

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The text is centered in the white space between these shapes.

ACSM Scientific Roundtable: Updating Recommendations for Exercise Preparticipation Health Screening

Updating the ACSM Recommendations for Exercise Preparticipation Health Screening

- Discuss the **current** (2009) American College of Sports Medicine's (ACSM) exercise preparticipation health screening recommendations
 - *American College of Sports Medicine's (ACSM) Guidelines for Exercise Testing and Prescription the Ninth Edition (GETP 9)*
- Discuss the **new** (2015) ACSM exercise preparticipation health screening recommendations
 - *Medicine Science Sports & Exercise* in November 2015
 - *ACSM GETP10* in 2017
- Apply the **new** ACSM exercise preparticipation health screening recommendations to a case study

ACSM's Exercise Preparticipation Health Screening

- To identify individuals who may be at risk for serious acute exercise-related cardiovascular events including sudden cardiac death and myocardial infarction
- Vigorous intensity exercise does have a small but measureable acute risk of CVD complications; mitigating this risk in susceptible individuals is important

The ACSM Exercise Preparticipation Health Screening Recommendations Published in 2009

- All people wanting to initiate a physical activity program should be screened at minimum by a ***self-guided medical history or health risk appraisal questionnaire*** such as the PAR-Q or modified American Heart Association / ACSM Health/Fitness Facility Preparticipation Screening Questionnaire for the presence of risk factors for cardiovascular, pulmonary, renal, and metabolic diseases as well as other conditions (e.g., pregnancy and orthopedic injury) that require special attention when designing the exercise prescription (Ex R_x)

The 2009 ACSM Exercise Preparticipation Health Screening Recommendations

➤ Individuals are classified as low, moderate, or high risk based on the presence or absence of:

- Cardiovascular disease (CVD) risk factors
- Signs and symptoms of cardiovascular, pulmonary, renal, or metabolic disease
- Known cardiovascular, pulmonary, renal, or metabolic disease

