitometry in the second stage) was the most cost-effective strategy from a health system perspective with an incremental cost-effectiveness ratio (ICER) of USD 1,875 per QALY gained compared to no screening. SARSA-Mod—a prediction model containing age, weight, and CC measurement—was the second-best strategy (ICER USD 1,881/QALY) and was suggested as the screening method of choice in settings where DXA is not available.³²

4.8.6. Equity, Acceptability, and Feasibility

A scoping review published in 2022 found that healthcare professionals from Australia, the Netherlands and Brazil had low awareness of and limited knowledge on sarcopenia.³³ To address this knowledge gap, it was recommended to promote sarcopenia measurement in epidemiological studies of older adults and chronic disease, to collaborate with policymakers regarding medical claims using ICD diagnosis code for sarcopenia, to develop new treatments, and to use consensus diagnostic criteria (e.g., EWGSOP, ICFSR, AWGS).³⁴

Several studies have demonstrated the feasibility of incorporating sarcopenia screening in primary care and hospital settings. Simple self-completed sarcopenia questionnaires were found to be feasible and acceptable to both patients and staff in fracture clinics, cancer wards, and dialysis centers.³⁵⁻³⁷ Another study explored the feasibility and implementation of an iPad mobile application for Rapid Geriatric Assessment (RGA) to screen for sarcopenia (using SARC-F), frailty, and cognition in the primary care setting. Findings showed that screening could be completed in ≤5 minutes per patient, did not require additional resources or staff, and obtained complete data for 96% of patients.³⁸ Conducting SARC-F by phone interviews also produced similar results as in-person administration based on a study of community-dwelling older adults (n=1,451) in Brazil.³⁹ Finally, a study of urban community-dwelling Malaysian seniors showed that it was feasible to do multi-domain geriatric health screening using online surveys, with an average response time of 16.8 minutes and an 83% completion rate.⁴⁰

In the Philippines, sarcopenia screening is not routinely done during screening for geriatric syndromes.⁴¹ However, with the proposed creation of geriatric specialty centers in each DOH-retained regional hospital, sarcopenia screening and research may become easier to implement across the country.⁴²

4.8.7. Recommendations from Other Groups

Generally, a case-finding approach instead of universal screening was recommended by all groups. Of the two groups that used GRADE Methodology (2018 ICFSR, 2022 Singapore CPG), screening annually or after a major health event (e.g., fall, hospitalization) was conditionally recommended for adults ≥ 65 years old with high-risk for sarcopenia based on low certainty-evidence. The European and Asian Working Groups for Sarcopenia (EWGSOP 2019, AWGS 2019) did not specify a required age or frequency for screening. The recommended screening tools included SARC-F, CC, SARC-CalF, Ishii score, Yubi-wakka test, MSRA-7, or MSRA-5.

The 2019 Consensus guidelines from AWGS recommended screening for “possible sarcopenia” to facilitate timely lifestyle intervention in community and primary care settings.¹ Screening was to be done in two phases: case-finding using SARC-F, CC, or SARC-CalF, followed by muscle strength (handgrip strength) or physical performance testing (5-time chair stand test).

Annual screening of adults ≥ 65 years old was conditionally recommended based on low certainty of evidence in the 2018 International CPG on Sarcopenia due to the high burden of sarcopenia and the perceived effectiveness of screening.² The SARC-F questionnaire and gait speed were recommended, while grip strength testing was considered a diagnostic assessment rather than a screening test. Although no direct evidence was found to support a specific frequency for sarcopenia screening, the group recommended opportunistic screening (e.g., annual health check-ups or flu vaccinations) until sufficient evidence from modelling studies proved the cost-effectiveness of formal screening programs.

The latest guidelines from Singapore did not recommend universal screening because the screening tools have diagnostic limitations and an unclear effect on relevant outcomes. Instead, a case-finding approach using SARC-F, CC, or SARC-CalF was conditionally recommended for at-risk or symptomatic cases, or for care settings where a higher prevalence of sarcopenia was expected (e.g., hospitalized, rehabilitation settings, nursing homes). No specific frequency for screening was indicated due to lack of direct evidence.⁴³

The EWGSOP2 diagnostic approach for sarcopenia was adopted in the 2022 consensus guidelines in Australia and New Zealand.⁴⁴ Screening was recommended using either SARC-F or clinical suspicion (e.g., falls, feeling weak, weight loss, reduced mobility) among adults at risk for sarcopenia. The frequency of screening was specified as annually or when a major health event occurred. Emphasis was also given on checking the local availability of adequate training and resources before proceeding to confirmatory testing.

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4.9. Screening for osteoporosis

RECOMMENDATIONS

14. Among asymptomatic, apparently healthy women ≥ 65 years old, we recommend screening for osteoporosis using FRAX with or without BMD or OSTA.

(strong recommendation, low certainty evidence)

15. Among asymptomatic, apparently healthy men at any age and women < 65 years old, we recommend against screening for osteoporosis.

(strong recommendation, very low certainty evidence)

Justification and Considerations

The consensus panel considered the following when formulating these recommendations:

- Osteoporosis is a silent disease, and its downstream effects are disabling and potentially fatal. Screening high-risk women aged ≥ 65 years is already standard of care. Screening tools, the Fracture Risk Assessment Tool (FRAX) and Osteoporosis Self-Assessment Tool for Asians (OSTA), are easy to use.
- Screen-negative individuals will need to be screened again. The decision on appropriate timing of a rescreen is left to the discretion of the healthcare provider.
- For women < 65 years and men, the recommendation against screening is strong because of the potential harm and cost of early intervention and the lack of evidence of its benefit.

4.9.1. Key Findings

- Five RCTs assessed the effect of osteoporosis screening versus no screening in asymptomatic adults.
- Among women aged ≥ 65 years (4 RCTs), the rates of major osteoporosis fractures (MOFs), any type of fractures, osteoporosis-related fractures, and hip fractures is the same or lower compared to no screening. Among women aged 45 to 54 years (1 RCT), the effect of screening on fracture rates was inconclusive. Screening had no significant effect on mortality reduction or quality of life improvement in women ≥ 65 years old. Screening-related adverse events resulted in anxiety levels comparable to no screening.
- The overall certainty of evidence from studies in women ≥ 65 years old was low due to the high risk of bias (i.e., two studies with high risk of attrition and reporting bias) and imprecision in the studies that compared screening to no screening. The certainty of evidence was very low in studies among women 45–54 years old because of high risk of attrition bias, imprecision, and indirectness.

4.9.2. Burden of Disease

Disease Frequency

According to the 2003 NNS, the overall prevalence of osteoporosis in the Philippines was 0.8% and 2.5% among those aged 60–69 years and aged ≥ 70 years, respectively.¹ Globally, the incidence is expected to rise by more than 200% by 2050.²

Osteoporosis has serious implications for both health and the global economy.² The prevalence of fractures, an osteoporosis complication, was estimated to be 11.3% among females and 9.0% among males in the Philippines.¹ Subsequent fragility fractures caused by osteoporosis have disastrous consequences. A hip fracture results in loss of function and independence, with mortality rates reaching up to 20–24% in the first year. The economic cost of fragility fractures is approximated to be USD 37.5 billion in 2017, and is expected to rise by 27% by 2030.

Management of the Disease

Osteoporosis management includes fall prevention measures, calcium and vitamin D supplementation, and medications such as bisphosphonates, like alendronate and zoledronic acid, denosumab, teriparatide, or raloxifene. The major objective of an osteoporosis screening strategy is to avoid osteoporotic fractures because of the asymptomatic nature of osteoporosis before the occurrence of the first fracture.³ Some tools used in screening for osteoporosis are included in Table 34, and some of the most common risk factors associated with osteoporosis across various populations are summarized in Table 35.

Table 34. Commonly used tools in screening for osteoporosis

Screening test	Description
FRAX ⁴	<ul style="list-style-type: none">• Calculates the 10-year probability of a hip fracture or MOF (hip, clinical spine, humerus, or wrist) (http://www.shef.ac.uk/FRAX)• Considers age, sex, BMI, previous fractures, parent fractured hip, current smoking, glucocorticoids, rheumatoid arthritis, secondary osteoporosis, and alcohol of ≥ 3 units/day• BMD of the femoral neck may be entered to enhance risk prediction for fracture
OSTA ⁵	<ul style="list-style-type: none">• Used to identify Asian women at high risk of osteoporosis

Screening test	Description
	<ul style="list-style-type: none"> • Considers age and weight as variables to predict a BMD T-score of ≤ 2.5 • Formula: OSTA = 0.2[weight (kg) - age (year)].
PIO ⁶	<ul style="list-style-type: none"> • First validated among Korean males aged <70 years to determine who would benefit from BMD screening • Considers age, weight, and smoking • Formula: [age(years) + 10 (for current smoker)]/weight(kg).

BMD bone mineral density; BMI body mass index; FRAX Fracture Risk Assessment Tool; MOF major osteoporosis fracture; OSTA Osteoporosis Self-Assessment Tool for Asians; PIO Predictive Index for Osteoporosis

Table 35. Risk factors for osteoporosis

Risk factor	Effect Estimate [95% CI]		
	General population ^a	Women 40–60 years ^b	Men ^c
BMI	BMI $\leq 18.5 \text{ kg/m}^2$: RR 2.76 [1.81, 4.22]	Increased weight/10kg lower odds <ul style="list-style-type: none"> • Lumbar spine: OR 0.43 [0.34, 0.55] • Hip: OR 0.23 [0.15, 0.36] • Femoral neck: OR 0.31 [0.24, 0.40] 	Low BMI: OR 1.12 [1.04, 1.20]
Age	Prevalence by age range <ul style="list-style-type: none"> • 50–59 yrs: 11.4% [8.4, 14.7] • 60–69 yrs: 24.8% [19.5, 30.6] • 70–79 yrs: 37.6% [30.5, 45.0] • 80–89 yrs: 40.8% [32.2, 49.7] • ≥ 90: 20.5% [18.4, 22.7] 		<ul style="list-style-type: none"> • OR 1.12 [1.07, 1.18] • >70 yrs: OR 1.52 [1.11, 2.08]
Smoking	RR 1.14 [1.04, 1.25]		Current: OR 1.49 [1.29, 1.72]
History of major fracture	RR 1.46 [1.15, 1.84]		Fractures in last 12 months: OR 2.08 [1.57, 2.77]
Others	Lower education level (less than a college degree): RR 2.32 [1.12, 4.83]	Post-menopausal status <ul style="list-style-type: none"> • Lumbar spine: OR 1.18 [1.11, 1.26] • Hip: OR 1.15 [1.05, 1.27] • Femoral neck: OR 1.09 [1.03, 1.16] 	<ul style="list-style-type: none"> • Daily excessive alcohol use or >10 drinks/week: OR 1.28 [1.08, 1.53] • Chronic corticosteroid: OR 1.29 [1.03, 1.61] • Falls within last year: OR 2.11 [1.44, 3.11] • History of hypogonadism: OR 1.76 [1.37, 2.26] • History of stroke: OR 3.73 [1.75-7.92] • History of diabetes: OR 1.57 [1.14, 2.15]

BMI body mass index; CI confidence interval; OR odds ratio; RR risk ratio

^aSystematic review with high overall confidence

^bSystematic review with low overall confidence

^cSystematic review with moderate overall confidence

4.9.3. Benefits and Harms of Screening

Fracture Reduction

Based on low-certainty evidence, screening for osteoporosis resulted in similar or lower rates of any type of fracture (pooled RR 0.98 [95% CI 0.94, 1.02]), major osteoporosis fractures (MOFs) (RR 0.98 [95% CI 0.92, 1.04]), osteoporosis-related fractures (ORFs) (RR 0.94 [95% CI 0.88, 1.01]) and hip fractures (RR 0.93 [95% CI 0.85, 1.02]) among women aged ≥ 65 years.^{4,7-9} The effect estimates reported here from an intention-to-treat analysis are more conservative than those of Merlijn's study which did a per protocol analysis.⁸

Among women aged 45–54 years, the effects of screening using DXA on the following outcomes were inconclusive: any type of fracture (RR 0.94 [95% CI 0.73, 1.21]), ORF (RR 0.82 [95% CI 0.61, 1.11]), MOFs (RR 1.01 [95% CI 0.69, 1.50]), and hip fractures (RR 0.95 [95% CI 0.19, 4.72]).¹⁰ These effects are based on very low certainty-evidence.

Mortality Reduction

There is moderate-certainty evidence that the difference in mortality rate between the screened and not screened group of women aged >65 years was inconclusive, with pooled RR 1.04 (95% CI 0.95, 1.13).^{4,8}

Quality of Life Improvement

Quality of life was similar for women aged ≥65 years who were screened and not screened as assessed by the EuroQol-5D (MD 0 [95% CI -0.01, 0.01]).⁴ However, using the Short Form 12 Health Survey (SF-12) the difference between groups was inconclusive (MD 0.10 [95% CI -0.59, 0.79]).

Safety Outcomes

The difference in anxiety scores (Screening State-Trait Anxiety Inventory, SF-12) between the screened and unscreened women was inconclusive for both low- and high-risk groups (adjusted for recruiting region, age, and baseline anxiety score). The mean difference was 0.20 (95% CI 0.00, 0.40) for the low-risk group and -0.10 (95% CI -0.47, 0.27) for the high-risk group.⁴ Differences were also inconclusive between treatment groups in the occurrence of the following adverse events: discontinuation from adverse events, mortality, upper gastrointestinal events, esophageal ulcer, acid regurgitation and atrial fibrillation.

There were more reports of esophagitis (RR 1.67 [95% CI 1.09, 2.56]) among alendronate users compared to placebo, and of any musculoskeletal pain (RR 4.56 [95% CI 2.14, 9.68]) and influenza-like illness or acute phase reactions (RR 4.41 [95% CI 3.63, 5.37]) among zoledronic acid users compared with placebo. There was less musculoskeletal pain in the denosumab group versus placebo (RR 0.78 [95% CI 0.65, 0.95]). In five RCTs, there were no recorded events of hypocalcemia and osteonecrosis of the jaw for the zoledronic acid, denosumab, and placebo groups.

There were higher events of stroke and gallbladder disease in women given combined continuous hormone therapy (CHT) or estrogen alone compared to placebo. Those given CHT had higher coronary events, venous thromboembolism, and breast cancer compared to placebo. However, the differences among these events were inconclusive when estrogen only was compared with placebo.¹¹ There were increased hot flashes in the raloxifene group compared to placebo, but there were inconclusive differences for leg cramps, deep vein thrombosis, and discontinuation from any adverse events.¹²

A summary of findings on the benefits of screening are presented in Table 36.

