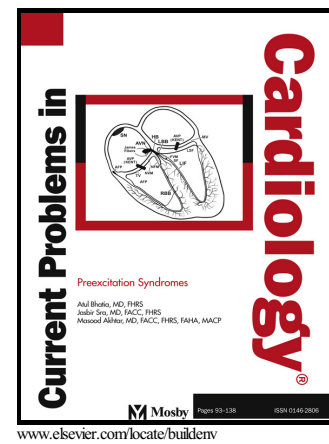


Author's Accepted Manuscript

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PII: S0146-2806(17)30106-8
DOI: <http://dx.doi.org/10.1016/j.cpcardiol.2017.07.001>
Reference: YMCD356

To appear in: *Current Problems in Cardiology*

Cite this article as: Ross Arena, Amy McNeil, Carl J. Lavie, Cemal Ozemek, Daniel Forman, Jonathan Myers, Deepika R. Laddu, Dejana Popovic, Codie R. Rouleau, Tavis S. Campbell and Andrew P. Hills, Assessing the Value of Moving More – The Integral Role of Qualified Health Professionals, *Current Problems in Cardiology*, <http://dx.doi.org/10.1016/j.cpcardiol.2017.07.001>

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Assessing the Value of Moving More – The Integral Role of Qualified Health Professionals

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Abstract

Being physically active, or, in a broader sense, simply moving more throughout each day, is one of the most important components of an individual's health plan. In conjunction with regular exercise training (ET), taking more steps in a day and sitting less are also important components of one's movement portfolio. Given this priority, healthcare professionals must develop enhanced skills for prescribing and guiding individualized movement programs for all their patients. An important component of a healthcare professional's ability to prescribe *movement as medicine* is competency in assessing an individual's risk for untoward events if physical exertion was increased. The ability to appropriately assess one's risk prior to advising an individual to move more is integral to clinical decision making related to subsequent testing if needed, exercise prescription and level of supervision with ET. At present, there is a lack of clarity pertaining to how a healthcare professional should go about assessing an individual's readiness to move more on a daily basis in a safe manner. Therefore, this perspectives paper clarifies key issues related to prescribing movement as medicine and presents a new process for clinical assessment prior to prescribing an individualized movement program.

Key Words: Exercise test; adverse event; cardiovascular risk; sitting time; exercise training; steps per day

Introduction

Being physically active, or, in a broader sense, simply moving more throughout each day, is one of the most important components of an individual's health plan.¹⁻⁵ In fact, "exercise as medicine" is now a well-accepted premise.^{3, 6-9} Our understanding of the benefits of physical exertion have evolved to encompass more than just a the structured exercise program.¹⁰ In conjunction with regular exercise training (ET), taking more steps in a day and¹¹⁻¹³ sitting less^{4, 14, 15}, all activities that increase heart rate to varying levels^{16, 17}, are important components of one's *movement portfolio*. Simply stated, individuals should move more, minimizing idle time, throughout each day. In fact, the more appropriate premise may be *movement is medicine*. There is clear and undeniable evidence, spanning several decades, that individuals who are more physically active and have a higher level of cardiorespiratory fitness (CRF)¹⁸, the latter being a primary result of regularly participating in the former, realize profound health benefits. Specifically, compared to those who lead a sedentary lifestyle, incrementally increasing physical activity levels results in a progressively lower risk of developing chronic disease [i.e., cardiovascular disease (CVD), certain cancers, diabetes, etc.] as well as frailty, disability, premature morbidity and mortality, supporting the premise that some level of movement is better than none at all and more is better. Adopting a physically active lifestyle confers great benefit irrespective of baseline health status (i.e., from apparently healthy to diagnosed chronic disease) and should therefore be an integral health intervention across the prevention spectrum (i.e., primordial to secondary). Moreover, given the paradigm shift in healthcare, moving away from a reactionary model (i.e., waiting for poor health to manifest before initiating treatment) and toward a proactive model (i.e., maintaining optimal health and minimizing the need for hospitalizations, surgeries, etc.), there has never been a more opportune time to consider moving

more throughout the day as a both an integral component of chronic disease prevention and, if an individual has been diagnosed with a chronic disease, a medical intervention.¹⁹

As such, healthcare professionals (e.g., physicians, nurses, physical therapists, dieticians, and exercise physiologists) must develop an enhanced skillset for prescribing an individualized *movement program*, which includes a structured ET program as well as increased total steps per day and reduced sitting time. An important component of a healthcare professional's skills to prescribe *movement as medicine* is competency in assessing an individual's risk for untoward events as physical exertion is increased. The ability to appropriately assess one's risk prior to advising them to move more is instrumental to sound clinical decision making as it pertains to subsequent testing if needed, ET prescription and level of monitoring during physical exertion (i.e., supervised vs. independent management of an ET program). Present day standards for clinicians to assess an individual's readiness to advance daily movement are relatively ambiguous. Therefore, this perspectives paper discusses key issues related to prescribing *movement as medicine* and presents a new process for clinical assessment and communication prior to prescribing an individualized movement program.