TABLE 2.2. Atherosclerotic Cardiovascular Disease (CVD) Risk Factors and Defining Criteria (26,31)

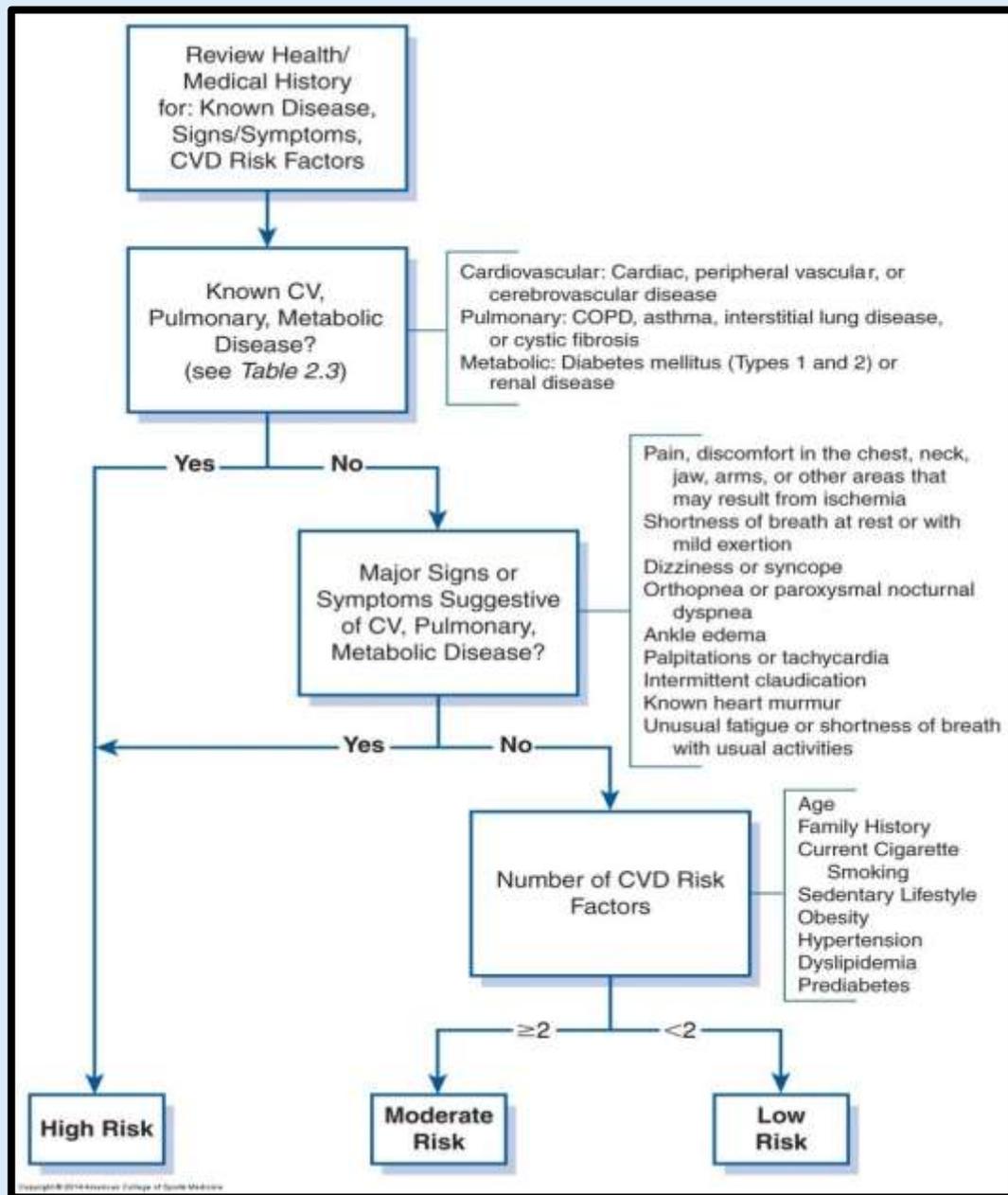
Risk Factors	Defining Criteria
Age	Men ≥ 45 yr; women ≥ 55 yr (12)
Family history	Myocardial infarction, coronary revascularization, or sudden death before 55 yr in father or other male first-degree relative or before 65 yr in mother or other female first-degree relative
Cigarette smoking	Current cigarette smoker or those who quit within the previous 6 mo or exposure to environmental tobacco smoke
Sedentary lifestyle	Not participating in at least 30 min of moderate intensity, physical activity (40%–<60% $\dot{V}O_2R$) on at least 3 d of the week for at least 3 mo (22,30)
Obesity	Body mass index ≥ 30 $\text{kg} \cdot \text{m}^{-2}$ or waist girth >102 cm (40 in) for men and >88 cm (35 in) for women (10)
Hypertension	Systolic blood pressure ≥ 140 mm Hg and/or diastolic ≥ 90 mm Hg, confirmed by measurements on at least two separate occasions, or on antihypertensive medication (9)
Dyslipidemia	Low-density lipoprotein (LDL) cholesterol ≥ 130 $\text{mg} \cdot \text{dL}^{-1}$ (3.37 $\text{mmol} \cdot \text{L}^{-1}$) or high-density lipoprotein ^b (HDL) cholesterol <40 $\text{mg} \cdot \text{dL}^{-1}$ (1.04 $\text{mmol} \cdot \text{L}^{-1}$) or on lipid-lowering medication. If total serum cholesterol is all that is available, use ≥ 200 $\text{mg} \cdot \text{dL}^{-1}$ (5.18 $\text{mmol} \cdot \text{L}^{-1}$) (21)
Prediabetes ^d	Impaired fasting glucose (IFG) = fasting plasma glucose ≥ 100 $\text{mg} \cdot \text{dL}^{-1}$ (5.55 $\text{mmol} \cdot \text{L}^{-1}$) and ≤ 125 $\text{mg} \cdot \text{dL}^{-1}$ (6.94 $\text{mmol} \cdot \text{L}^{-1}$) or impaired glucose tolerance (IGT) = 2 h values in oral glucose tolerance test (OGTT) ≥ 140 $\text{mg} \cdot \text{dL}^{-1}$ (7.77 $\text{mmol} \cdot \text{L}^{-1}$) and ≤ 199 $\text{mg} \cdot \text{dL}^{-1}$ (11.04 $\text{mmol} \cdot \text{L}^{-1}$) confirmed by measurements on at least two separate occasions (5)
Negative Risk Factors	Defining Criteria
High-density lipoprotein (HDL) cholesterol	≥ 60 $\text{mg} \cdot \text{dL}^{-1}$ (1.55 $\text{mmol} \cdot \text{L}^{-1}$)