Table 36. Summary of findings: effects of screening versus no screening for osteoporosis among adults aged ≥65 years and aged 45–54 years

Outcomes	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Adults aged ≥65 years				
ORF reduction	2 RCTs (n=23,404) ^{4,8}	RR 0.94 [0.88, 1.01]	As good as or better	Moderate
MOF reduction	2 RCTs (n=45,150) ^{8,9}	RR 0.98 [0.92, 1.04]	As good as or better	Low
Hip fracture reduction	4 RCTs (n=60,833) ^{4,7-9}	RR 0.93 [0.85, 1.02]	As good as or better	Low

Outcomes	No. of Studies (No. of Participants)	Effect Estimate [95% CI]	Interpretation	Certainty of Evidence
Adults aged ≥65 years				
All-fracture reduction	4 RCTs (n=60,833) ^{4,7-9}	RR 0.98 [0.94, 1.02]	As good as or better	Low
Mortality	2 RCTs (n=23,404) ^{4,8}	RR 1.04 [0.95, 1.13]	Inconclusive	Moderate
QOL improvement (EuroQoL-5D ^a)	1 RCT (n=12,483) ⁴	MD 0.00 [-0.01, 0.01]	Equivalent	High
QOL improvement (SF-12 ^b)	1 RCT (n=12,483) ⁴	MD 0.10 [-0.59, 0.79]	Inconclusive	High
Adults aged 45–54 years				
ORF reduction	1 RCT (n=4,800) ¹⁰	RR 0.82 [0.61, 1.11]	Inconclusive	Very Low
MOF reduction	1 RCT (n=4,800) ¹⁰	RR 1.01 [0.69, 1.50]	Inconclusive	Very Low
Hip fracture reduction	1 RCT (n=4,800) ¹⁰	RR 0.95 [0.19, 4.72]	Inconclusive	Very Low
All-fracture reduction	1 RCT (n=4,800) ¹⁰	RR 0.94 [0.73, 1.21]	Inconclusive	Very Low

MOF major osteoporosis fractures; ORF osteoporosis-related fractures; QOL quality of life

^a0-1; 1=best health state

^b0-100; 100=best physical health function

4.9.4. Diagnostic Performance of Screening Tests

The pooled estimates could not be derived due to variations in cutoffs among index tests.

Fracture Risk Assessment Tool

The National Osteoporosis Foundation suggested a treatment threshold of 10-year fracture probability $\geq 3\%$ for hip fractures or $\geq 20\%$ for MOFs, but different thresholds have been investigated in several countries. In the Philippines, the validated cutoffs for FRAX with or without BMD are $\geq 1.2\%$ for hip fractures or $\geq 3.75\%$ for MOFs.¹³ The sensitivity was 80–94% with a specificity of 74–93% for FRAX with BMD, while the sensitivity was 74–93% and the specificity was 81–84% for FRAX without BMD.

Osteoporosis Self-Assessment Tool for Asians

OSTA has been validated in the Philippines with a sensitivity of 97.56% and a specificity of 59.19% for women, and a sensitivity of 90.91% and a specificity of 66.12% for men.¹⁴ The cutoff of 0.712 was suggested to discriminate between high- and low-risk patients.¹⁵

Predictive Index for Osteoporosis

PIO has been validated in the Philippines for both men and women, with a sensitivity of 57.58% and a specificity of 58.33% for a cutoff of 0.686.¹⁵

4.9.5. Cost Implication

The cost of osteoporosis is associated with fractures induced by the disease, and the main drivers of expenditures are hospital and surgical charges.¹⁶ The average out-of-pocket expenditure per patient in a tertiary government hospital was PHP 36,333.55 (USD 751.09), whereas the average implant cost was PHP 18,686.21 (USD 385.68).¹⁷ The average overall treatment cost was PHP 138,007.31 (USD 2,852.91), with the hospital covering 47.29% of the cost. The Z package rate for total hip prosthesis (cemented) for members ≥ 66 years old is PHP 103,400.00, while the Z package rate for total hip prosthesis (cementless) for members 65 years and 364 days old and below is PHP 169,400.00.¹⁸

In a cost-effectiveness analysis of rural women with limited access to DXA scans, the BMD-based strategy had an incremental cost-effectiveness ratio of USD 140,800.00 per QALY gained for those with travel distances of 25–39 miles. The clinical risk factor-based strategy would be more efficient and less costly than other strategies for those traveling >40 miles.¹⁹ In comparison to usual management, screening 1,000 patients prevented nine hip fractures and 20 non-hip fractures over the course of the remaining lifetime (mean 14 years) in the 2017 economic study of the Screening for Prevention of Fractures in Older Women (SCOOP) trial.²⁰ Screening for osteoporosis may have gained 0.015 QALYs per patient and saved £286.00 (PHP ~19,000.00) in costs.

The screening tests (FRAX, OSTA and PIO) have no cost, but the DXA scan may cost from PHP 3,000.00–7,000.00 per test (Table 37). Depending on the medication a patient prefers, osteoporosis treatment can cost anywhere between PHP 7,000.00–25,000.00 per year (Table 38).

Table 37. Costs of DXA scan at various institutions

Institution	Type	Cost
Capitol Medical Center	Central	PHP 4,276.00
St Luke's Hospital - QC	Central	PHP 6,605.00
Makati Medical Center	Central	PHP 6,255.00
Philippine General Hospital	Routine	PHP 2,995.00
	Whole Body	PHP 3,740.00
Manila Doctors Hospital	Central	PHP 5,800.00
	Whole Body	PHP 5,800.00
	Forearm (Additional)	PHP 1,950.00
New World Diagnostics	Routine	PHP 3,125.00

Table 38. Costs of antiosteoporosis medications

Item	Brand	Dose (mg)	Cost per unit	Frequency	Cost per year	Source
Alendronate	Alendra	70	PHP 342.25.00	Weekly	PHP 17,797.00	Mercury Drug, South Star & Rose Pharmacy
Alendronate	Aldren	70	PHP 210.00	Weekly	PHP 10,920.00	Mercury Drug
Denosumab	Prolia	60	PHP 12,105.00	2x/year	PHP 24,210.00	Mercury Drug
Conjugated Estrogen	Premarin	0.625	PHP 39.25	1x/day	PHP 14,326.25	Mercury Drug
Raloxifene	Larfen	60	PHP 69.50	1x/day	PHP 25,367.00	Mercury Drug
Zoledronic Acid	Zobone	4	PHP 7,142.75	Yearly	PHP 7,142.75	Mercury Drug
Zoledronic Acid	Zometa	4	PHP 11,600.00	Yearly	PHP 11,600.00	Mercury Drug

4.9.6. Equity, Acceptability, and Feasibility

The fracture risk assessment tools (OSTA, PIO and FRAX without BMD) are simple to use and have no cost. However, access to DXA scan may be a challenge economically and geographically. During focus group discussions and key informant interviews, screening for osteoporosis was viewed by women as both a moral obligation and a chance to halt osteoporosis progression.²¹ Due to the lack of symptoms and lack of interference with daily

activities, patients may not perceive osteoporosis to be worrisome. The DXA scan may cause anxiety attributable to false-positive results, as well as concerns related to the stigma of being branded as patients at high risk for osteoporosis or as "sick" people with a chronic disease.^{22,23}

4.9.7. Recommendations from Other Groups

Five groups advocate using a risk assessment tool (FRAX or OSTA) for the assessment of clinical risk factors in postmenopausal women to determine who will get BMD measurements.^{3,24-27} In 2018, the USPSTF recommended testing BMD in postmenopausal women aged ≥65 years. Concerning fracture risk in men, the USPSTF found insufficient evidence to recommend screening; however, the Endocrine Society advised BMD assessment in people aged ≥70 years and those <70 years who have risk factors.^{3,28}

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5. Research Implications/Gaps

There was limited evidence on the benefits and harms of screening (compared to no screening) for the selected MSDs among the asymptomatic, apparently healthy Filipino population. One of the limitations of the evidence was its indirectness. For some questions, the available evidence on screening came from specific subgroups of the general population—e.g., office workers, kitchen workers, and hospital orderlies for WRMSD; overweight or obese children for physical inactivity; athletes for MSKI; and women ≥ 65 years old for osteoporosis—and may not be generalizable to the entire apparently healthy population. The available data on the effectiveness of linked management of some conditions, such as physical inactivity, were for high-risk groups only.

More studies are needed to substantiate evidence on the use of the recommended screening tools. There are currently no standardized tools for screening of WRMSD, physical inactivity, and risk of falls. Most of the available tools have also not been locally validated. In the case of screening for WRMSD, the screening tools included in this review could only be used for specific occupations and may not apply to the general population of working individuals. Screening for sarcopenia and risk of MSKI are also limited by the lack of locally validated cut-offs.

Future studies could also investigate the resources required and cost-effectiveness of screening, patient values and preferences, and the acceptability, feasibility, and equity of screening for the selected MSDs. Only a few of these studies were found to support screening for MSDs, and most of these studies were conducted in Western countries.

6. Dissemination and Implementation

6.1. Dissemination

A full copy of this document will be sent to the DOH for transmittal and publication. The Disease Prevention and Control Bureau will transmit copies of this CPG to PHIC, health maintenance organizations (HMOs) and NGOs involved in a periodic health examination.

The DOH plans to develop a simplified version of this CPG and to make it available in a format that will be ready for reproduction and dissemination to patients in different healthcare settings. It will also be available electronically for interested parties who might visit the DOH website. The different medical societies and other stakeholders may also include the guidelines in their own websites and discuss the recommendations during medical conventions and other educational activities. The guideline will be disseminated to the general public through discussions in trimedia.

6.2. Implementation and Monitoring

The SC will develop a program of monitoring to determine the best practices of relevant stakeholders in terms of screening for MSDs. Monitoring the use of this CPG may also be a subject of research by interested parties.

As one of the PHEX guidelines, its recommendations will be incorporated into an online application that can be accessed by PCPs and patients. For any individual person, after provision of basic demographic data, the application will enumerate the screening tests that should be done. The use of the app can serve as documentation of the uptake of the CPG. Once included in the PHIC packages, uptake of the CPG through monitoring of reimbursement for screening can also be monitored.

7. Applicability Issues

7.1. Organizational Considerations to Implementation

Comprehensive history taking, physical examination, and monitoring are essential parts of evaluating risk factors and the probability of developing diseases. This CPG does not necessarily supersede the consumers' (i.e., health professionals, hospital administrators, employers, payors, patients) values, settings, and circumstances. Although this CPG intends to influence the direction of health policies for the general population, it should not be the sole basis for recreating or abolishing practices that aim to improve the health conditions of many Filipinos, particularly those who are part of the workforce.

7.2. Resource Implications

Although considered important factors in arriving at a recommendation, data was limited on the cost-effectiveness of screening and risk assessment of MSDs and their risk factors at the local setting. Health technology assessment is vital to ensuring that the investments the government will make to implement this CPG will be cost-effective.

8. Updating of the Guidelines

The recommendations herein shall hold until new evidence on screening, diagnosing, or managing various risk factors and MSDs emerges, or after three (3) years when contingencies dictate updating this Philippine Guidelines on Periodic Health Examination.

Table 39. Proposed process and timeline for updating the guideline

PROCESS	RESPONSIBLE UNIT/ ORGANIZATION	FREQUENCY	TIMELINE
1. Review of current evidence relevant to MSD screening and risk assessment	SC and TWG	Annual	2024-2026
2. Review of feedback on the MSD CPG by end users	SC	Annual	2024-2026
3. Amendment to the recommendations if new strong evidence becomes available	SC, TWG, and CP	N/A	2024-2026
4. Major update of the MSD CPG based on recent evidence and feedback obtained using the questionnaire	SC, TWG, and CP DOH	N/A	2025-2026

9. Appendices

9.1 PERIODIC HEALTH EXAMINATION TASK FORCE ON MUSCULOSKELETAL DISORDERS 2022-2023

Steering Committee:	Evelyn O. Salido, MD, MSc (Chair) Ranali Mendoza, MD (Co-Chair) Bernadette Heizel Reyes, MD, MHPED Nathaniel Orillaza, MD Carl Leochico, MD
Technical Coordinator:	Ivan Burog, MD
Evidence Review Experts:	Howell Henrian G. Bayona, RSLP, MSc Kerwyn Jim C. Chan, RSLP, Msc Vaneza Leah A. Espino, MD, FPPS, DPAPP Mark David Francisco, MD, FPCP, FPCEDM Myzelle Anne J. Infantado, PTRP, MSc (cand) Rich Ericson C. King, MD, FPCP, DPSMO Cary Amiel G. Villanueva, MD, MPH Mithi Kalayaan S. Zamora, MD, FPCP, FPCCP
Consensus Panelists:	Zenaida Aquino Christine B. Bernal, MD, FPPS, FPRA Amanda Glenda M. Bonife-Kiamko Ma. Teresita S. Cucueco, MD, MOH, FPCOM Myrna S. Estrada, MD, MBA, FPARM, DPCOM Ivy Catherine Rivera-Go, MD, FPCP, FPRA Cheridine P. Oro- Josef, MD, MMHoA, FPAFP, FPCGM Ma. Zaela Vanessa M. Mailom, MD, DPCOM, FPAPSHI Robert Matthew A. Marquez, MAN, RN Kenneth Charles V. Mutia, PTRP Ameena Tara X. Santos, MD, FPOA Reynold Sta. Ana, MD, MOH, FPCOM Endrik H. Sy, MD, FPAFP
External Reviewers:	Ruth Padua, MD, FPOA (Ortho) Sandra Torres, MD, FPCP, FPRA (Rheuma) Jose Alvin Mojica, MD, MHPED, FPARM (Rehab)
Facilitator:	Diana Tamondong-Lachica, MD, FPCP
Technical Writer:	Isabel Teresa O. Salido
Administrative Officer:	Ma. Caroline Peralta, DMD

9.2 PERIODIC HEALTH EXAMINATION PHASE 3 CENTRAL COMMITTEE

Program Leader:	Ian Theodore Cabaluna, MD, GDip, MSc (cand.)
Co-Program Leaders:	Leonila Dans, MD, MSc Marissa Alejandria, MD, MSc
Steering Committee Members:	Antonio Dans, MD, MSc Dante Morales, MD Diana Tamondong-Lachica, MD Aileen Espina, MD Maria Vanessa Sulit, RN, MSc
Program Manager:	Josephine Sanchez, RN
Assistant Program Manager:	Lea Galia, MD
Administrative Staff:	Pamela Tagle Lailanie Tejuco
COI Committee Members:	Dante Morales, MD, FPCP Antonio Dans, MD, MSc Maria Vanessa Sulit, RN, MSc Angela Du, MD Camilo Te, MD Miriam Timonera, MD
COI Administrative Officer:	Ivy Cruz

9.3 SUMMARY OF COI DECLARATIONS

Steering Committee

Name	Expertise	Summary of Declared COIs	Management
Evelyn Osio Salido, MD, MSc, FPCP, FPRA	Internal Medicine Rheumatology Clinical Epidemiology	Non-financial COI	COIC recommended transfer of uric acid question to Renal TF
Nenacia Ranali Nirena P. Mendoza, MD, FPAFP	Family Medicine Clinical Epidemiology	None	COIC recommended as co-chair instead of Dr. Reyes.
Carl Froilan D. Leochico, MD DPBRM, FPARM	Rehabilitation Medicine	Non-financial COI	Declared: CAP-UPCM, MS III-UPPGH; Special Editor – Acta Medica (Rehab Med Special Issue)-Android based physical monitoring app
Bernadette Heizel D. Manapat-Reyes, MD, MHPEd, FPCP, FPRA	Internal Medicine Rheumatology Medical Education	Financial COI – owns stocks in rehab medica that performs screening; gives lectures sponsored by pharma	COIC recommended transferring her to another TF where she has no COI. The central committee approved her as a minority member of the SC. Her contributions were corroborated by the Chair, Co-chair, and another SC member.
Nathaniel S. Orillaza, MD, MSc (cand), FPOA	Orthopedics Clinical Epidemiology	Financial COI – speaker and adviser for different pharma companies: Viatris (celecoxib, pregabalin, glucosamine), Menarini (dexketoprofen, ketoprofen gel, dexketoprofen + tramadol), Multipharma speaker – Betaplast, Delex Pharma	COIC recommended transferring him to another TF where he has no COI. The central committee approved him as a minority member of the SC. His contributions were corroborated by the Chair, Co-chair, and another SC member.