Is being physically active safe and beneficial across the health spectrum?

There is certainly a risk of adverse events with acute bouts of physical exertion; risks increase more so in those who are unaccustomed to regular physical activity (PA) at higher ET intensities.^{20, 21} The risk of a serious adverse event precipitously drops if the intensity level of PA is below a threshold that would trigger physiologic instability in a given individual (i.e., myocardial ischemia, ventricular arrhythmias, hemodynamic decompensation, etc.). In some instances, individuals who have a history of *moving too much* (i.e., ultra-endurance athletes), are also at increased risk if ET at extremely high volumes and intensities persist.²² Overall, the

incidence of serious adverse events during PA, from a population level, is extremely low. This is counterbalanced by the numerous physiologic and clinical benefits derived from participation in a regular ET program including: 1) Improved lipids, blood glucose and systemic inflammation profiles; 2) Improved body habitus (i.e., increased lean mass and decreased fat mass); 3) Improved psychosocial profile²³; 4) Improved autonomic tone, favoring parasympathetic influence; 5) Reduced risk of developing a chronic disease; and 6) Reduced risk of frailty and disability; and 7) Reduced morbidity and mortality.²⁴ Given that long-term benefits of PA far outweigh the transient risks, a general tenant is that every individual who is in a stable physiologic state should be counseled to move more in a way that suits their own health profile and functional capabilities.

Public Health Messaging Campaigns Focused on Moving More

The clear health benefits of moving more has prompted numerous public health initiatives focused on this issue. For example, the Let's Move campaign, initiated by the Obama administration, is a prime example of recent public campaigns to promote PA and raise awareness of its benefits.²⁵⁻²⁷ The Centers for Disease Control²⁸, American Heart Association²⁹, World Health Organization³⁰ and many other organizations also have campaigns that promote moving more. Well formulated campaigns that clearly articulate and operationally define the value of being physically active, encourage individuals to adopt this key healthy living trait, and provide guidance on when to seek assessment by a health professional prior to moving more are vital components of promoting healthy behaviors on a population level. Public health messaging campaigns do not necessarily assume communication between a qualified health professional and an individual for the purpose of developing a movement plan. From a population perspective, any risk of adverse events in a previously sedentary individual who autonomously

decides to make a health behavior change and move more is far outweighed by the health benefits of physical exertion on a regular basis. An individual who decides to become physically active without seeking medical advice assumes personal responsibility. However, once an individual decides to seek medical care, healthcare professionals delivering this care have a responsibility to perform a pre-movement assessment, which, at this time, is not a common occurrence.

Pre-Movement Assessment Conducted by a Health Professional: Reframing the Concept of Clearance to Move More

As stated previously, becoming more physically active and moving more is highly beneficial and carries minimal risk if performed at an appropriate level given one's health status. Even so, when an individual engages with a healthcare professional, that professional should perform a health screen to guide the prescription for increased movement and determine if there are any contraindications to this prescription. In rare instances, the healthcare professional will assess individuals who have chronically performed ET at extremely high volumes, leading to an increased risk of adverse events.²² In such cases, the healthcare professional may opt to advise the individual to down-titrate their ET program to reduce risk.

Historically, a pre-exercise health screen and an exercise test (entailing an incremental maximal or symptom limited aerobic test on a bike or treadmill) were inaccurately assumed to be synonymous. Some have posited that the exercise stress test, as a gateway that must be passed through prior to beginning or titrating a movement prescription, is a barrier to being more physically active, a premise that is not substantiated by scientific analysis. However, the exercise test is but one of numerous options the health professional may call upon in performing a pre-movement screen to ensure an individual is ready to safely begin their individualized movement

prescription. Initial screening may entail a general history and physical as well as completing one of several validated CVD risk calculators. Based on these findings, the healthcare professional may decide additional examinations are warranted, such as a symptom limited/maximal exercise test, echocardiography, etc.³¹

The American College of Sports Medicine (ACSM) recently proposed a revised pre-screening algorithm, removing risk factor assessment from the decision for medical clearance to begin an ET program.³² Rather, this new algorithm categorizes individuals based upon: 1) ET history (yes *vs.* no); 2) the presence or absence of a diagnosis of CVD, metabolic or renal disease; and 3) Signs or symptoms suggestive of CVD, metabolic or renal disease. Medical clearance prior to an ET program is recommended when signs and symptoms suggestive of CVD, metabolic or renal disease is present, and the individual has not initiated ET and is about to embark on a moderate intensity ET program. If a person does exercise and signs and symptoms are present, discontinuation of ET and medical clearance is proposed. Medical clearance is also recommended for those who are asymptomatic and have been diagnosed with CVD, metabolic or renal disease prior to beginning a moderate intensity ET program. Lastly, this algorithm only speaks to clearance from the perspective of moderate to vigorous intensity ET which is designed to significantly increase heart rate; steps per day and activities performed while encouraging individuals to decrease sitting time are not raised.