^aIf the presence or absence of a CVD risk factor is not disclosed or is not available, that CVD risk factor should be counted as a risk factor except for prediabetes. If the prediabetes criteria are missing or unknown, prediabetes should be counted as a risk factor for those ≥ 45 yr, especially for those with a body mass index (BMI) ≥ 25 $\text{kg} \cdot \text{m}^{-2}$, and those <45 yr with a BMI ≥ 25 $\text{kg} \cdot \text{m}^{-2}$ and additional CVD risk factors for prediabetes. The number of positive risk factors is then summed.

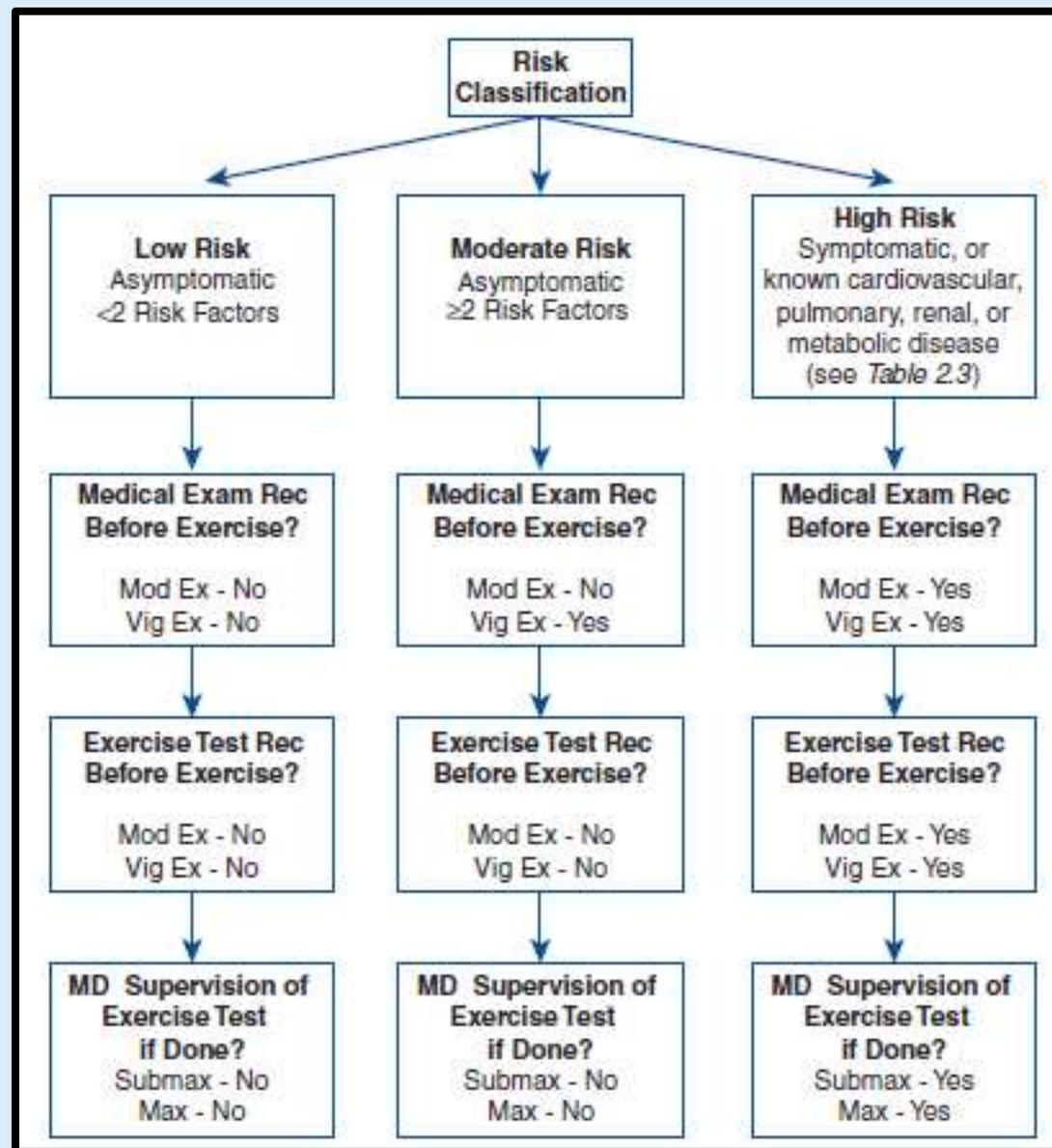
^bHigh HDL is considered a negative risk factor. For individuals having high HDL ≥ 60 $\text{mg} \cdot \text{dL}^{-1}$ (1.55 $\text{mmol} \cdot \text{L}^{-1}$), for these individuals one positive risk factor is subtracted from the sum of positive risk factors.

$\dot{V}O_2R$, oxygen uptake reserve.

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ACSM GETP 9 FIGURE 2.3. Logic model for classification of risk. CV, cardiovascular; CVD, cardiovascular disease.



ACSM GETP 9 FIGURE 2.4. Medical examination, exercise testing, and supervision of exercise testing preparticipation recommendations based on classification of risk. Ex Rx, exercise prescription; HR, heart rate; METs, metabolic equivalents; VO₂R, oxygen uptake reserve.

The 2009 ACSM Exercise Preparticipation Health Screening Recommendations

- Individuals at moderate risk with ≥ 2 CVD risk factors should be encouraged to consult with their physician prior to initiating a vigorous intensity, physical activity program
 - While medical evaluation is taking place, the majority of these people can begin light to moderate intensity, physical activity programs such as walking without consulting a physician
- Individuals at high risk with symptoms or diagnosed disease should consult with their physician prior to initiating a physical activity program

TABLE 2.3. New ACSM Recommendations for Exercise Testing Prior to Exercise-Diagnosed Cardiovascular Disease

Unstable or new or possible symptoms of cardiovascular disease (see *Table 2.2*)

Diabetes mellitus and at least one of the following:

Age >35 yr OR

Type 2 diabetes mellitus >10-yr duration OR

Type 1 diabetes mellitus >15-yr duration OR

Hypercholesterolemia (total cholesterol ≥ 240 mg \cdot L⁻¹) (6.62 mmol \cdot L⁻¹) OR

Hypertension (systolic blood pressure ≥ 140 or diastolic ≥ 90 mm Hg) OR

Smoking OR

Family history of CAD in first-degree relative <60 yr OR

Presence of microvascular disease OR

Peripheral artery disease OR

Autonomic neuropathy

End-stage renal disease

Patients with symptomatic or diagnosed pulmonary disease including chronic obstructive pulmonary disease (COPD), asthma, interstitial lung disease, or cystic fibrosis.

ACSM, American College of Sports Medicine; CAD, coronary artery disease.

The Updated 2015 ACSM Exercise Testing Recommendations

- Routine exercise testing before initiating a vigorous intensity, physical activity program is recommended **only** for individuals at high risk of exercise-related complications

The 2015 ACSM Exercise Preparticipation Health Screening Recommendations

- Compared to the previous ACSM recommendations, the updated ACSM exercise preparticipation health screening recommendations:
- More strongly support the public health message that all people should adopt a physically active lifestyle
 - Reduce the emphasis on the need for medical evaluation in healthy, asymptomatic persons
 - Emphasize identifying those with known disease because they are at greatest risk for an exercise-related cardiac event
 - Simplify the exercise preparticipation health screening process

Why Reevaluate the 2009 ACSM Exercise Preparticipation Health Screening Recommendations?