Technical Working Group

Name	Expertise	Summary of Declared COIs	Management
Technical Facilitator			
Diana Tamondong-Lachica, MD, FPCP	Internal Medicine	Non-financial COI	Declared involvement PHEX 1 and 2; editor-in-chief of the JAPMC and promoter of wellness through lectures
Technical Coordinator			
Aldrich Ivan Lois Burog, MD, MSc (cand)	Clinical Epidemiology	Non-financial COI	Declared work as Senior Medical Science Liaison – Diabetes for AstraZeneca Pharmaceuticals (Phils.) Inc
Evidence Review Expert			
Rich Ericson C. King, MD, FPCP, DPSMO (WRMSD)	Internal Medicine Oncology Clinical Epidemiology	Indirect financial conflict. Received funds from drug-sponsored trials	Paired with another ERE who had no COI
Kerwyn Jim C. Chan, RSLP, Msc (Low vitamin D)	Speech Language Pathology Clinical Epidemiology	None	-
Mark David Francisco, MD, FPCP, FPCEDM (Osteoporosis)	Internal Medicine Endocrinology Clinical Epidemiology	None	-
Myzelle Anne J. Infantado, PTRP, MSc (cand) (Risk of falls)	Physical Therapy Clinical Epidemiology	None	-
Vaneza Leah A. Espino, MD, FPPS, DPAPP (Scoliosis)	Pediatrics Pulmonology	None	-
Cary Amiel G. Villanueva, MD, MPH (GALS/pGALS)	Internal Medicine	None	-
Howell Henrian G. Bayona, RSLP, MSc (Risk of MSKI, Sarcopenia)	Speech Language Pathology Clinical Epidemiology	None	-
Mithi Kalayaan S. Zamora, MD, FPCP, FPCCP (Physical inactivity)	Internal Medicine Pulmonary Clinical Epidemiology	None	-
Technical Writer			
Isabel Teresa O. Salido	Public Health	None	-

Consensus Panel

Name	Affiliation	Summary of Declared COIs	Management
Ivy Catherine Rivera-Go, MD, FPCP, FPRA	Philippine Rheumatology Association	Non-financial COI	Declared practicing rheumatologist
Reynold Sta. Ana, MD, MOH, FPCOM	Philippine College of Occupational Medicine	Non-financial COI	Declared specializes in occupational medicine
Christine B. Bernal, MD, FPPS, FPRA	Philippine Pediatric Society	Non-financial COI	Declared practicing pediatric rheumatologist
Amanda Glenda M. Bonife- Kiamko	Philippine Alliance of Patient Organizations	Non-financial COI	Declared president and founder of Scoliosis Philippines Support Group, Inc.; financial advisor of AXA Philippines, Davao City (June 2019-present)
Zenaida Aquino	Philippine Alliance of Patient Organizations	None	-
Ma. Zaela Vanessa M. Mailom, MD, DPCOM, FPAPSHI	Philippine Academy of Physicians in School Health, Inc	Non-financial COI	Declared practicing occupational medicine
Kenneth Charles V. Mutia, PTRP	Philippine Physical Therapy Association, Inc	None	-
Robert Matthew A. Marquez, MAN, RN	Philippine Society of Geriatrics and Gerontology	None	-
Ameena Tara X. Santos, MD, FPOA	Philippine Orthopedics Association	None	-
Ma. Teresita S. Cucueco, MD, MOH, FPCOM	Department of Labor and Employment	Non-financial COI	Declared Director IV Bureau of Working Conditions (DOLE); Former Assistant Secretary (DOLE)
Myrna S. Estrada, MD, MBA, FPARM, DPCOM	Philippine Academy of Rehabilitation Medicine	None	-
Endrik H. Sy, MD, FPAFP	Philippine Academy of Family Physicians	None	-
Cheridine P. Oro- Josef, MD, MMHoA, FPAFP, FPCGM	Osteoporosis Society of the Philippines Foundation, Inc.	Non-financial COI	Declared National Board of Director for OSPFI; author of research paper entitled <i>The Effect of Dietary Supplementation and Exercise on the Muscle Mass of Older Persons 60 years old and Above in Marikina</i>

9.4 SEARCH STRATEGY

Question 1. Screening for musculoskeletal disease

Database: **PubMed (pGALS / GALS)**

Date and time: 19 September 2022 23:19

#	Query	Results
1	GALS	140
2	pGALS	24
3	gait AND arm AND leg AND spine	27
4	((GALS) OR (pGALS)) OR (gait AND arm AND leg AND spine)	178

Database: **PubMed (linked management)**

Date and time: 14 December 2022 18:45

#	Query	Results
1	"Arthritis, Rheumatoid"[Mesh]	123,444
2	"Antirheumatic Agents"[Mesh]	118,236
3	rheumatoid arthritis[Title/Abstract]	118,689
4	("Arthritis, Rheumatoid"[Mesh]) OR (rheumatoid arthritis[Title/Abstract])	162,781
5	early[Title/Abstract] OR delay[Title/Abstract]	1,953,117
6	(("Arthritis, Rheumatoid"[Mesh]) OR (rheumatoid arthritis[Title/Abstract])) AND (early[Title/Abstract] OR delay[Title/Abstract])	13,382
7	therapy[Title/Abstract] OR referral[Title/Abstract]	2,341,294
8	((("Arthritis, Rheumatoid"[Mesh]) OR (rheumatoid arthritis[Title/Abstract])) AND (early[Title/Abstract] OR delay[Title/Abstract])) AND (therapy[Title/Abstract] OR referral[Title/Abstract])	3,265
9	((("Arthritis, Rheumatoid"[Mesh]) OR (rheumatoid arthritis[Title/Abstract])) AND (early[Title/Abstract] OR delay[Title/Abstract])) AND (therapy[Title/Abstract] OR treatment[Title/Abstract] OR management[Title/Abstract])	7,131
10	(DMARD[Title/Abstract]) OR ("Antirheumatic Agents"[Mesh])	119,036
11	(("Arthritis, Rheumatoid"[Mesh]) OR (rheumatoid arthritis[Title/Abstract])) AND ((DMARD[Title/Abstract]) OR ("Antirheumatic Agents"[Mesh]))	22,306
12	((("Arthritis, Rheumatoid"[Mesh]) OR (rheumatoid arthritis[Title/Abstract])) AND ((DMARD[Title/Abstract]) OR ("Antirheumatic Agents"[Mesh]))) AND (early[Title/Abstract] OR delay[Title/Abstract])	3,197

Database: **Cochrane Library**

Date and time: 19 September 2022 10:36

#	Query	Results
1	GALS	8
2	pGALS	0
3	gait AND arm AND leg AND spine	28
4	#1 OR #2 OR #3	35

Database: **EMBASE**

Date and time: 19 September 2022 16:34

#	Query	Results
1	GALS.ti,ab	228
2	pGALS.ti,ab.	75

#	Query	Results
3	(gait and arm and leg and spine).ab,ti.	36
4	1 or 2 or 3	331

Question 2. Screening for scoliosis

#	Query	Results
1 AND 2	Search: (scoliosis) AND (screening) ("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields] OR "scolioses"[All Fields]) AND ("diagnosis"[MeSH Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields] OR "screen"[All Fields] OR "screenings"[All Fields] OR "screened"[All Fields] OR "screens"[All Fields])	13,022
2 AND 3	Search: (idiopathic scoliosis) AND (screening) ("idiopathic"[All Fields] OR "idiopathically"[All Fields] OR "idiopathics"[All Fields]) AND ("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields] OR "scolioses"[All Fields]) AND ("diagnosis"[MeSH Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields] OR "screen"[All Fields] OR "screenings"[All Fields] OR "screened"[All Fields] OR "screens"[All Fields])	4,083
1 AND 2	Search: (scoliosis) AND (screening) Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review (("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields] OR "scolioses"[All Fields]) AND ("diagnosis"[MeSH Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields] OR "screen"[All Fields] OR "screenings"[All Fields] OR "screened"[All Fields] OR "screens"[All Fields])) AND (clinicaltrial[Filter] OR meta-analysis[Filter] OR randomizedcontrolledtrial[Filter] OR systematicreview[Filter])	486
2 AND 3	Search: (idiopathic scoliosis) AND (screening) ("idiopathic"[All Fields] OR "idiopathically"[All Fields] OR "idiopathics"[All Fields]) AND ("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields] OR "scolioses"[All Fields]) AND ("diagnosis"[MeSH Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields] OR "screen"[All Fields] OR "screenings"[All Fields] OR "screened"[All Fields] OR "screens"[All Fields])	4,083
3 AND 4	Search: (idiopathic scoliosis) AND (treatment) ("idiopathic"[All Fields] OR "idiopathically"[All Fields] OR "idiopathics"[All Fields]) AND ("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields] OR "scolioses"[All Fields]) AND ("therapeutics"[MeSH Terms] OR "therapeutics"[All Fields] OR "treatments"[All Fields] OR "therapy"[MeSH Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "treatment s"[All Fields])	6,196

#	Query	Results
5	Search: (#3) AND (#4) AND (children) ("idiopathic"[All Fields] OR "idiopathically"[All Fields] OR "idiopathics"[All Fields]) AND ("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields] OR "scolioses"[All Fields]) AND ("therapeutics"[MeSH Terms] OR "therapeutics"[All Fields] OR "treatments"[All Fields] OR "therapy"[MeSH Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "treatment s"[All Fields]) AND ("child"[MeSH Terms] OR "child"[All Fields] OR "children"[All Fields] OR "child s"[All Fields] OR "children s"[All Fields] OR "childrens"[All Fields] OR "childs"[All Fields])	3,522

Question 3. Screening for work-related musculoskeletal disorders

Database: MEDLINE

Date: 19 September 2022

#	Query	Results
	Filters: Clinical Trial, Meta-Analysis, Randomized Controlled Trial	
1	"musculoskeletal diseases"[MeSH] OR "musculoskeletal pain"[MeSH] OR "occupational diseases"[MeSH] OR "occupational injuries"[MeSH] OR "occupational health"[MeSH] OR "cumulative trauma disorders"[MeSH] OR "carpal tunnel syndrome"[MeSH] OR "shoulder pain"[MeSH] OR "neck pain"[MeSH] OR "back pain"[MeSH] OR "leg injuries"[MeSH] OR "back injuries"[MeSH] OR "neck injuries"[MeSH] OR "arm injuries"[MeSH] OR "hand injuries"[MeSH] OR "upper extremity"[MeSH] OR "lower extremity"[MeSH] OR "muscle fatigue"[MeSH] OR posture[MeSH] OR movement[MeSH] OR fatigue[MeSH] OR "physical exertion"[MeSH]	146,442
2	"occupational overuse"[tw] OR "tension neck"[tw] OR "cumulative trauma"[tw] OR musculoskeletal*[tw] OR skeletal*[tw] OR pain[tw] OR disorder*[tw] OR "carpal tunnel"[tw] OR discomfort[tw] OR well-being[tw] OR wellbeing[tw] OR myalgia[tw] OR muscle*[tw] OR muscular*[tw] OR postur*[tw] OR position*[tw]	271,021
3	(repetiti*[tw] OR monoton*[tw]) AND (strain[tw] OR stress[tw] OR motion[tw] OR movement[tw] OR workload*[tw] OR task[tw] OR tasks[tw]) AND (injur*[tw] OR disorder*[tw] OR disease*[tw] OR decreas*[tw] OR reduc*[tw])	1,438
4	#1 OR #2 OR #3	346,773
5	workplace[MeSH] OR work[MeSH] OR "work schedule tolerance"[MeSH] OR work*[tw] OR occupation*[tw] OR job[tw] OR jobs[tw] OR employee*[tw]	55,963
6	#4 AND #5	25,586
7	"mass screening"[MESH] or "early diagnosis"[MESH]	24,961
8	#6 AND #7	607

Database: CENTRAL

Date: 19 September 2022

#	Query	Results
1	(workplace or work or occupation or job or employee or seafarer or driver or masonry or carpenter or construction or office or home):ti,ab,kw (Word variations have been searched)	176,401
2	(pain OR injury OR discomfort OR strain OR disorder OR disability):ti,ab,kw (Word variations have been searched)	457,473
3	(Musculoskeletal OR occupational OR overuse OR ergonomic OR repetitive OR posture):ti,ab,kw (Word variations have been searched)	60,350
4	(Screening or examination):ti,kw	41,133

#	Query	Results
	(Word variations have been searched)	
5	#1 AND #2 AND #3 AND #4 in Cochrane Reviews and Trials	294

Database: **HERDIN**

Date: 19 September 2022

#	Query	Results
1	Work	1,959
2	Musculoskeletal	212
3	#1 AND #2	47

Question 4. Screening for physical inactivity

Initial Search

Database: **Hand searching, Google Scholar, Cochrane and PUBMED**

Date: November 2022

Publication dates: 2000–2022

Filters: Randomized Controlled Trials, Meta-Analysis

#	Query	Results
1	"physical inactivity"[All Fields] OR "sedentary lifestyle"[All Fields]	14, 393
2	"assessment tools"[All Fields]	12,885
3	"healthy"[All Fields] OR "asymptomatic"[All Fields]	1,168,650
4	#1 AND #2 AND #3	1
5	"International Physical Activity Questionnaire"[All Fields] OR "General Practice Physical Activity Questionnaire"[All Fields] OR "Global Physical Activity Questionnaire"[All Fields]	3,230
6	#1 AND #2 AND #5	2
7	("International Physical Activity Questionnaire"[All Fields] OR "General Practice Physical Activity Questionnaire"[All Fields] OR "Global Physical Activity Questionnaire"[All Fields]) AND (randomizedcontrolledtrial[Filter])	193
8	("International Physical Activity Questionnaire"[All Fields] OR "General Practice Physical Activity Questionnaire"[All Fields] OR "Global Physical Activity Questionnaire"[All Fields]) AND (meta-analysis[Filter] OR randomizedcontrolledtrial[Filter])	203
9	#8 AND #3 Filters: Meta-Analysis, Randomized Controlled Trials	45

Subsequent Search

Database: **Hand searching, Google Scholar, Cochrane and PUBMED**

Date: March 2023

Publication date: 2000 - 2022

Filters: Randomized Controlled Trials, Meta-Analysis

#	Query	Results
1	"physical activity" [MeSH]	242,211
2	"primary health care" [MeSH]	188,838
3	#1 AND #2	1,536
4	"surveys and questionnaires" [MeSH]	1,199,920

#	Query	Results
5	"vital signs" [MeSH]	437,206
6	#1 AND #2 AND #5	2
7	"sedentary behavior" [MeSH]	13,360
8	#7 AND #5	724
9	#8 AND #3	1
10	"accelerometry"[MeSH Terms] AND "body mass index"[MeSH Terms]	850
11	#10 AND #3	4
12	#3 AND (#4 OR #5 OR #10)	337
13	"sedentary behavior"	16,010
14	#12 AND #13	
15	"assessment tool"	23,304
16	(#12 OR #13) AND #16	51