It should be noted that the clearance algorithm proposed by the ACSM is not supported by evidence to indicate this approach either increases or decreases the risk for adverse events during physical exertion. Nor is there any evidence to indicate this clearance algorithm decreases barriers to becoming more physically active. As such, there is a continual opportunity to refine and improve the interaction between a qualified healthcare professional and an

individual who is preparing to move more. The current perspectives paper proposes a deviation from the recently proposed ACSM model in several ways. First, use of the word *clearance* may not be the optimal way to characterize the interaction between a healthcare professional and an individual under their care with respect to assessing an individual's readiness to move more or need to titrate their current movement portfolio. Rather, in counseling an individual to move more, they should be comprehensively assessed, including traditional risk factors for CVD. We acknowledge that the presence of CVD risk factors should not be a barrier to initiating or continuing a well-movement program. Despite the likelihood of untoward events during physical exertion remains low, however, the presence of CVD risk factors does increase the risk of adverse events with physical exertion, particularly vigorous exertion in sedentary individuals with a poor health profile.³³ This risk should be discussed in the proper context and used to formulate the most appropriate movement program for an individual's health status at any given time. Secondly, the algorithm proposed by the ACSM creates somewhat rigid phenotypes, removing the ability of a qualified healthcare professional to exercise sound clinical reasoning and decision making. We propose the core tenants of a sound approach to a pre-movement assessment are: 1) identification of known CVD, metabolic or renal disease; 2) active signs and symptoms suggestive of CVD, metabolic or renal disease; and 3) the presence of traditional CVD risk factors, as outlined in **Table 1**. Thirdly, current pre-exercise recommendations exclusively focus on clearance for moderate to vigorous ET. An acknowledgement that all movement is good broadens the discussion between the healthcare professional and individual receiving guidance. Decreasing sitting time and increasing steps per day should be incorporated into the discussion once an assessment has been completed. These activities are light intensity and carry minimal adverse event risk.

Once an initial assessment has been completed, the need for further diagnostic testing is left to the qualified healthcare professional. Active signs and symptoms suggestive of CVD, cardiovascular dysfunction, metabolic or renal disease are primary determinants for additional testing, particularly for physical activities that require moderate to vigorous intensity ET. The exercise test is a leading option if additional testing is warranted; other options include echocardiography and Holter monitoring. It should be noted that gauging CRF provides a litany of valuable information, particularly with respect to risk prediction for a future chronic disease diagnosis, adverse events, and premature mortality. A low CRF is such a potent predictor of a poor health trajectory it has been put forth as a vital sign.³⁴⁻³⁶ Therefore, the healthcare professional performing a pre-movement assessment may be particularly compelled to consider exercise testing for individuals who present with a poor health phenotype (i.e., multiple CVD risk factors) even in the absence of signs and symptoms of CVD. Identification of a particularly low CRF (i.e., < 5 Metabolic equivalents) would prompt a greater urgency to up-titrate an individual's movement portfolio at intensities that would significantly improve CRF. The need for additional testing and justification of the approach is left to the qualified healthcare professional; there is no evidence that this approach is a barrier to moving more. Suffice to say, individuals who are receiving healthcare should be assessed in this nature and appropriately counseled to move more following completion of the assessment.

Proposing a New Pre-Movement Assessment Process and Framework

Figure 1 illustrates a newly proposed approach to assessing an individual prior to being given guidance to move more or titrating their current movement portfolio. The top of the algorithm recognizes public health campaigns promoting increased movement. We have placed this in the algorithm to highlight the value of such campaigns to encourage individuals to move

more and provide information on when an individual should seek medical advice prior to initiating this important lifestyle change. This should not be viewed as a barrier to moving more as there is no evidence to indicate such an approach reduces uptake of behavior change.

Individuals should have an awareness of their personal risk for chronic disease as well as signs and symptoms suggestive of chronic disease, in particular risk for CVD. From this awareness, individuals can make an informed decision as to whether or not to seek an assessment and advice from a qualified healthcare professional prior to moving more.