- Exercise is safe for most people and has many health/fitness benefits
- The cardiovascular risks associated with exercise lessen as individuals become more physically active/fit
- Exercise-related cardiovascular events are rare and often are preceded by warning signs and symptoms
- The current prescreening algorithms can result in excessive referrals to physicians for medical clearance
 - Potential barrier to adopting exercise
 - Financial burden on the individual and health care system

ACSM Scientific Roundtable: Updating Recommendations for Exercise Preparticipation Health Screening

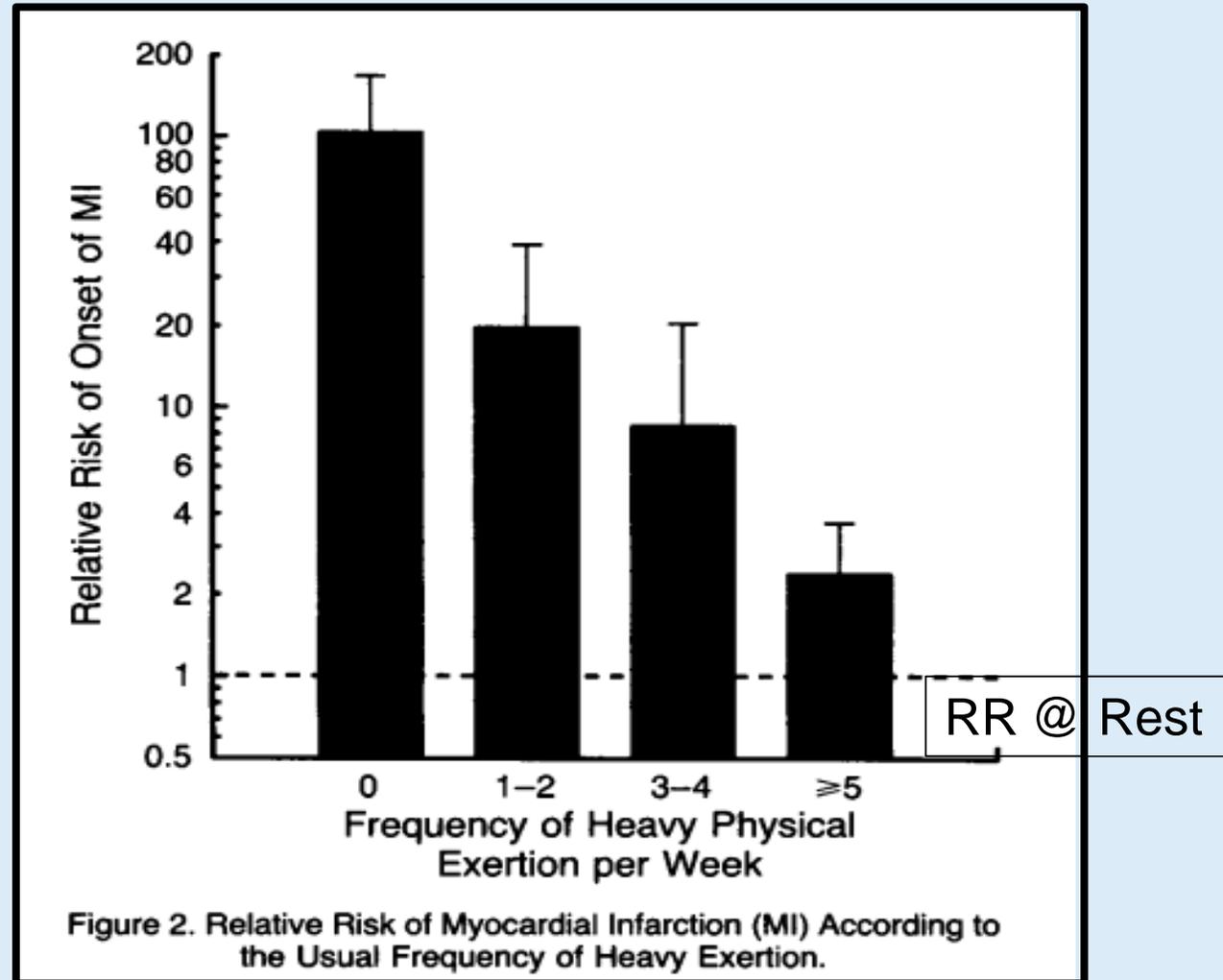
- Expert panel was convened by ACSM in June 2014 to establish best practices in the exercise preparticipation health screening practice
 - Experts in risk assessment, preventive cardiology, public health, exercise physiology, and geriatrics
 - Practitioners from the field of medicine, clinical exercise physiology, and health fitness/prevention
- David M. Buchner, M.D., M.P.H., FACSM
 - Joanne Eickhoff-Schemek, Ph.D.
 - Carol Ewing Garber, Ph.D., FACSM
 - Barry A. Franklin, Ph.D., FACSM
 - Adrian Hutber, Ph.D.
 - Elizabeth A. Joy, M.D., M.P.H., FACSM
 - Gary Liguori, Ph.D., FACSM
 - Meir Magal, Ph.D., FACSM
 - Linda S. Pescatello, Ph.D., FACSM
 - Deborah Riebe, Ph.D., FACSM
 - Thomas Spring, M.S.
 - Paul D. Thompson, M.D., FACSM
 - Darren E.R. Warburton, Ph.D.
 - Geoffrey P. Whitfield, Ph.D.
 - Walter R. Thompson, Ph.D., FACSM

Exercise Is Safe!

- The relative risk of a cardiovascular event is increased during vigorous intensity exercise relative to rest, but the absolute risk of a cardiac event is low

Why Re-evaluate the 2009 ACSM Exercise Preparticipation Health Screening Recommendations?