Question 5. Screening for risk of musculoskeletal injuries

Database: MEDLINE

Date: 29 September 2022

Query	Results
<u>Search strategy for studies on movement screening tests:</u> ("Athletic Injuries"[MeSH Terms] OR "musculoskeletal injury"[Title/Abstract] OR "sports injury"[Title/Abstract] OR "Athletic Injuries"[Title/Abstract] OR "injury risk"[Title/Abstract]) AND ("Mass Screening"[MeSH Terms] OR "screening"[Title/Abstract] OR "screening test"[Title/Abstract] OR "diagnostic tests, routine"[MeSH Terms])	996
<u>Search strategy for studies on risk factors or questionnaires for screening:</u> (("screening"[Title/Abstract] AND (("musculoskeletal"[Title/Abstract] AND ("injury"[Title/Abstract] OR "injuries"[Title/Abstract])) OR "musculoskeletal injur*"[Title/Abstract]) AND ("risk"[Title/Abstract] OR "risk factor"[Title/Abstract])) OR ("screening"[Title/Abstract] AND (("musculoskeletal"[Title/Abstract] AND ("injury"[Title/Abstract] OR "injuries"[Title/Abstract])) OR "musculoskeletal injur*"[Title/Abstract]) AND "questionnaire"[Title/Abstract])) AND ((clinicaltrial[Filter] OR meta-analysis[Filter] OR observationalstudy[Filter] OR practiceguideline[Filter] OR randomizedcontrolledtrial[Filter] OR review[Filter] OR systematicreview[Filter]) AND (fft[Filter]))	60

Database: EMBASE

Date: 29 September 2022

Query	Results
<u>Search strategy for studies on movement screening tests:</u> ('musculoskeletal injuries':ab,ti OR musculoskeletal:ab,ti OR 'sport injury':ab,ti OR 'sports injuries':ab,ti) AND ('mass screening':ab,ti OR 'screening test':ab,ti OR 'preparticipation screening' OR 'preparticipation evaluation')	92
<u>Search strategy for studies on risk factors or questionnaires for screening:</u> musculoskeletal:ti,ab AND (injury:ti,ab OR injuries:ti,ab) AND (risk:ti,ab OR 'risk factor':ti,ab) AND screening:ti,ab AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) AND	25

Query	Results
[embase]/lim NOT ([embase]/lim AND [medline]/lim) AND ('article'/it OR 'article in press'/it OR 'review'/it)	

Database: **clinicaltrials.gov**

Date: 29 September 2022

Query	Results
musculoskeletal injury AND screening	35

Database: **HERDIN**

Date: 29 September 2022

Query	Results
Musculoskeletal injury OR sports injury	25

Question 6. Screening for low vitamin D

Initial Search

Database: **MEDLINE (PubMed)**

Date: 14 December 2022

#	Query	Results
1	"vitamin d"[MeSH Terms]	66,297
2	vitamin d deficiency[MeSH Terms]	31,554
3	hypovitaminosis d[Title/Abstract]	2,086
4	#1 OR #2 OR #3	79,596
5	"mass screening"[MeSH Terms]	141,426
6	"diagnostic tests, routine"[MeSH Terms]	14,892
7	vitamin d test*[Title/Abstract]	199
8	vitamin d assay[Title/Abstract]	91
9	#5 OR #6 OR #7 OR #8	155,701
10	#4 AND #9	469

Database: **Cochrane CENTRAL**

Date: 14 December 2022

#	Query	Results
1	MeSH descriptor: [Vitamin D] explode all trees	6,163
2	MeSH descriptor: [Vitamin D Deficiency] explode all trees	1,701
3	(hypovitaminosis d):ti,ab,kw	366
4	#1 OR #2 OR #3	6,482
5	MeSH descriptor: [Mass Screening] explode all trees	4,127
6	MeSH descriptor: [Diagnostic Tests, Routine] explode all trees	256
7	(vitamin d test*):ti,ab,kw	4,055
8	(vitamin d assay):ti,ab,kw	614
9	#5 OR #6 OR #7 OR #8	8,796
10	#4 AND #9	1,409

Subsequent Search

Database: **MEDLINE (PubMed)**

Date: 14 December 2022

#	Query	Results
1	"administration, oral"[MeSH Terms]	156,275
2	"parenteral nutrition"[MeSH Terms]	25,121
3	"prescriptions"[MeSH Terms]	40,383
4	"diet"[MeSH Terms]	317,969
5	#1 OR #2 OR #3 OR #4	533,247
6	"vitamin d/administration and dosage"[MeSH Terms]	11,114
7	"vitamin d/adverse effects"[MeSH Terms]	3,006
8	"vitamin d/complications"[MeSH Terms]	1
9	"vitamin d/poisoning"[MeSH Terms]	334
10	"vitamin d/therapeutic use"[MeSH Terms]	24,125
11	"vitamin d/toxicity"[MeSH Terms]	457
12	#6 OR #7 OR #8 OR #9 OR #10 OR #11	24,473
13	#5 OR #12	554,998
14	"vitamin d deficiency"[MeSH Terms]	31,554
15	#13 AND #14 Filter: Randomized Controlled Trial, Humans	858

Database: **Cochrane CENTRAL**

Date: 14 December 2022

#	Query	Results
1	MeSH descriptor: [Administration, Oral] this term only	24,046
2	MeSH descriptor: [Parenteral Nutrition] this term only	1,044
3	MeSH descriptor: [Prescriptions] this term only	147
4	MeSH descriptor: [Diet] this term only	7,532
5	#1 OR #2 OR #3 OR #4	32,641
6	MeSH descriptor: [Vitamin D] explode all trees	6,163
7	MeSH descriptor: [Vitamin D Deficiency] explode all trees	1,701
8	#6 OR #7	6,297
9	#5 AND #8	461

Question 7. Screening for risk of falls

Guideline Search

- U.S. Preventive Services Task Force (2018)
- NICE Guidelines (2013)

Database: **MEDLINE (PubMed)**

Date: 21 August 2022

Keywords	Query	Results	Hits
Fall risk evaluation, fall risk screening, tests for fall risk, fall, elderly mobility scale, fall risk	((((((((fall risk[Title/Abstract]) OR (fall[Title/Abstract]))) OR (fall risk screening[Title/Abstract])) OR (fall risk assessment[Title/Abstract])) OR (fall risk evaluation[Title/Abstract])) OR (fall risk evaluation[Title/Abstract])) OR (elderly mobility	139,661	-

Keywords	Query	Results	Hits
assessment, elderly fall screening	scale[Title/Abstract])) OR (fall screening[Title/Abstract])) OR (fall evaluation[Title/Abstract])) OR (fall evaluation[Title/Abstract])) OR (fall assessment[Title/Abstract])) OR (accidental fall[MeSH Terms]))		
Elderly, older adults, 60 years	((((((((frail older adult[MeSH Terms])) OR (older adult[MeSH Terms])) OR (elderly[MeSH Terms])) OR (older adult[Title/Abstract])) OR (adult[Title/Abstract])) OR (adult[MeSH Terms])) OR (elderly[Title/Abstract])) OR (60 years old[Title/Abstract])) OR (60 years*[Title/Abstract]))	8,392,878	-
	(((((((((fall risk[Title/Abstract])) OR (fall[Title/Abstract])) OR (fall risk screening[Title/Abstract])) OR (fall risk assessment[Title/Abstract])) OR (fall risk evaluation[Title/Abstract])) OR (fall risk evaluation[Title/Abstract])) OR (elderly mobility scale[Title/Abstract])) OR (fall screening[Title/Abstract])) OR (fall evaluation[Title/Abstract])) OR (fall evaluation[Title/Abstract])) OR (fall assessment[Title/Abstract])) OR (accidental fall[MeSH Terms])) AND (((((((frail older adult[MeSH Terms]) OR (older adult[MeSH Terms])) OR (elderly[MeSH Terms])) OR (older adult[Title/Abstract])) OR (adult[Title/Abstract])) OR (adult[MeSH Terms])) OR (elderly[Title/Abstract])) OR (60 years old[Title/Abstract])) OR (60 years*[Title/Abstract]))	59,378	-
	Filter: meta-analysis	289	23

Database: **Cochrane Library (CENTRAL)**

Date: 21 August 2022

Keywords	Query	Results	Hits
Fall risk evaluation, fall risk screening, tests for fall risk, fall, elderly mobility scale, fall risk assessment, elderly fall screening, timed up and go	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 (includes MeSH term: accidental falls)	10,145	
Elderly, older adults, community-dwelling	#9 OR #10 OR #11 OR #12 (includes MeSH term: frail elderly)	81,162	
	#8 AND #14 (combination) Filter: Cochrane reviews Filter: January 1, 2017 to October 1, 2022	3,731 877 421	1 (duplicate)

Database: **Google Scholar**

Date: 21 August 2022

Keywords	Query	Results	Hits
Fall risk evaluation, fall risk screening, tests for fall risk, fall, elderly mobility scale, fall risk assessment, elderly fall screening, timed up and go	Fall risk assessment AND healthy adults	17,900	3 (duplicate =2)
Elderly, older adults, community-dwelling, adults			

Database: HERDIN

Date: 21 August 2022

Keywords	Query	Results	Hits
Fall risk evaluation, fall risk screening, tests for fall risk, fall, elderly mobility scale, fall risk assessment, elderly fall screening, timed up and go	Fall risk	42	0

Question 8. Screening for sarcopenia

Database: MEDLINE

Date: 23 January 2023

Query	Results
("sarcopenia"[Title/Abstract] AND "loattrfull text"[Filter] AND ((mass screening"[Title/Abstract] OR "screening"[Title/Abstract]) AND "loattrfull text"[Filter])) AND (fft[Filter])	893

Database: EMBASE

Date: 23 January 2023

Query	Results
(sarcopenia:ab,ti AND ('mass screening'/exp OR 'mass screening' OR screening:ab,ti)) AND ([adult]/lim OR [aged]/lim OR [middle aged]/lim OR [very elderly]/lim) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) AND ('Article'/it OR 'Article in Press'/it OR 'Review'/it)	110

Database: clinicaltrials.gov

Date: 23 January 2023

Query	Results
Sarcopenia AND screening Filters: Study type (Interventional/Clinical Trial), Recruitment (Not yet recruiting, recruiting, enrolling by invitation, active but not recruiting, completed)	37

Question 9. Screening for osteoporosis

Database: MEDLINE

Date: 21 January 2023

#	Query	Filters	Results
1	osteoporosis		102,017
2	(screening[Text Word]) OR (mass screening[MeSH Terms])		742,301
3	("risk factor*[Text Word]) OR (risk factor[MeSH Terms])		1,338,067
4	((osteoporosis)) AND ((screening[Text Word]) OR (mass screening[MeSH Terms]))		4,635
5	(osteoporosis) AND ((risk factor*[Text Word]) OR (risk factor[MeSH Terms]))		16,544
6	#4 OR #5		19,667
7	#4 OR #5	Clinical Trial	775
8	#4 OR #5	Clinical Trial, Systematic Review	1,174

9	#4 OR #5	Clinical Trial, Meta-Analysis, Systematic Review	1,329
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Database: **CENTRAL**

Date: 21 January 2023

Query	Results
"osteoporosis" in Title Abstract Keyword AND "assessment tool" OR "OSTA" OR "FRAX" in Title Abstract Keyword - (Word variations have been searched) / (* osteoporosis):ti, ab, kw AND (*assessment tool" OR "OSTA' OR "FRAX"):ti,ab,kw	255

Database: **Google Scholar**

Date: 21 January 2023

Query	Results
allintitle: osteoporosis screen	77

Database: **HERDIN Plus**

Date: 21 January 2023

Query	Results
Mesh:osteoporosis	47

Database: **Journal of the ASEAN Federation of Endocrine Societies JAFES**

Date: 21 January 2023

Query	Results
Osteoporosis	53

9.5 SCREENING TOOLS

Question 1. Screening for musculoskeletal disease

'Gait, Arms, Legs and Spine' screen (adapted from Doherty et al.¹⁴)

Screening questions:

- (a) Do you have any pain or stiffness in your muscles, joints, or back?
- (b) Can you dress yourself completely without any difficulty?
- (c) Can you walk up and down stairs without any difficulty?

Responses

A positive response to any of the screening questions will require further questioning.

Screening examination:

- (a) *Gait.* Inspect the patient walking, turning and walking back.
- (b) *Arms.* Still inspecting from in front, ask the patient to 'place both hands behind your head, elbows back', 'place both hands down by your side, elbows straight', 'place both hands out in front, palms down, fingers straight', 'turn both hands over', 'make a tight fist with each hand', 'place the tip of each finger onto the tip of your thumb in turn'. The examiner then squeezes across the second to fifth metacarpal to elicit tenderness due to metacarpophalangeal joint synovitis (which may not be evidenced by swelling).
- (c) *Legs.* With the patient still standing, inspect from in front for normal lower limb appearances. The screen is then completed by inspection or examination of the patient lying on a couch. In this position:
 - a. Flex each hip and knee while holding the knee (confirming full knee flexion, no knee crepitus)
 - b. Passively internally rotate each hip in flexion (no pain, restriction)
 - c. Press on each patella for patellofemoral tenderness and palpate for an effusion
 - d. Squeeze across the metatarsals for tenderness due to metatarsophalangeal disease
 - e. Inspect both soles for callosities, reflecting abnormal weight bearing (spine, hip, knee, or foot abnormality).
- (d) *Spine.* Inspect the patient standing from three views.
 - a. From behind – observe normal spine (and lower limb) features

Assessment	
Appearance	Movement

- b. From the side – observe normal spine contours. Ask the patient to ‘bend forward and touch toes’. Press over the midpoint of each supraspinatus to elicit hyperalgesia of fibromyalgia
- c. From in front – ask the patient to ‘try and place your ear on your left then your right shoulder in turn’.

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Pediatric ‘Gait, Arms, Legs and Spine’ screen

(adapted from Foster et al.¹⁵)

Screening questions:

- (a) Do you have any pain or stiffness in your muscles, joints, or back?
- (b) Do you have any difficulty getting yourself dressed without any help?
- (c) Do you have any difficulty going up and down stairs?

Responses

A positive response to any of the screening questions will require further questioning.

Screening examination:

- (a) *Gait.* Observe the child walking. Ask the child to ‘walk on your tip-toes/walk on your heels’.
- (b) *Arms.* Ask the child to ‘put your hands out in front of you’, ‘you’re your hands over and make a fist’, ‘pinch your index finger and thumb together’, ‘touch the tips of your fingers with your thumb’, ‘put your hands together/put your hands back to back’, ‘reach up and touch the sky’, ‘look at the ceiling’, and ‘put your hands up behind your neck’. Squeeze the metacarpophalangeal joints.
- (c) *Legs.* Feel for effusion at the knee. Ask the child to ‘bend and then straighten your knee’ (active movement of knees and examiner feels for crepitus). Check for passive flexion (90 degrees) with internal rotation of hip.
- (d) *Spine.* Ask the child to ‘open your mouth and put 3 of your (child’s own) fingers in your mouth’. To check for lateral flexion of cervical spine, ask the child to ‘try and touch your shoulder with your ear’. Observe spine from behind. Ask the child ‘can you bend and touch your toes?’ while observing the curve of the spine from the side and behind.