- Exercise is safe for most people and has many health/fitness benefits
- **Cardiovascular risks associated with exercise lessen as individuals become more active/fit**



ACSM GETP 9, Mittleman *NEJM* 1993; AHA Scientific Statement. *Circulation* 2007

Association of Episodic Physical Activity With Triggering of Acute Cardiac Events

Systematic Review and Meta-analysis

Issa J. Dahabreh, MD

Jessica K. Paulus, ScD

ACUTE CARDIAC EVENTS ARE A major cause of morbidity and mortality, with as many as a million acute myocardial infarctions (MIs) and 300 000 cardiac arrests occurring in the United States each year.^{1,2} Regular physical activity has been identified as strongly associated with a decreased risk of cardiovascular disease and related mortality.³ Despite the well-established benefits of regular physical activity, anecdotal evidence has suggested that physical activity, as well as other acute exposures, such as sexual activity and psychological stress, can act as triggers of acute cardiac events.⁴⁻⁷ In fact, in the original description of MI, Obraztsov and Strazhesko⁸ observed that the acute event is often precipitated by exposure to physical or mental stressors.⁹

Traditional epidemiological designs, such as case-control and cohort studies, are not particularly suitable for identifying acute triggers (proximal causes) of cardiac events, primarily because short-term exposures close to the time of event occurrence are likely to be confounded by patient-level factors. In the early 1990s, the case-crossover design was developed specifically to address the problem of identifying triggers of acute events.^{10,11} A case-crossover study is based on the

Context Evidence has suggested that physical and sexual activity might be triggers of acute cardiac events.

Objective To assess the effect of episodic physical and sexual activity on acute cardiac events using data from case-crossover studies.

Data Sources MEDLINE and EMBASE (through February 2, 2011) and Web of Science (through October 6, 2010).

Study Selection Case-crossover studies investigating the association between episodic physical or sexual activity and myocardial infarction (MI) or sudden cardiac death (SCD).

Data Extraction Two reviewers extracted descriptive and quantitative information from each study. We calculated summary relative risks (RRs) using random-effects meta-analysis and absolute event rates based on US data for the incidence of MI and SCD. We used the Fisher *P* value synthesis method to test whether habitual physical activity levels modify the triggering effect and meta-regression to quantify the interaction between habitual levels of physical activity and the triggering effect.

Results We identified 10 studies investigating episodic physical activity, 3 studies investigating sexual activity, and 1 study investigating both exposures. The outcomes of interest were MI (10 studies), acute coronary syndrome (1 study), and SCD (3 studies). Episodic physical and sexual activity were associated with an increase in the risk of MI (RR=3.45; 95% confidence interval [CI], 2.33-5.13, and RR=2.70; 95% CI, 1.48-4.91, respectively). Episodic physical activity was associated with SCD (RR=4.98; 95% CI, 1.47-16.91). The effect of triggers on the absolute rate of events was limited because exposure to physical and sexual activity is infrequent and their effect is transient; the absolute risk increase associated with 1 hour of additional physical or sexual activity per week was estimated as 2 to 3 per 10 000 person-years for MI and 1 per 10 000 person-years for SCD. Habitual activity levels significantly affected the association of episodic physical activity and MI ($P < .001$), episodic physical activity and SCD ($P < .001$), and sexual activity and MI ($P = .04$); in all cases, individuals with lower habitual activity levels had an increased RR for the triggering effect. For every additional time per week an individual was habitually exposed to physical activity, the RR for MI decreased by approximately 45%, and the RR for SCD decreased by 30%.

Conclusion Acute cardiac events were significantly associated with episodic physical and sexual activity; this association was attenuated among persons with high levels of habitual physical activity.

JAMA. 2011;305(12):1225-1233

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identification of patients who have experienced the event of interest and requires the assessment of exposure dur-

ing a relatively brief period preceding the event of interest (the hazard period) and during period(s) when the

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Harvard School of Public Health (Dr Paulus), Boston. **Corresponding Author:** Issa J. Dahabreh, MD, Center for Clinical Evidence Synthesis, Institute for Clinical Research and Health Policy Studies, Tufts Medical Center, 800 Washington St, Box 63, Boston, MA 02111 (idahabreh@tuftsmedicalcenter.org).



CME available online at
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and questions on p 1249.

Conclusion: Acute cardiac events were significantly associated with episodic physical activity; this association was significantly attenuated among persons with high levels of habitual physical activity.

Dahabreh IJ, Paulus JK. JAMA
2011;305(12):1225-1233

Why Reevaluate the 2009 ACSM Exercise Preparticipation Health Screening Recommendations?

- Exercise is safe for most people and has many health/fitness benefits
- Cardiovascular risks associated with exercise lessen as individuals become more active/fit
- **Exercise-related cardiovascular events are rare and often preceded by warning signs and symptoms**

Signs and Symptoms

TABLE 5. Prodromal symptoms reported by 45 subjects within 1 week of their SCD.

Symptom	Reports, n
Chest pain/angina	15
Increasing fatigue	12
Indigestion/heartburn/gastrointestinal symptoms	10
Excessive breathlessness	6
Ear or neck pain	5
Vague malaise	5
Upper respiratory tract infection	4
Dizziness/palpitations	3
Severe headache	2

Adapted from Northcote et al. (57).



- Individuals who experience cardiovascular complications during or soon after exercise often have prodromal symptoms in the days and weeks before the event.
- Exercise professionals should promote education about exertion-related symptoms in the persons they counsel

Franklin *Circulation* 2014; Thompson *Circulation* 2007

Why Reevaluate the 2009 ACSM Exercise Preparticipation Health Screening Recommendations?