Assessment	
<i>Appearance</i>	<i>Movement</i>

Question 3. Screening for work-related musculoskeletal disorders

RSI QuickScan Questionnaire (adapted from Speklé et al.^{57,58})

SYMPTOMS

Questions

1. "Have you at any time during the last 12 months had trouble (ache, pain, discomfort) in:

Region	Yes, once or twice	Yes, regular	Yes, long-lasting	No, never
Neck				
Upper back				
Shoulder				
Elbow				
Forearm				
Wrist				
Hand				

2. "Have you at any time during the last 7 days had trouble (ache, pain, discomfort) in:

Region	Yes, once or twice	Yes, regular	Yes, long-lasting	No, never
Neck				
Upper back				
Shoulder				
Elbow				
Forearm				
Wrist				
Hand				

FACTORS RELATED TO WORK

Information

1. Information on computer work and health

Work hours

- 2. Amount of work hours per week
- 3. Amount of work days per week
- 4. Hours computer work per day
- 5. Hours private computer use per day
- 6. Amount of breaks per day
- 7. Total break time per day

Work posture and movement

- 8. Upper body slightly bent forward
- 9. Upper body bent forward a lot
- 10. Trunk slightly twisted
- 11. Trunk twisted a lot
- 12. Upper body bent forward and twisted
- 13. Neck hunched forward
- 14. Neck hunched backward
- 15. Neck twisted
- 16. Wrist bent
- 17. Wrist extended
- 18. Wrist twisted

Work tasks

- 19. Repetitive movements of arm, hand and fingers
- 20. Repetitive twisting/bending upper body
- 21. Repetitive twisting/bending upper body
- 22. Same work all day
- 23. Same work every day
- 24. Repetitive movements

Job decision latitude

- 25. Choose time begin/stop work
- 26. Choose time breaks
- 27. Choose which days off
- 28. Choose how to do your work
- 29. Choose order of work tasks
- 30. Choose when work tasks
- 31. Leave workspace
- 32. Choose stop work
- 33. Control work pace

FACTORS RELATED TO WORK (cont'd)Work relation with management and colleagues

- 34. Good management
- 35. Irritated by others
- 36. Management notes what you say
- 37. Good general atmosphere
- 38. Management knows you/your work
- 39. Support direct supervisor
- 40. Support colleague
- 41. Sufficient information from company

Work pace and load

- 42. Pace of work/work load regularly high
- 43. Regularly work under time pressure
- 44. Hurry to finish on time
- 45. Regular problems with pace of work/work load
- 46. Should take it easier
- 47. Work too tiring
- 48. Have to work very fast
- 49. A tremendous amount of work
- 50. Enough time to finish work

Recovery time

- 51. Feel mentally exhausted
- 52. Feel empty after a day's work
- 53. Feel tired when waking up in the morning
- 54. Feel 'burned out'
- 55. Feel frustrated by job
- 56. Feel work asks too much
- 57. Feel at the end of your tether

FACTORS RELATED TO OFFICE ERGONOMICS

Yes / No / Does not apply

Work environment factors

- 58. Bothered by light from outside
- 59. Bothered by reflection in your monitor
- 60. Cold draughts or changes in temperature
- 61. Disturbed by noise

Furniture

- 62. Correct height chair
- 63. Comfortable chair
- 64. Correct height arm rests
- 65. Adjustable width arm rests
- 66. Correct length arm rests
- 67. Correct height desk
- 68. Adjustable height desk
- 69. Sufficient work surface
- 70. Sufficient leg room
- 71. Availability footrest

Computer workstation physical attributes

- 72. Availability of external mouse and keyboard
- 73. Hindered by length mouse cable
- 74. Mouse works properly
- 75. Document holder available
- 76. Head set
- 77. Correct height monitor
- 78. Correct viewing distance monitor
- 79. Eyesight test
- 80. Need for computer glasses
- 81. Disposal of computer glasses

Sample of RULA worksheet downloaded from Physiopedia.com

RULA Employee Assessment Worksheet based on RULA: a survey method for the investigation of work-related upper limb disorders, McAtamney & Corlett, Applied Ergonomics 1993, 24(2), 91-99

A. Arm and Wrist Analysis		B. Neck, Trunk and Leg Analysis																																																																																																													
Step 1: Locate Upper Arm Position: Step 1a: Adjust... If shoulder is raised: +1 If upper arm is abducted: +1 If arm is supported or person is leaning: -1		Step 9: Locate Neck Position: Step 9a: Adjust... If neck is twisted: +1 If neck is side bending: +1																																																																																																													
Step 2: Locate Lower Arm Position: Step 2a: Adjust... If either arm is working across midline or out to side of body: Add +1		Step 10: Locate Trunk Position: Step 10a: Adjust... If trunk is twisted: +1 If trunk is side bending: +1																																																																																																													
Step 3: Locate Wrist Position: Step 3a: Adjust... If wrist is bent from midline: Add +1		Step 11: Legs: Step 11a: Adjust... If legs and feet are supported: +1 If not: +2																																																																																																													
Step 4: Wrist Twist: Step 5: Look-up Posture Score in Table A: Using values from steps 1-4 above, locate score in Table A		Table A: Wrist Posture Score <table border="1"> <thead> <tr> <th>Upper Arm</th> <th>Lower Arm</th> <th>Wrist</th> <th>Wrist</th> <th>Wrist</th> <th>Wrist</th> </tr> <tr> <th></th> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>1</td> <td>2</td> <td>2</td> <td>3</td> </tr> <tr> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> <td>3</td> </tr> <tr> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>4</td> </tr> <tr> <td>4</td> <td>1</td> <td>2</td> <td>3</td> <td>3</td> <td>4</td> </tr> <tr> <td>5</td> <td>2</td> <td>3</td> <td>4</td> <td>4</td> <td>4</td> </tr> <tr> <td>6</td> <td>3</td> <td>4</td> <td>4</td> <td>4</td> <td>5</td> </tr> <tr> <td>7</td> <td>1</td> <td>3</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>8</td> <td>2</td> <td>3</td> <td>4</td> <td>4</td> <td>5</td> </tr> <tr> <td>9</td> <td>3</td> <td>4</td> <td>4</td> <td>4</td> <td>5</td> </tr> <tr> <td>10</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>5</td> </tr> <tr> <td>11</td> <td>5</td> <td>5</td> <td>5</td> <td>5</td> <td>6</td> </tr> <tr> <td>12</td> <td>2</td> <td>5</td> <td>6</td> <td>6</td> <td>7</td> </tr> <tr> <td>13</td> <td>3</td> <td>6</td> <td>6</td> <td>7</td> <td>7</td> </tr> <tr> <td>14</td> <td>1</td> <td>7</td> <td>7</td> <td>7</td> <td>8</td> </tr> <tr> <td>15</td> <td>2</td> <td>8</td> <td>8</td> <td>8</td> <td>9</td> </tr> <tr> <td>16</td> <td>3</td> <td>9</td> <td>9</td> <td>9</td> <td>9</td> </tr> </tbody> </table>		Upper Arm	Lower Arm	Wrist	Wrist	Wrist	Wrist			1	2	3	4	1	1	1	2	2	3	2	2	2	2	3	3	3	3	3	3	3	4	4	1	2	3	3	4	5	2	3	4	4	4	6	3	4	4	4	5	7	1	3	3	4	5	8	2	3	4	4	5	9	3	4	4	4	5	10	4	4	4	4	5	11	5	5	5	5	6	12	2	5	6	6	7	13	3	6	6	7	7	14	1	7	7	7	8	15	2	8	8	8	9	16	3	9	9	9	9
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Step 6: Add Muscle Use Score If posture mainly static (i.e. held>10 minutes), Or if action repeated occurs 4X per minute: +1		Table B: Trunk Posture Score <table border="1"> <thead> <tr> <th>Neck</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> <tr> <th>Posture</th> <th>Legs</th> <th>Legs</th> <th>Legs</th> <th>Legs</th> <th>Legs</th> <th>Legs</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>2</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>3</td> <td>3</td> <td>3</td> <td>4</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>5</td> <td>5</td> <td>5</td> <td>6</td> <td>7</td> <td>7</td> <td>8</td> </tr> <tr> <td>6</td> <td>6</td> <td>7</td> <td>7</td> <td>7</td> <td>8</td> <td>9</td> </tr> <tr> <td>7</td> <td>7</td> <td>7</td> <td>7</td> <td>8</td> <td>8</td> <td>9</td> </tr> <tr> <td>8</td> <td>8</td> <td>8</td> <td>8</td> <td>8</td> <td>8</td> <td>9</td> </tr> <tr> <td>9</td> <td>9</td> <td>9</td> <td>9</td> <td>9</td> <td>9</td> <td>9</td> </tr> </tbody> </table>		Neck	1	2	3	4	5	6	Posture	Legs	Legs	Legs	Legs	Legs	Legs	1	1	2	3	4	5	6	2	2	3	4	5	6	7	3	3	3	4	4	5	6	4	4	4	4	5	6	7	5	5	5	6	7	7	8	6	6	7	7	7	8	9	7	7	7	7	8	8	9	8	8	8	8	8	8	9	9	9	9	9	9	9	9																															
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Step 7: Add Force/Load Score If load < 4.4 lbs (intermittent): +0 If load 4.4 to 22 lbs (intermittent): +1 If load 4.4 to 22 lbs (static or repeated): +2 If more than 22 lbs or repeated or shocks: +3		Step 12: Look-up Posture Score in Table B: Using values from steps 9-11 above, locate score in Table B																																																																																																													
Step 8: Find Row in Table C Add values from steps 5-7 to obtain Wrist and Arm Score. Find row in Table C.		Step 13: Add Muscle Use Score If posture mainly static (i.e. held>10 minutes), Or if action repeated occurs 4X per minute: +1																																																																																																													
Step 9: Find Column in Table C Add values from steps 12-14 to obtain Neck, Trunk and Leg Score. Find Column in Table C.		Step 14: Add Force/Load Score If load < 4.4 lbs (intermittent): +0 If load 4.4 to 22 lbs (intermittent): +1 If load 4.4 to 22 lbs (static or repeated): +2 If more than 22 lbs or repeated or shocks: +3																																																																																																													
Step 10: Find Row in Table C Add values from steps 12-14 to obtain Neck, Trunk and Leg Score. Find Column in Table C.		Step 15: Find Column in Table C Add values from steps 12-14 to obtain Neck, Trunk and Leg Score. Find Column in Table C.																																																																																																													
Scoring: (final score from Table C) 1 or 2 = acceptable posture 3 or 4 = further investigation, change may be needed 5 or 6 = further investigation, change soon 7 = investigate and implement change		Final Score																																																																																																													
Wrist and Arm Score 		Posture Score B 																																																																																																													
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Task name: _____ Reviewer: _____ Date: _____ / _____ / _____

This tool is provided without warranty. The author has provided this tool as a simple means for applying the concepts provided in RULA.

provided by Practical Ergonomics

rbarber@ergosmart.com (816) 444-1667

Sample REBA worksheet downloaded from Ergo-Plus.com.

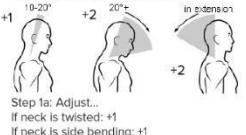
REBA Employee Assessment Worksheet

Task Name:

Date:

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

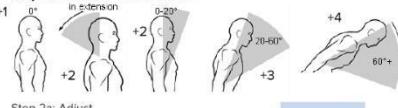


Step 1a: Adjust...
If neck is twisted: +1
If neck is side bending: +1



Scores											
Neck											
		1		2		3		4		5	
Legs		1	2	3	4	1	2	3	4	3	5
Trunk		1	2	3	4	1	2	3	4	5	6
Posture		2	2	3	4	5	3	4	5	6	7
Score		3	2	4	5	6	4	5	6	7	8
		4	3	5	6	7	5	6	7	8	9
		5	4	6	7	8	6	7	8	9	9

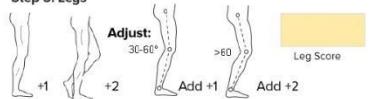
Step 2: Locate Trunk Position



Step 2a: Adjust...
If neck is twisted: +1
If trunk is side bending: +1



Step 3: Legs



Step 4: Look-up Posture Score in Table A

Using values from steps 1-3 above,

Locate score in Table A



Step 5: Add Force/Load Score

If load <11 lbs.: +0
If load 11 to 22 lbs.: +1
If load > 22 lbs.: +2
Adjust: If shock or rapid build up of force: add +1



Step 6: Score A, Find Row in Table C

Add values from steps 4 & 5 to obtain Score A.

Find Row in **Table C**.

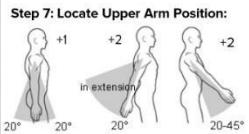


Scoring

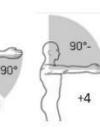
- 1 = Negligible Risk
- 2-3 = Low Risk. Change may be needed.
- 4-7 = Medium Risk. Further Investigate. Change Soon.
- 8-10 = High Risk. Investigate and Implement Change
- 11+ = Very High Risk. Implement Change

B. Arm and Wrist Analysis

Step 7: Locate Upper Arm Position



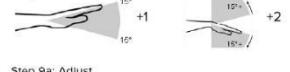
Step 7a: Adjust...
If shoulder is raised: +1
If upper arm is abducted: +1
If arm is supported or person is leaning: -1



Step 8: Locate Lower Arm Position:



Step 9: Locate Wrist Position:



Step 9a: Adjust...
If wrist is bent from midline or twisted: Add +1



Step 10: Look-up Posture Score in Table B

Using values from steps 7-9 above, locate score in Table B

Step 11: Add Coupling Score

Well fitting Handle and mid rang power grip, **good: +0**
Acceptable but not ideal hand hold or coupling acceptable with another body part, **fair: +1**
Hand hold not acceptable but possible, **poor: +2**
No handles, awkward, unsafe with any body part, **Unacceptable: +3**



Step 12: Score B, Find Column in Table C

Add values from steps 10 & 11 to obtain

Score B. Find column in **Table C** and match with Score A in row from step 6 to obtain Table C Score.



Step 13: Activity Score

+1 or more body parts are held for longer than 1 minute (static)

+1 Repeated small range actions (more than 4x per minute)

+1 Action causes rapid large range changes in postures or unstable base

Original Worksheet Developed by Dr. Alan Hedge. Based on Technical note: Rapid Entire Body Assessment (REBA). Hignett, McAtamney, Applied Ergonomics 31 (2000) 201-205

Question 4. Screening for physical inactivity

Download the GSHS questionnaire [here](#).

GLOBAL SCHOOL-BASED STUDENT HEALTH SURVEY 2021 Version

This survey is about your health and the things you do that may affect your health. Students like you all over your country are doing this survey. Students in many other countries around the world also are doing this survey. The information you give will be used to develop better health programs for young people like yourself.

DO NOT write your name on this survey or the answer sheet. The answers you give will be kept private. No one will know how you answer. Answer the questions based on what you really know or do. There are no right or wrong answers.

Completing the survey is voluntary. Your grade or mark in this class will not be affected whether or not you answer the questions. If you do not want to answer a question, just leave it blank.

Make sure to read every question. Fill in the circles on your answer sheet that match your answer. Use only the pencil you are given. When you are done, do what the person who is giving you the survey says to do.