- Exercise is safe for most people and has many health/fitness benefits
- Cardiovascular risks associated with exercise lessen as individuals become more active/fit
- Exercise-related cardiovascular events are rare and often preceded by warning signs and symptoms
- **The current prescreening algorithms can result in excessive referrals to physicians for medical clearance**
 - Potential barrier to adopting exercise
 - Financial burden on the individual and health care system

Application of the American Heart Association/American College of Sports Medicine Adult Preparticipation Screening Checklist to a Nationally Representative Sample of US Adults Aged ≥ 40 Years From the National Health and Nutrition Examination Survey 2001 to 2004

Geoffrey P. Whitfield, PhD; Kelley K. Pettee Gabriel, PhD; Mohammad H. Rahbar, PhD; Harold W. Kohl III, PhD

Background—Although the American Heart Association/American College of Sports Medicine's Preparticipation Questionnaire (AAPQ) is a recommended preexercise cardiovascular screening tool, it has never been systematically evaluated. The purpose of this research is to provide preliminary evidence of its effectiveness among adults aged ≥ 40 years.

Methods and Results—Under the assumption that participants would respond to AAPQ items as they responded to a general health survey, we calculated the sex- and age-specific proportions of adult participants in the National Health and Nutrition Examination Survey 2001 to 2004 who would receive a recommendation for physician consultation based on AAPQ referral criteria. Additionally, we compared recommended AAPQ referrals to a similar assessment using the Physical Activity Readiness Questionnaire in the study sample. AAPQ referral proportions were higher with older age. Across all age groups ≥ 40 years, 95.5% (94.3% to 96.8%) of women and 93.5% (92.2% to 94.7%) of men in the United States would be advised to consult a physician before exercise. Prescription medication use and age were the most commonly selected items. When referral based on AAPQ was compared with that of the Physical Activity Readiness Questionnaire, the 2 screening tools produced similar results for 72.4% of respondents.

Conclusions—These results suggest that $>90\%$ of US adults aged ≥ 40 years would receive a recommendation for physician consultation by the AAPQ. Excessive referral may present an unnecessary barrier to exercise adoption and stress the healthcare infrastructure. (*Circulation*. 2014;129:1113-1120.)

Key Words: epidemiology ■ exercise ■ health surveys ■ mass screening

It is well-established that regular participation in vigorous and moderate-intensity physical activity lowers the risk of cardiovascular disease (CVD) and CVD mortality.¹ Paradoxically, the risk of an acute cardiac event, including myocardial infarction or sudden cardiac death, is increased during a bout of physical activity, although less so in those who are habitually physically active.^{2,3} Occlusive coronary artery disease is the most prevalent underlying pathology precipitating physical activity-associated myocardial infarction and sudden cardiac death in adults aged ≥ 35 years.² Accordingly, efforts to identify adults at elevated risk for physical activity-associated cardiovascular complications usually center on assessment of CVD risk factors or diagnosis of occult CVD.

Editorial see p 1081 Clinical Perspective on p 1120

Preventing physical activity-associated cardiac events is 1 argument for preparticipation screening, which is championed by medical and professional organizations.^{4,5} For adults, such screening can take many forms and varies in formality and thoroughness, from physician-led examination and testing, to cardiovascular health assessments by allied-health professionals, to self-administered health questionnaires (henceforth, self-screening). Self-screening is the least formal but arguably the most common preparticipation screening method, the purpose of which is to identify those with CVD symptoms that may benefit from a physician consultation before initiating or increasing participation in physical activity of moderate or

Conclusion: $> 90\%$ of US adults aged ≥ 40 years would receive a recommendation for physician consultation by the AAPQ. Excessive referral may present an unnecessary barrier to exercise adoption and stress the healthcare infrastructure.

Whitefield *Circulation* 2014

Received May 30, 2013; accepted November 20, 2013.

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The online-only Data Supplement is available with this article at <http://circ.ahajournals.org/lookup/suppl/doi:10.1161/CIRCULATIONAHA.113.004160/-DC1>.

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Circulation is available at <http://circ.ahajournals.org>