Here is an example of how to fill in the circles:

Fill in the circles like this  Not like this  or 

Survey

1. Do fish live in water?
 - A. Yes
 - B. No

Answer sheet

1.        

Thank you very much for your help.

GSHS Core Questionnaire Respondent Demographics Module

1. How old are you?

- A. 11 years old or younger
- B. 12 years old
- C. 13 years old
- D. 14 years old
- E. 15 years old
- F. 16 years old
- G. 17 years old
- H. 18 years old or older

2. What is your sex?

- A. Male
- B. Female

3. In what grade/class/ standard are you?

COUNTRY SPECIFIC RESPONSE OPTIONS

- A. OPTION 1
- B. OPTION 2
- C. OPTION 3
- D. OPTION 4
- E. OPTION 5
- F. OPTION 6

GSHS Core Questionnaire Alcohol Use Module

The next 7 questions ask about drinking alcohol. This includes drinking **COUNTRY SPECIFIC EXAMPLES**. Drinking alcohol does not include drinking a few sips of wine for religious purposes. A "drink" is a glass of wine, a bottle of beer, a small glass of liquor or home brew, or a mixed drink.

1. How old were you when you had your first drink of alcohol other than a few sips?
 - A. I have never had a drink of alcohol other than a few sips
 - B. 7 years old or younger
 - C. 8 or 9 years old
 - D. 10 or 11 years old
 - E. 12 or 13 years old
 - F. 14 or 15 years old
 - G. 16 or 17 years old
 - H. 18 years old or older
2. During the past 30 days, on how many days did you have at least one drink containing alcohol?
 - A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days
3. During the past 30 days, on the days you drank alcohol, how many drinks did you **usually** drink **per day**?
 - A. I did not drink alcohol during the past 30 days
 - B. Less than one drink
 - C. 1 drink
 - D. 2 drinks
 - E. 3 drinks
 - F. 4 drinks
 - G. 5 or more drinks

4. During the past 30 days, what is the largest number of alcoholic drinks you had in a row, that is, within a couple of hours?
 - A. I did not drink alcohol during the past 30 days
 - B. 1 or 2 drinks
 - C. 3 drinks
 - D. 4 drinks
 - E. 5 drinks
 - F. 6 or 7 drinks
 - G. 8 or 9 drinks
 - H. 10 or more drinks
5. During the past 30 days, how did you **usually** get the alcohol you drank? **SELECT ONLY ONE RESPONSE.**
 - A. I did not drink alcohol during the past 30 days
 - B. I bought it in a store, shop, or from a street vendor
 - C. I gave someone else money to buy it for me
 - D. I got it from my friends
 - E. I got it from my family
 - F. I stole it or got it without permission
 - G. I got it some other way
6. During your life, how many times have you got into trouble at home, work, or school or got into fights, as a result of drinking alcohol?
 - A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 to 19 times
 - F. 20 or more times

Staggering when walking, not being able to speak right, throwing up, and passing out are some signs of being really drunk.

7. During your life, how many times have you drank so much alcohol that you were really drunk?
 - A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 to 19 times
 - F. 20 or more times

GSHS Core Questionnaire Dietary Behaviours Module

The next 3 questions ask about your height, weight, and going hungry.

1. How tall are you without your shoes on? ON THE ANSWER SHEET, WRITE YOUR HEIGHT IN THE SHADED BOXES AT THE TOP OF THE GRID. THEN FILL IN THE CIRCLE BELOW EACH NUMBER.

Example

Height (cm)		
1	5	3
(0)	(0)	(0)
●	(1)	(1)
(2)	(2)	(2)
	(3)	●
	(4)	(4)
	●	(5)
	(6)	(6)
	(7)	(7)
	(8)	(8)
	(9)	(9)
I do not know	(9)	

2. How much do you weigh without your shoes on? ON THE ANSWER SHEET, WRITE YOUR WEIGHT IN THE SHADED BOXES AT THE TOP OF THE GRID. THEN FILL IN THE CIRCLE BELOW EACH NUMBER.

Example

Weight (kg)		
0	5	2
●	(0)	(0)
(1)	(1)	(1)
(2)	(2)	●
	(3)	(3)
	(4)	(4)
	●	(5)
	(6)	(6)
	(7)	(7)
	(8)	(8)
	(9)	(9)
I do not know	(9)	

3. During the past 30 days, how often did you go hungry because there was not enough food in your home?

- A. Never
- B. Rarely
- C. Sometimes
- D. Most of the time
- E. Always

The next 4 questions ask about what you might eat and drink.

4. During the past 7 days, how many times did you eat fruit, such as COUNTRY SPECIFIC EXAMPLES?

- A. I did not eat fruit during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

5. During the past 7 days, how many times did you eat vegetables, such as COUNTRY SPECIFIC EXAMPLES?

- A. I did not eat vegetables during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

6. During the past 7 days, how many times did you drink a can, bottle, or glass of a carbonated soft drink, such as COUNTRY SPECIFIC EXAMPLES? (Do not count diet soft drinks.)

- A. I did not drink carbonated soft drinks during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

GSHS Core Questionnaire Dietary Behaviours Module

For this question, sugar-sweetened drinks include sports drinks (**COUNTRY SPECIFIC EXAMPLES**), energy drinks (**COUNTRY SPECIFIC EXAMPLES**), 100% fruit juices (**COUNTRY SPECIFIC EXAMPLES**), fruit drinks that are not 100% juice (**COUNTRY SPECIFIC EXAMPLES**), sugar-sweetened flavoured milks (**COUNTRY SPECIFIC EXAMPLES**), and sugar-sweetened teas, coffees, or flavoured waters.

For this question, **DO NOT COUNT** carbonated soft drinks measured in the previous question or diet or no calorie drinks.

7. During the past 7 days, how many times did you drink a can, bottle, or glass of a sugar-sweetened drink?
 - A. I did not drink sugar-sweetened drinks during the past 7 days
 - B. 1 to 3 times during the past 7 days
 - C. 4 to 6 times during the past 7 days
 - D. 1 time per day
 - E. 2 times per day
 - F. 3 times per day
 - G. 4 or more times per day

GSHS Core Questionnaire Drug Use Module

The next 4 questions ask about drug use. This includes using cannabis (also called marijuana), amphetamines, cocaine, inhalants, and heroin, and COUNTRY SPECIFIC EXAMPLES. Do not count tobacco and alcohol use.

1. How old were you when you first used drugs?
 - A. I have never used drugs
 - B. 7 years old or younger
 - C. 8 or 9 years old
 - D. 10 or 11 years old
 - E. 12 or 13 years old
 - F. 14 or 15 years old
 - G. 16 or 17 years old
 - H. 18 years old or older
2. During your life, how many times have you used cannabis (also called marijuana and COUNTRY SPECIFIC SLANG TERMS FOR CANNABIS)?
 - A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 to 19 times
 - F. 20 or more times
3. During the past 30 days, how many times did you use cannabis (also called marijuana and COUNTRY SPECIFIC SLANG TERMS FOR CANNABIS)?
 - A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 to 19 times
 - F. 20 or more times
4. During your life, how many times have you used amphetamines or methamphetamines (also called COUNTRY SPECIFIC SLANG TERMS FOR AMPHETAMINES AND METHAMPHETAMINES) for non-medical purposes?
 - A. 0 times
 - B. 1 or 2 times
 - C. 3 to 5 times
 - D. 6 to 9 times
 - E. 10 to 19 times
 - F. 20 or more times

GSHS Core Questionnaire Hygiene Module

The next 3 questions ask about your oral health.

1. During the past 30 days, how many times per day did you **usually** clean or brush your teeth?
 - A. I did not clean or brush my teeth during the past 30 days
 - B. Less than 1 time per day
 - C. 1 time per day
 - D. 2 times per day
 - E. 3 or more times per day

2. During the past 30 days, did you **usually** use a toothpaste that contains fluoride when you cleaned or brushed your teeth?
 - A. I did not clean or brush my teeth during the past 30 days
 - B. Yes, I usually used a toothpaste that contains fluoride
 - C. No, I did not usually use a toothpaste that contains fluoride
 - D. I do not know if the toothpaste I usually used contains fluoride

3. During the past 30 days, did a problem with your mouth, teeth, or gums cause you to miss classes or school?
 - A. Yes
 - B. No

The next 3 questions ask about washing your hands.

4. During the past 30 days, how often did you wash your hands before eating?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

5. During the past 30 days, how often did you wash your hands after using the toilet or latrine?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

6. During the past 30 days, how often did you use soap when washing your hands?

- A. Never
- B. Rarely
- C. Sometimes
- D. Most of the time
- E. Always

GSHS Core Questionnaire Mental Health Module

The next 3 questions ask about your friendships and feelings.

1. How many close friends do you have?
 - A. 0 friends
 - B. 1 friend
 - C. 2 friends
 - D. 3 or more friends
2. During the past 12 months, how often did you feel lonely?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always
3. During the past 12 months, how often were you so worried about something that you could not sleep at night?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

Sometimes people feel so depressed about the future that they may consider attempting suicide, that is, taking some action to end their own life.
The next 3 questions ask about attempted suicide.

4. During the past 12 months, did you seriously consider attempting suicide?
 - A. Yes
 - B. No
5. During the past 12 months, did you make a plan about how you would attempt suicide?
 - A. Yes
 - B. No

6. During the past 12 months, how many times did you attempt suicide?

- A. 0 times
- B. 1 time
- C. 2 or 3 times
- D. 4 or 5 times
- E. 6 or more times

GSHS Core Questionnaire Physical Activity Module

The next 4 questions ask about physical activity. Physical activity is any activity that increases your heart rate and makes you breathe hard. Physical activity can be done in sports, playing with friends, walking to school, or in physical education class. Some examples of physical activity are running, fast walking, biking, dancing, football, and COUNTRY SPECIFIC EXAMPLES.

1. During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? ADD UP ALL THE TIME YOU SPENT IN ANY KIND OF PHYSICAL ACTIVITY EACH DAY.
 - A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
 - G. 6 days
 - H. 7 days
2. During the past 7 days, on how many days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weightlifting?
 - A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
 - G. 6 days
 - H. 7 days
3. During the past 7 days, on how many days did you walk or ride a bicycle to or from school?
 - A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
 - G. 6 days
 - H. 7 days

4. During this school year, on how many days did you go to physical education (PE) class each week?

- A. 0 days
- B. 1 day
- C. 2 days
- D. 3 days
- E. 4 days
- F. 5 or more days

The next question asks about the time you spend mostly sitting when you are not in school or doing homework.

5. How much time do you spend during a typical or usual day sitting and watching television, playing computer games, talking with friends, using your mobile phone, or doing other sitting activities, such as COUNTRY SPECIFIC EXAMPLES?

- A. Less than 1 hour per day
- B. 1 to 2 hours per day
- C. 3 to 4 hours per day
- D. 5 to 6 hours per day
- E. 7 to 8 hours per day
- F. More than 8 hours per day

The next question asks about how much sleep you get.

6. On an average school night, how many hours of sleep do you get?

- A. 4 or less hours
- B. 5 hours
- C. 6 hours
- D. 7 hours
- E. 8 hours
- F. 9 hours
- G. 10 or more hours

GSHS Core Questionnaire Protective Factors Module

The next 7 questions ask about your experiences at school and at home.

1. During the past 30 days, on how many days did you miss classes or school without permission?
 - A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 or more days

2. During the past 30 days, how often were most of the students in your school kind and helpful?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

3. During the past 30 days, how often were you able to talk to someone about difficult problems and worries?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

4. During the past 30 days, how often did your parents or guardians understand your problems and worries?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

5. During the past 30 days, how often did your parents or guardians check to see if your homework was done?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

6. During the past 30 days, how often did your parents or guardians **really** know what you were doing with your free time?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

7. During the past 30 days, how often did your parents or guardians go through your things without your approval?
 - A. Never
 - B. Rarely
 - C. Sometimes
 - D. Most of the time
 - E. Always

GSHS Core Questionnaire Sexual Behaviours That Contribute to HIV Infection, Other STI, and Unintended Pregnancy Module

The next 5 questions ask about sexual intercourse.

1. Have you ever had sexual intercourse?
 - A. Yes
 - B. No
2. How old were you when you had sexual intercourse for the first time?
 - A. I have never had sexual intercourse
 - B. 11 years old or younger
 - C. 12 years old
 - D. 13 years old
 - E. 14 years old
 - F. 15 years old
 - G. 16 or 17 years old
 - H. 18 years old or older
3. During your life, with how many people have you had sexual intercourse?
 - A. I have never had sexual intercourse
 - B. 1 person
 - C. 2 people
 - D. 3 people
 - E. 4 people
 - F. 5 people
 - G. 6 or more people
4. The **last time** you had sexual intercourse, did you or your partner use a condom or [COUNTRY SPECIFIC SLANG TERM FOR CONDOM]?
 - A. I have never had sexual intercourse
 - B. Yes
 - C. No
5. The **last time** you had sexual intercourse, what **one** method did you or your partner use to prevent pregnancy? SELECT ONLY ONE RESPONSE.
 - A. I have never had sexual intercourse
 - B. No method was used to prevent pregnancy
 - C. Birth control pills
 - D. Condoms
 - E. An IUD or implant
 - F. A shot, patch, or birth control ring
 - G. Withdrawal or some other method including COUNTRY SPECIFIC METHOD
 - H. I do not know

GSHS Core Questionnaire Tobacco Use Module

The next 3 questions ask about cigarette use. Cigarettes include manufactured cigarettes, roll-your-own cigarettes, and kretek cigarettes, and COUNTRY SPECIFIC EXAMPLES.

1. Have you ever tried or experimented with cigarette smoking, even one or two puffs?
 - A. Yes
 - B. No
2. How old were you when you first tried smoking a cigarette?
 - A. I have never tried smoking a cigarette
 - B. 7 years old or younger
 - C. 8 or 9 years old
 - D. 10 or 11 years old
 - E. 12 or 13 years old
 - F. 14 or 15 years old
 - G. 16 or 17 years old
 - H. 18 years old or older
3. During the past 30 days, on how many days did you smoke cigarettes?
 - A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days

The next question asks about other forms of smoked tobacco products other than cigarettes. This includes pipes, cigars, mini cigars, cigarillos, waterpipes, hookah, shisha, narghile, bubble-bubble, bidis, and heated tobacco products (HTPs) and COUNTRY SPECIFIC EXAMPLES.

4. During the past 30 days, on how many days did you use any form of smoked tobacco products other than cigarettes?
 - A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days

The next question asks about smokeless tobacco products. This includes snuff, chewing tobacco, dip, betel quid with tobacco, and gutka and COUNTRY SPECIFIC EXAMPLES.

5. During the past 30 days, on how many days did you use any form of smokeless tobacco products?
 - A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days

The next question asks about electronic cigarettes. Electronic cigarettes, or e-cigarettes, are electronic devices that usually contain a nicotine-based liquid that is vaporized and inhaled. You may also know them as vape-pens, hookah-pens, electronic hookahs (e-hookahs), electronic cigars (e-cigars), electronic pipes (e-pipes), or e-vaporizers. Some look like cigarettes and others look like pens or small pipes. They are battery-powered devices that produce vapor instead of smoke. They do not contain tobacco.