DOI: 10.1161/CIRCULATIONAHA.113.004160

The 2015 ACSM Exercise Preparticipation Health Screening Recommendations

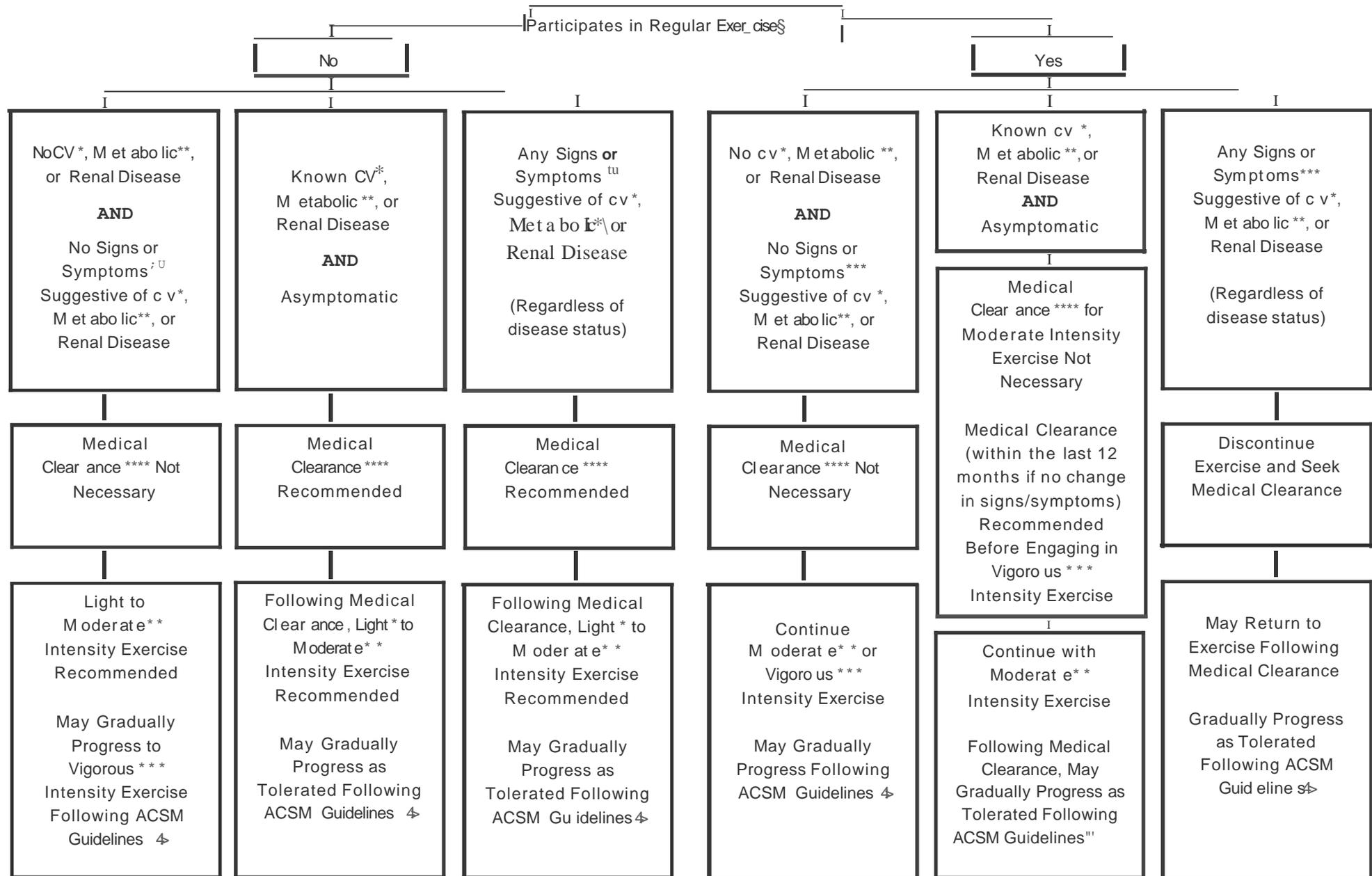
- The new exercise preparticipation health screening recommendations are not a replacement for sound clinical judgment, and decisions about referral to a health care provider for medical clearance prior to the initiation of an exercise program should continue to be made on an individual basis

What's New?

- The expert panel proposed a new evidence-informed model for exercise preparticipation health screening based on three factors:
 - The individual's current level of physical activity
 - Presence of signs or symptoms and/or known cardiovascular, metabolic, or renal disease
 - Desired exercise intensity

What's New?

- No longer includes the CVD risk factor profile as part of the decision making for referral to a health care provider prior to the initiating a moderate-to-vigorous intensity exercise program
- No longer recommends a low/moderate/high risk classification scheme
- Makes general recommendations for *medical clearance* versus specific recommendations for *medical exams* or *exercise tests*, leaving the manner of clearance to the discretion of the healthcare provider.
- Does not automatically refer individuals with pulmonary disease for medical clearance prior to the initiation of an exercise program



Participates in Regular Exercise[§]

No

**No CV[‡], Metabolic^{##}, or Renal Disease
AND
No Signs or Symptoms^{###} Suggestive
of CV[‡], Metabolic^{##}, or Renal Disease**

Medical Clearance^{###} Not Necessary

Light to Moderate^{} Intensity Exercise
Recommended**

**May Gradually Progress to
Vigorous^{***} Intensity Exercise
Following ACSM Guidelines^ϕ**

**Known CV[‡], Metabolic^{##}, or Renal
Disease
AND
Asymptomatic**

Medical Clearance^{###} Recommended

**Following Medical Clearance, Light* to
Moderate^{**} Intensity Exercise
Recommended**

**May Gradually Progress as Tolerated
Following ACSM Guidelines^ϕ**

**Any Signs or Symptoms^{###}
Suggestive of CV[‡], Metabolic^{##}, or
Renal Disease

(Regardless of disease status)**

Medical Clearance^{###} Recommended

**Following Medical Clearance, Light*
to Moderate^{**} Intensity Exercise
Recommended**

**May Gradually Progress as Tolerated
Following ACSM Guidelines^ϕ**

Participates in Regular Exercise[§]

Yes

No CV[‡], Metabolic^{‡‡}, or Renal Disease
AND
No Signs or Symptoms^{‡‡‡} Suggestive of CV[‡], Metabolic^{‡‡}, or Renal Disease

Medical Clearance^{‡‡‡‡} Not Necessary

Continue Moderate^{} or Vigorous^{***} Intensity Exercise**
May Gradually Progress Following ACSM Guidelines^ϕ

Known CV[‡], Metabolic^{‡‡}, or Renal Disease
AND
Asymptomatic

Medical Clearance^{‡‡‡‡} for Moderate Intensity Exercise Not Necessary
Medical Clearance (within the last 12 months if no change in signs/symptoms) Recommended Before Engaging in Vigorous^{*} Intensity Exercise**

Continue with Moderate^{} Intensity Exercise**
Following Medical Clearance, May Gradually Progress as Tolerated Following ACSM Guidelines^ϕ

Any Signs or Symptoms^{‡‡‡} Suggestive of CV[‡], Metabolic^{‡‡}, or Renal Disease
(Regardless of disease status)

Discontinue Exercise and Seek Medical Clearance

May Return to Exercise Following Medical Clearance
Gradually Progress as Tolerated Following ACSM Guidelines^ϕ

Medical Clearance vs. Medical Exam and Exercise Test

- Medical clearance has replaced specific recommendations for a medical exam or exercise test because it should be the health care provider that decides what evaluation, if any, is appropriate prior to the initiation of exercise
- There is a lack of evidence that medical clearance and exercise testing are effective in mitigating the risk of exercise-related cardiovascular deaths

The 2015 ACSM Exercise Preparticipation Health Screening Recommendations

- Emphasizes the important public health message of regular physical activity for all
- Simplifies the prescreening process by eliminating the need for medical clearance and/or exercise testing in many individuals, especially when low to moderate intensity exercise is contemplated

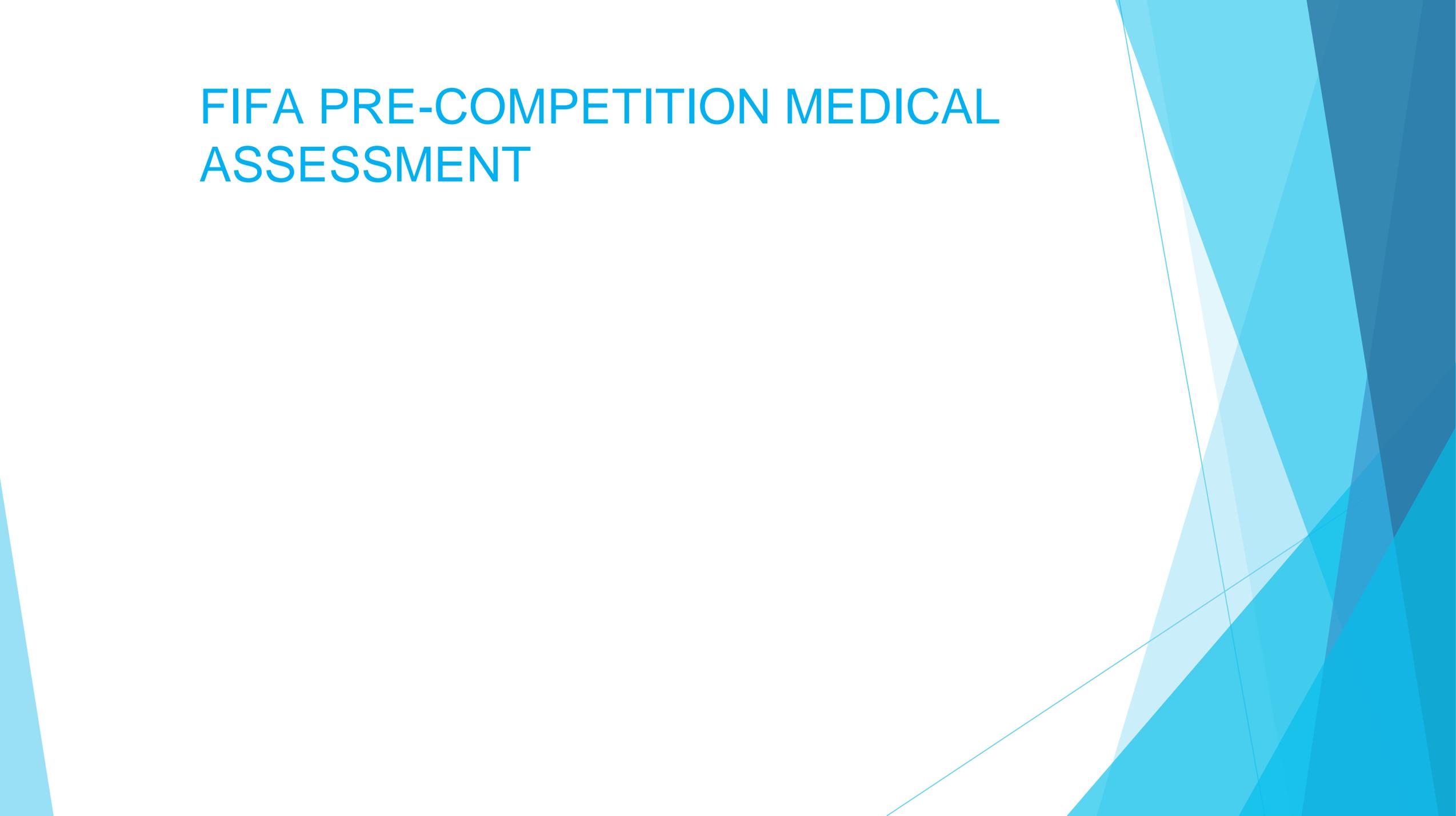
The 2015 ACSM Exercise Preparticipation Health Screening Recommendations

- Recognize that the hazards of exercise-related cardiovascular events may more likely be reduced by careful attention to a safe and effective exercise prescription that:
 - Addresses FITT-VP (frequency, intensity, time, type, volume, progression) that incorporates a progressive transitional phase during which exercise duration and intensity are gradually increased
 - Advocates appropriate warm-up and cool-down
 - Promotes education of warning signs/symptoms
 - Encourages sedentary people to engage in regular, brisk walking to move them out of the least physically fit, least physically active cohort
 - Counsels physically inactive individuals to avoid unaccustomed vigorous intensity physical activity.

Acknowledgements

- The Exercise Preparticipation Health Screening Scientific Roundtable was generously supported by ACSM.
- Several ACSM staff played key advisory, leadership, and administrative roles including:
 - Jim Whitehead
 - Richard Cotton
 - Katie Feltman
 - Jane Gleason-Senior

FIFA PRE-COMPETITION MEDICAL ASSESSMENT

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. The shapes are primarily triangles and polygons, creating a dynamic, modern aesthetic. The text is positioned in the upper left quadrant of the white space.