6. During the past 30 days, on how many days did you use electronic cigarettes?
 - A. 0 days
 - B. 1 or 2 days
 - C. 3 to 5 days
 - D. 6 to 9 days
 - E. 10 to 19 days
 - F. 20 to 29 days
 - G. All 30 days

GSHS Core Questionnaire Violence and Unintentional Injury Module

The next 3 questions ask about **serious injuries** that happened to you. An injury is serious when it makes you miss at least one full day of usual activities (such as school, sports, or a job) or requires treatment by a doctor or nurse.

1. During the past 12 months, how many times were you seriously injured?

- A. 0 times
- B. 1 time
- C. 2 or 3 times
- D. 4 or 5 times
- E. 6 or 7 times
- F. 8 or 9 times
- G. 10 or 11 times
- H. 12 or more times

2. During the past 12 months, what was the **most serious injury** that happened to you?

- A. I was not seriously injured during the past 12 months
- B. I had a broken bone, a dislocated joint, or a broken or knocked out tooth
- C. I had a cut or stab wound
- D. I had a concussion or other head or neck injury, was knocked out, or could not breathe
- E. I had a gunshot wound
- F. I had a bad burn
- G. I was poisoned or took too much of a drug
- H. Something else happened to me

3. During the past 12 months, **what was the major cause** of the most serious injury that happened to you?

- A. I was not seriously injured during the past 12 months
- B. I was in a motor vehicle accident or hit by a motor vehicle
- C. I fell
- D. Something fell on me or hit me
- E. I was attacked or abused or was fighting with someone
- F. I was in a fire or too near a flame or something hot
- G. I inhaled or swallowed something bad for me
- H. Something else caused my injury

The next question asks about physical attacks. A physical attack occurs when one or more people hit or strike someone, or when one or more people hurt another person with a weapon (such as a stick, knife, or gun). It is not a physical attack when two students of about the same strength or power choose to fight each other.

4. During the past 12 months, how many times were you physically attacked?

- A. 0 times
- B. 1 time
- C. 2 or 3 times
- D. 4 or 5 times
- E. 6 or 7 times
- F. 8 or 9 times
- G. 10 or 11 times
- H. 12 or more times

The next question asks about physical fights. A physical fight occurs when two students of about the same strength or power choose to fight each other.

5. During the past 12 months, how many times were you in a physical fight?

- A. 0 times
- B. 1 time
- C. 2 or 3 times
- D. 4 or 5 times
- E. 6 or 7 times
- F. 8 or 9 times
- G. 10 or 11 times
- H. 12 or more times

GSHS Core Questionnaire Violence and Unintentional Injury Module

The next 3 questions ask about bullying. Bullying occurs when one or more students or other people about your age say or do hurtful or mean things. Bullying can occur when someone teases, threatens, ignores, spreads rumors about, calls someone a bad name, makes sexual remarks, or hits, shoves, or hurts another person over and over again. It is not bullying when two people of about the same strength or power argue or fight or tease each other in a friendly way.

6. During the past 12 months, were you bullied **on school property?**

A. Yes
B. No

7. During the past 12 months, were you bullied when you were **not on school property?**

A. Yes
B. No

Cyber bullying is a form of bullying using social media and other forms of online communication. Cyber bullying may happen on Instagram, Twitter, Snapchat, and Facebook, **COUNTRY SPECIFIC EXAMPLES**, and other social media platforms or through texting and email.

8. During the past 12 months, were you **cyber bullied?**

A. Yes
B. No

Download the PAQ-C/PAQ-A questionnaire [here](#).

Physical Activity Questionnaire (Elementary School)

Name: _____

Age: _____

Sex: M _____ F _____

Grade: _____

Teacher: _____

We are trying to find out about your level of physical activity from **the last 7 days** (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right and wrong answers — this is not a test.
 2. Please answer all the questions as honestly and accurately as you can — this is very important.
-

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

No	1-2	3-4	5-6	7 times or more
Skipping	○	○	○	○
Rowing/canoeing	○	○	○	○
In-line skating	○	○	○	○
Tag	○	○	○	○
Walking for exercise	○	○	○	○
Bicycling	○	○	○	○
Jogging or running	○	○	○	○
Aerobics	○	○	○	○
Swimming	○	○	○	○
Baseball, softball	○	○	○	○
Dance	○	○	○	○
Football	○	○	○	○
Badminton	○	○	○	○
Skateboarding	○	○	○	○
Soccer	○	○	○	○
Street hockey	○	○	○	○
Volleyball	○	○	○	○
Floor hockey	○	○	○	○
Basketball	○	○	○	○
Ice skating	○	○	○	○
Cross-country skiing	○	○	○	○
Ice hockey/ringette	○	○	○	○
Other: _____	○	○	○	○
_____	○	○	○	○

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

- I don't do PE
- Hardly ever
- Sometimes
- Quite often
- Always

3. In the last 7 days, what did you do most of the time *at recess*? (Check one only.)

- Sat down (talking, reading, doing schoolwork).....
- Stood around or walked around
- Ran or played a little bit
- Ran around and played quite a bit
- Ran and played hard most of the time

4. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? (Check one only.)

- Sat down (talking, reading, doing schoolwork).....
- Stood around or walked around
- Ran or played a little bit
- Ran around and played quite a bit
- Ran and played hard most of the time

5. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Check one only.)

- None
- 1 time last week
- 2 or 3 times last week
- 4 times last week
- 5 times last week

6. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? (Check one only.)

- None
- 1 time last week
- 2 or 3 times last week
- 4 or 5 last week
- 6 or 7 times last week

7. On the last weekend, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

- None
1 time
2 — 3 times
4 — 5 times
6 or more times

8. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

- A. All or most of my free time was spent doing things that involve little physical effort
B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics)
C. I often (3 — 4 times last week) did physical things in my free time
D. I quite often (5 — 6 times last week) did physical things in my free time
E. I very often (7 or more times last week) did physical things in my free time

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very often
Monday	<input type="radio"/>				
Tuesday	<input type="radio"/>				
Wednesday	<input type="radio"/>				
Thursday	<input type="radio"/>				
Friday	<input type="radio"/>				
Saturday	<input type="radio"/>				
Sunday	<input type="radio"/>				

10. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

- Yes
No

If Yes, what prevented you? _____

Download the PAVS questionnaire [here](#).

Physical Activity Vital Sign

Exercise
is Medicine® | AMERICAN COLLEGE
of SPORTS MEDICINE

1. On average, how many days per week do you engage in moderate to vigorous physical activity (like a brisk walk)? _____ days
 2. On average, how many minutes do you engage in physical activity at this level? _____ minutes
- Total minutes per week of physical activity (multiply #1 by #2)** _____ minutes per week

Incorporate the Physical Activity Vital Sign (PAVS) into your electronic health record and patient intake forms. Calculations may be programmed and the sedentary patient flagged for referral or counseling.

Using the Physical Activity Vital Sign

National guidelines recommend 150 minutes per week of moderate intensity physical activity. That's just 2 1/2 hours out of 168 hours in a week! In place of moderate intensity activity, you can complete 75 minutes of vigorous intensity activity, or an equivalent combination of moderate and vigorous intensity physical activity.

- 1 minute of vigorous activity is equal to 2 minutes of moderate activity.
- You can perform activity in multiple “bouts” of any length throughout the day to add up to the recommended 150 minutes/week.

Although light intensity physical activity (such as a casual walk) is not assessed by the PAVS, it positively impacts health. Wherever they are on their physical activity journey, encourage patients to become and remain active. Promote active living throughout the day to reduce sedentary time (less screen time!).



What's Moderate Intensity?

- You can talk, but not sing, while performing the activity.
- Examples: brisk walking, slow biking, doubles tennis, various forms of dance, active home chores and gardening, etc.



What's Vigorous Intensity?

- Vigorous intensity: You can no longer talk easily during the activity and are somewhat out of breath.
- Examples: jogging, fast bicycling, singles tennis, aerobic exercise class, swimming laps, etc.

The Physical Activity Vital Sign – Additional Option

- A comprehensive assessment of physical activity should include muscle strengthening exercises as recommended by the Physical Activity Guidelines for Americans: Adults should do muscle strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week.
- If you wish to add a question on muscle strengthening activities, we recommend the following:



How many days a week do you perform muscle strengthening exercises, such as bodyweight exercises or resistance training? _____ days

Question 7. Screening for risk of falls

Download the Berg Balance Scale instrument [here](#).

BERG BALANCE TESTS AND RATING SCALE

Patient Name _____
Date _____
Location _____
Rater _____

ITEM DESCRIPTION SCORE (0-4) Sitting to standing ____ Standing unsupported ____ Sitting unsupported ____ Standing to sitting ____ Transfers ____ Standing with eyes closed ____ Standing with feet together ____ Reaching forward with outstretched arm ____ Retrieving object from floor ____ Turning to look behind ____ Turning 360 degrees ____ Placing alternate foot on stool ____ Standing with one foot in front ____ Standing on one foot ____ TOTAL ____

GENERAL INSTRUCTIONS

Please demonstrate each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if the time or distance requirements are not met, if the subject's performance warrants supervision, or if the subject touches an external support or receives assistance from the examiner. Subjects should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing are a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5 and 10 inches (5, 12 and 25 cm). Chairs used during testing should be of reasonable height. Either a step or a stool (of average step height) may be used for item #12.

1. SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hands for support.

- () 4 able to stand without using hands and stabilize independently
- () 3 able to stand independently using hands
- () 2 able to stand using hands after several tries
- () 1 needs minimal aid to stand or to stabilize
- () 0 needs moderate or maximal assist to stand

2. STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding.

- () 4 able to stand safely 2 minutes
- () 3 able to stand 2 minutes with supervision
- () 2 able to stand 30 seconds unsupported
- () 1 needs several tries to stand 30 seconds unsupported
- () 0 unable to stand 30 seconds unassisted

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported.
Proceed to item #4.

3. SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

- () 4 able to sit safely and securely 2 minutes
- () 3 able to sit 2 minutes under supervision
- () 2 able to sit 30 seconds
- () 1 able to sit 10 seconds
- () 0 unable to sit without support 10 seconds

4. STANDING TO SITTING

INSTRUCTIONS: Please sit down.

- () 4 sits safely with minimal use of hands
- () 3 controls descent by using hands
- () 2 uses back of legs against chair to control descent
- () 1 sits independently but has uncontrolled descent
- () 0 needs assistance to sit

5. TRANSFERS

INSTRUCTIONS: Arrange chairs(s) for a pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

- () 4 able to transfer safely with minor use of hands
- () 3 able to transfer safely definite need of hands
- () 2 able to transfer with verbal cueing and/or supervision
- () 1 needs one person to assist
- () 0 needs two people to assist or supervise to be safe

6. STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

- () 4 able to stand 10 seconds safely
- () 3 able to stand 10 seconds with supervision
- () 2 able to stand 3 seconds
- () 1 unable to keep eyes closed 3 seconds but stays steady
- () 0 needs help to keep from falling

7. STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding.

- () 4 able to place feet together independently and stand 1 minute safely
- () 3 able to place feet together independently and stand for 1 minute with supervision
- () 2 able to place feet together independently but unable to hold for 30 seconds
- () 1 needs help to attain position but able to stand 15 seconds with feet together
- () 0 needs help to attain position and unable to hold for 15 seconds

8. REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the finger reaches while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

- () 4 can reach forward confidently >25 cm (10 inches)
- () 3 can reach forward >12 cm safely (5 inches)
- () 2 can reach forward >5 cm safely (2 inches)
- () 1 reaches forward but needs supervision
- () 0 loses balance while trying/requires external support

9. PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper which is placed in front of your feet.

- () 4 able to pick up slipper safely and easily
- () 3 able to pick up slipper but needs supervision
- () 2 unable to pick up but reaches 2-5cm (1-2 inches) from slipper and keeps balance independently
- () 1 unable to pick up and needs supervision while trying
- () 0 unable to try/needs assist to keep from losing balance or falling

10. TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward left shoulder. Repeat to the right. Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.

- () 4 looks behind from both sides and weight shifts well
- () 3 looks behind one side only other side shows less weight shift
- () 2 turns sideways only but maintains balance
- () 1 needs supervision when turning
- () 0 needs assist to keep from losing balance or falling

11. TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

- () 4 able to turn 360 degrees safely in 4 seconds or less
- () 3 able to turn 360 degrees safely one side only in 4 seconds or less
- () 2 able to turn 360 degrees safely but slowly
- () 1 needs close supervision or verbal cueing
- () 0 needs assistance while turning

12. PLACING ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

- () 4 able to stand independently and safely and complete 8 steps in 20 seconds
- () 3 able to stand independently and complete 8 steps in >20 seconds
- () 2 able to complete 4 steps without aid with supervision
- () 1 able to complete >2 steps needs minimal assist
- () 0 needs assistance to keep from falling/unable to try

13. STANDING UNSUPPORTED ONE FOOT IN FRONT

INSTRUCTIONS: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject's normal stride width)

- () 4 able to place foot tandem independently and hold 30 seconds
- () 3 able to place foot ahead of other independently and hold 30 seconds
- () 2 able to take small step independently and hold 30 seconds
- () 1 needs help to step but can hold 15 seconds
- () 0 loses balance while stepping or standing

14. STANDING ON ONE LEG

INSTRUCTIONS: Stand on one leg as long as you can without holding.

- () 4 able to lift leg independently and hold >10 seconds
- () 3 able to lift leg independently and hold 5-10 seconds
- () 2 able to lift leg independently and hold = or >3 seconds
- () 1 tries to lift leg unable to hold 3 seconds but remains standing independently
- () 0 unable to try or needs assist to prevent fall

TOTAL SCORE (Maximum = 56): _____

***References**

Wood-Dauphinee S, Berg K, Bravo G, Williams JI: The Balance Scale: Responding to clinically meaningful changes. Canadian Journal of Rehabilitation, 10: 35-50, 1997.

Berg K, Wood-Dauphinee S, Williams JI: The Balance Scale: Reliability assessment for elderly residents and patients with an acute stroke. Scand J Rehab Med, 27:27-36, 1995.

Berg K, Maki B, Williams JI, Holliday P, Wood-Dauphinee S: A comparison of clinical and laboratory measures of postural balance in an elderly population. Arch Phys Med Rehabil, 73: 1073-1083, 1992.

Berg K, Wood-Dauphinee S, Williams JI, Maki, B: Measuring balance in the elderly: Validation of an instrument. Can. J. Pub. Health, July/August supplement 2:S7-11, 1992.

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Download the Timed Up and Go guide [here](#).

ASSESSMENT

Timed Up & Go (TUG)

Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.

① Instruct the patient:

When I say “Go,” I want you to:

1. Stand up from the chair.
2. Walk to the line on the floor at your normal pace.
3. Turn.
4. Walk back to the chair at your normal pace.
5. Sit down again.

NOTE:
Always stay by
the patient for
safety.

② On the word “Go,” begin timing.

③ Stop timing after patient sits back down.

④ Record time.

Time in Seconds:

An older adult who takes ≥ 12 seconds to complete the TUG is at risk for falling.

CDC's STEADI tools and resources can help you screen, assess, and intervene to reduce your patient's fall risk. For more information, visit www.cdc.gov/steady

Patient _____

Date _____

Time _____ AM PM

OBSERVATIONS

Observe the patient's postural stability, gait, stride length, and sway.

Check all that apply:

- Slow tentative pace
- Loss of balance
- Short strides
- Little or no arm swing
- Steadying self on walls
- Shuffling
- En bloc turning
- Not using assistive device properly

These changes may signify neurological problems that require further evaluation.



**Centers for Disease
Control and Prevention**
National Center for Injury
Prevention and Control

2017

STEADI Stopping Elderly Accidents,
Deaths & Injuries

Question 8. Screening for sarcopenia

SARC-Calf test (adapted from Chen et al. ²⁶⁵)		
Components	Questions	SARC-Calf Score
Strength	Did you experience any difficulty in lifting or carrying 10 pounds?	None = 0 Some = 1 Great difficulty or unable to lift = 2
Assistance in walking	Did you experience any difficulty in walking across a room?	None = 0 Some = 1 Great difficulty, use aids, or unable to walk = 2
Rising from a chair	Did you experience any difficulty in transferring from a chair or bed?	None = 0 Some = 1 Great difficulty or unable to transfer without help = 2
Climbing stairs	Did you experience any difficulty in climbing a flight of 10 steps?	None = 0 Some = 1 Great difficulty or unable to climb = 2
Falls	Did you experience any falls in the past year?	None = 0 1–3 falls = 1 4 or more falls = 2
Calf circumference		Females: > 33cm = 0 ≤ 33cm = 10 Males: > 34cm = 0 ≤ 34cm = 10

Question 9. Screening for osteoporosis

Access the FRAX calculator [here](#).

Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: Philippines	Name/ID:	About the risk factors
Questionnaire:		
1. Age (between 40 and 90 years) or Date of Birth		
Age: <input type="text"/>	Date of Birth: Y: <input type="text"/> M: <input type="text"/> D: <input type="text"/>	10. Secondary osteoporosis <input checked="" type="radio"/> No <input type="radio"/> Yes
11. Alcohol 3 or more units/day <input checked="" type="radio"/> No <input type="radio"/> Yes		
12. Femoral neck BMD (g/cm ²) Select BMD <input type="button" value="▼"/> <input type="text"/>		
1. Age (between 40 and 90 years) or Date of Birth		
Age: <input type="text"/>	Date of Birth: Y: <input type="text"/> M: <input type="text"/> D: <input type="text"/>	10. Secondary osteoporosis <input checked="" type="radio"/> No <input type="radio"/> Yes
11. Alcohol 3 or more units/day <input checked="" type="radio"/> No <input type="radio"/> Yes		
12. Femoral neck BMD (g/cm ²) Select BMD <input type="button" value="▼"/> <input type="text"/>		
2. Sex <input type="radio"/> Male <input checked="" type="radio"/> Female		
3. Weight (kg) <input type="text"/>		
4. Height (cm) <input type="text"/>		
5. Previous Fracture <input checked="" type="radio"/> No <input type="radio"/> Yes		
6. Parent Fractured Hip <input checked="" type="radio"/> No <input type="radio"/> Yes		
7. Current Smoking <input checked="" type="radio"/> No <input type="radio"/> Yes		
8. Glucocorticoids <input checked="" type="radio"/> No <input type="radio"/> Yes		
9. Rheumatoid arthritis <input checked="" type="radio"/> No <input type="radio"/> Yes		

9.6 AGREE REPORTING CHECKLIST (SELF EVALUATION)

This checklist is intended to guide the reporting of clinical practice guidelines.

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
DOMAIN 1: SCOPE AND PURPOSE		
1. OBJECTIVES <i>Report the overall objective(s) of the guideline. The expected health benefits from the guideline are to be specific to the clinical problem or health topic.</i>	<input checked="" type="checkbox"/> Health intent(s) (i.e., prevention, screening, diagnosis, treatment, etc.) <input checked="" type="checkbox"/> Expected benefit(s) or outcome(s) <input checked="" type="checkbox"/> Target(s) (e.g., patient population, society)	16
2. QUESTIONS <i>Report the health question(s) covered by the guideline, particularly for the key recommendations.</i>	<input checked="" type="checkbox"/> Target population <input checked="" type="checkbox"/> Intervention(s) or exposure(s) <input checked="" type="checkbox"/> Comparisons (if appropriate) <input checked="" type="checkbox"/> Outcome(s) <input checked="" type="checkbox"/> Health care setting or context	11-13, 16-17
3. POPULATION <i>Describe the population (i.e., patients, public, etc.) to whom the guideline is meant to apply.</i>	<input checked="" type="checkbox"/> Target population, sex and age <input checked="" type="checkbox"/> Clinical condition (if relevant) <input type="checkbox"/> Severity/stage of disease (if relevant) <input type="checkbox"/> Comorbidities (if relevant) <input type="checkbox"/> Excluded populations (if relevant)	16
DOMAIN 2: STAKEHOLDER INVOLVEMENT		
4. GROUP MEMBERSHIP <i>Report all individuals who were involved in the development process. This may include members of the steering group, the research team involved in selecting and reviewing/rating the evidence and individuals involved in formulating the final recommendations.</i>	<input checked="" type="checkbox"/> Name of participant <input checked="" type="checkbox"/> Discipline/content expertise (e.g., neurosurgeon, methodologist) <input checked="" type="checkbox"/> Institution (e.g., St. Peter's hospital) <input type="checkbox"/> Geographical location (e.g., Seattle, WA) <input checked="" type="checkbox"/> A description of the member's role in the guideline development group	115-117
5. TARGET POPULATION PREFERENCES AND VIEWS	<input checked="" type="checkbox"/> Statement of type of strategy used to capture	21

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
<i>Report how the views and preferences of the target population were sought/considered and what the resulting outcomes were.</i>	<p>patients'/publics' views and preferences (e.g., participation in the guideline development group, literature review of values and preferences)</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Methods by which preferences and views were sought (e.g., evidence from literature, surveys, focus groups) <input checked="" type="checkbox"/> Outcomes/information gathered on patient/public information <input checked="" type="checkbox"/> How the information gathered was used to inform the guideline development process and/or formation of the recommendations 	
6. TARGET USERS <i>Report the target (or intended) users of the guideline.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> The intended guideline audience (e.g. specialists, family physicians, patients, clinical or institutional leaders/administrators) <input checked="" type="checkbox"/> How the guideline may be used by its target audience (e.g., to inform clinical decisions, to inform policy, to inform standards of care) 	16
DOMAIN 3: RIGOUR OF DEVELOPMENT		
7. SEARCH METHODS <i>Report details of the strategy used to search for evidence.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Named electronic database(s) or evidence source(s) where the search was performed (e.g., MEDLINE, EMBASE, PsychINFO, CINAHL) <input checked="" type="checkbox"/> Time periods searched (e.g., January 1, 2004 to March 31, 2008) <input checked="" type="checkbox"/> Search terms used (e.g., text words, indexing terms, subheadings) 	19, 118-127

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
	<input checked="" type="checkbox"/> Full search strategy included (e.g., possibly located in appendix)	
8. EVIDENCE SELECTION CRITERIA <i>Report the criteria used to select (i.e., include and exclude) the evidence. Provide rationale, where appropriate.</i>	<input checked="" type="checkbox"/> Target population (patient, public, etc.) characteristics <input checked="" type="checkbox"/> Study design <input checked="" type="checkbox"/> Comparisons (if relevant) <input checked="" type="checkbox"/> Outcomes <input type="checkbox"/> Language (if relevant) <input type="checkbox"/> Context (if relevant)	19-20
9. STRENGTHS & LIMITATIONS OF THE EVIDENCE <i>Describe the strengths and limitations of the evidence. Consider from the perspective of the individual studies and the body of evidence aggregated across all the studies. Tools exist that can facilitate the reporting of this concept.</i>	<input checked="" type="checkbox"/> Study design(s) included in body of evidence <input checked="" type="checkbox"/> Study methodology limitations (sampling, blinding, allocation concealment, analytical methods) <input checked="" type="checkbox"/> Appropriateness/relevance of primary and secondary outcomes considered <input checked="" type="checkbox"/> Consistency of results across studies <input checked="" type="checkbox"/> Direction of results across studies <input checked="" type="checkbox"/> Magnitude of benefit versus magnitude of harm <input checked="" type="checkbox"/> Applicability to practice context	24-108
10. FORMULATION OF RECOMMENDATIONS <i>Describe the methods used to formulate the recommendations and how final decisions were reached. Specify any areas of disagreement and the methods used to resolve them.</i>	<input checked="" type="checkbox"/> Recommendation development process (e.g., steps used in modified Delphi technique, voting procedures that were considered) <input checked="" type="checkbox"/> Outcomes of the recommendation development process (e.g., extent to which consensus was reached using modified Delphi technique, outcome of voting procedures)	21-22

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> How the process influenced the recommendations (e.g., results of Delphi technique influence final recommendation, alignment with recommendations and the final vote) 	
11. CONSIDERATION OF BENEFITS AND HARMS <i>Report the health benefits, side effects, and risks that were considered when formulating the recommendations.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Supporting data and report of benefits <input checked="" type="checkbox"/> Supporting data and report of harms/side effects/risks <input checked="" type="checkbox"/> Reporting of the balance/trade-off between benefits and harms/side effects/risks <input checked="" type="checkbox"/> Recommendations reflect considerations of both benefits and harms/side effects/risks 	24-108
12. LINK BETWEEN RECOMMENDATIONS AND EVIDENCE <i>Describe the explicit link between the recommendations and the evidence on which they are based.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> How the guideline development group linked and used the evidence to inform recommendations <input checked="" type="checkbox"/> Link between each recommendation and key evidence (text description and/or reference list) <input checked="" type="checkbox"/> Link between recommendations and evidence summaries and/or evidence tables in the results section of the guideline 	24-108
13. EXTERNAL REVIEW <i>Report the methodology used to conduct the external review.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Purpose and intent of the external review (e.g., to improve quality, gather feedback on draft recommendations, assess applicability and feasibility, disseminate evidence) <input checked="" type="checkbox"/> Methods taken to undertake the external review (e.g., 	22

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
	<p>rating scale, open-ended questions)</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Description of the external reviewers (e.g., number, type of reviewers, affiliations) <input type="checkbox"/> Outcomes/information gathered from the external review (e.g., summary of key findings) <input checked="" type="checkbox"/> How the information gathered was used to inform the guideline development process and/or formation of the recommendations (e.g., guideline panel considered results of review in forming final recommendations) 	
14. UPDATING PROCEDURE <i>Describe the procedure for updating the guideline.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> A statement that the guideline will be updated <input checked="" type="checkbox"/> Explicit time interval or explicit criteria to guide decisions about when an update will occur <input checked="" type="checkbox"/> Methodology for the updating procedure 	112
DOMAIN 4: CLARITY OF PRESENTATION		
15. SPECIFIC AND UNAMBIGUOUS RECOMMENDATIONS <i>Describe which options are appropriate in which situations and in which population groups, as informed by the body of evidence.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> A statement of the recommended action <input checked="" type="checkbox"/> Intent or purpose of the recommended action (e.g., to improve quality of life, to decrease side effects) <input checked="" type="checkbox"/> Relevant population (e.g., patients, public) <input checked="" type="checkbox"/> Caveats or qualifying statements, if relevant (e.g., patients or conditions for whom the recommendations would not apply) <input checked="" type="checkbox"/> If there is uncertainty about the best care option(s), the 	24, 29, 36, 45, 56, 60, 69, 88, 101

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
	uncertainty should be stated in the guideline	
16. MANAGEMENT OPTIONS <i>Describe the different options for managing the condition or health issue.</i>	<input checked="" type="checkbox"/> Description of management options <input type="checkbox"/> Population or clinical situation most appropriate to each option	25, 30-31, 37-38, 46-47, 58-59, 72, 80-81, 90-91, 102-103, 128-158
17. IDENTIFIABLE KEY RECOMMENDATIONS <i>Present the key recommendations so that they are easy to identify.</i>	<input checked="" type="checkbox"/> Recommendations in a summarized box, typed in bold, underlined, or presented as flow charts or algorithms <input checked="" type="checkbox"/> Specific recommendations grouped together in one section	12-13
DOMAIN 5: APPLICABILITY		
18. FACILITATORS AND BARRIERS TO APPLICATION <i>Describe the facilitators and barriers to the guideline's application.</i>	<input checked="" type="checkbox"/> Types of facilitators and barriers that were considered <input checked="" type="checkbox"/> Methods by which information regarding the facilitators and barriers to implementing recommendations were sought (e.g., feedback from key stakeholders, pilot testing of guidelines before widespread implementation) <input checked="" type="checkbox"/> Information/description of the types of facilitators and barriers that emerged from the inquiry (e.g., practitioners have the skills to deliver the recommended care, sufficient equipment is not available to ensure all eligible members of the population receive mammography) <input checked="" type="checkbox"/> How the information influenced the guideline development process and/or formation of the recommendations	24, 29, 36, 45, 56, 60, 69, 88, 101, 111

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19. IMPLEMENTATION ADVICE/TOOLS <i>Provide advice and/or tools on how the recommendations can be applied in practice.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Additional materials to support the implementation of the guideline in practice. For example: <ul style="list-style-type: none"> ○ Guideline summary documents ○ Links to check lists, algorithms ○ Links to how-to manuals ○ Solutions linked to barrier analysis (see Item 18) ○ Tools to capitalize on guideline facilitators (see Item 18) ○ Outcome of pilot test and lessons learned 	128-158
20. RESOURCE IMPLICATIONS <i>Describe any potential resource implications of applying the recommendations.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Types of cost information that were considered (e.g., economic evaluations, drug acquisition costs) <input checked="" type="checkbox"/> Methods by which the cost information was sought (e.g., a health economist was part of the guideline development panel, use of health technology assessments for specific drugs, etc.) <input checked="" type="checkbox"/> Information/description of the cost information that emerged from the inquiry (e.g., specific drug acquisition costs per treatment course) <input checked="" type="checkbox"/> How the information gathered was used to inform the guideline development process and/or formation of the recommendations 	27, 32-33, 42, 52, 65, 75-76, 83, 96, 105-106, 111
21. MONITORING/ AUDITING CRITERIA <i>Provide monitoring and/or auditing criteria to measure the application of guideline recommendations.</i>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Criteria to assess guideline implementation or adherence to recommendations <input checked="" type="checkbox"/> Criteria for assessing impact of implementing the 	110

CHECKLIST ITEM AND DESCRIPTION	REPORTING CRITERIA	Page #
	recommendations <input type="checkbox"/> Advice on the frequency and interval of measurement <input checked="" type="checkbox"/> Operational definitions of how the criteria should be measured	
DOMAIN 6: EDITORIAL INDEPENDENCE		
22. FUNDING BODY <i>Report the funding body's influence on the content of the guideline.</i>	<input checked="" type="checkbox"/> The name of the funding body or source of funding (or explicit statement of no funding) <input checked="" type="checkbox"/> A statement that the funding body did not influence the content of the guideline	3
23. COMPETING INTERESTS <i>Provide an explicit statement that all group members have declared whether they have any competing interests.</i>	<input checked="" type="checkbox"/> Types of competing interests considered <input checked="" type="checkbox"/> Methods by which potential competing interests were sought <input checked="" type="checkbox"/> A description of the competing interests <input checked="" type="checkbox"/> How the competing interests influenced the guideline process and development of recommendations	115-117