Once an individual becomes engaged with a qualified healthcare professional, irrespective of the path to this engagement or who initiated the engagement, an assessment focusing on gauging risk for adverse events during physical exertion is warranted. The process begins with a bi-directional conversation involving shared decision-making between the healthcare professional and individual receiving care. This conversation should entail an account of the individual's *movement history* as well personal goals their movement profile; frequency, intensity, time and type of movement. This information will help to begin to formulate an estimated level of risk for adverse events moving forward. For example, an individual with known CVD who has a sedentary lifestyle who plans to initiate a high intensity ET program at a relatively high percentage of maximal heart rate may be at a heightened risk for adverse events.³⁷ The level of risk varies with additional information that will be collected. The healthcare professional proceeds by performing a history to establish baseline health status and further refine risk for adverse events during physical exertion. There are several validated and freely available risk calculators including the ACC/AHA ASCVD Risk Calculator³⁸ and the AHA's My life check – Life's simple 7³⁹⁻⁴¹. Ascertaining the presence of signs and symptoms suggestive of cardiovascular, pulmonary or metabolic disease/dysfunction, traditional risk factors for CVD and

a confirmed diagnosis of a chronic disease are key components of the assessment prior to initiating or titrating current movement patterns (**Table 1**).

Following completion of the initial bi-directional discussion regarding current movement patterns, perceived readiness to change and future goals as well as a comprehensive health assessment, the healthcare professional must decide if there are any contraindications to an individual increasing or maintaining (e.g., ultra-endurance athlete with signs/symptoms suggestive of cardiovascular disease/dysfunction) their movement portfolio in the form of a structured ET program as well as taking more steps per day and sitting less. **Figure 1** illustrates the two paths that can be taken, depending on the absence (green) or presence (red) of contraindications to moving more or maintaining current movement patterns. Decisions on the type of tests and assessments to be performed prior to being given guidance on an individual's future movement portfolio is at the discretion of the qualified health professional. Active signs and symptoms would be the foundation for further tests/assessments before any type of movement prescription is offered/titrated. Established CVD risk factors and a confirmed diagnosis of one or more chronic diseases are not necessarily contraindications to moving more. The number of risk factors and the pathophysiologic severity of a given chronic disease, in conjunction with the ET intensity level proposed for moving more, will heavily factor into the need for additional tests/assessments. Take for example, an individual who is obese and sedentary, with a confirmed diagnosis of coronary artery disease that has been addressed by percutaneous coronary intervention six months earlier. If this individual expresses the intent of joining a gym and, with a personal trainer, progressing to a high-intensity interval ET program, additional tests/assessments would be warranted prior to program initiation. Conversely, if this same individual wanted to initiate moving more by walking, light jogging or taking several

thousand more steps per day, additional tests/assessments would not likely be necessary prior to initiating such a plan.

As far as the types of additional tests/assessments that may be warranted if a contraindication to a movement plan is suspected/identified, an exercise stress test, electrocardiography (resting or during physical exertion), echocardiography (resting or during physical exertion) or other forms of imaging are all feasible options. Performing additional tests/assessments during physical exertion (i.e., exercise testing) is optimal as it allows for the physiologic response to movement to be assessed and abnormalities to be detected. Data from an exercise test can also then be used to refine the movement plan with respect to an individualized movement intensity, particularly for the structured aerobic exercise program component.³¹

Additional tests/assessments, if performed, will either lead to: 1) Ruling out contraindications at which point the individualized movement plan can be initiated, maintained or titrated; or 2) Confirmation of suspected contraindications, facilitating a plan for resolution (e.g., surgery, pharmacotherapy, etc.). Once a confirmed contraindication has been resolved the individualized movement plan can be initiated, maintained or titrated as appropriate.

Health Literacy and Communication: The Opportunity to Create a Health Harmonic during the Pre-Movement Assessment

The concept of healthy literacy has gained increasing attention over recent years and rightfully so; the concept and its evolution has great relevance to the pre-movement assessment. Health literacy has been defined as “the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions”.⁴² Estimates indicate only 12% of the adult U.S. population have proficient health literacy; the elderly are at particularly high risk for being deficient in this area.⁴³ A lower

health literacy has been associated with poorer quality of life⁶¹ as well as an increased risk for adverse events⁴⁴⁻⁴⁶ in patients with chronic disease, as well as lower self-care behaviour⁴⁷. With respect to the pre-movement assessment, physical literacy, which has been defined as “the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in PA for life”⁴⁸, is a particularly important concept. The concept of health and physical literacy, while important, does have limitations. Specifically, health and physical literacy often take a *unidirectional approach*, placing ownership on the individual with respect to his or her own literacy as it relates to health. The healthcare professional should view the pre-movement assessment as an important opportunity to ascertain and, when needed, improve upon an individual’s physical literacy as part of an effort to promote a lifelong adoption of moving more in a safe manner with optimal health benefit; this would entail a bi-directional approach, where both the healthcare professional and individual receiving care are active participants in the process. Recently, McNeil and Arena proposed a new communication framework, *health harmonics*.⁴⁹ “In a harmonic transaction of communication, the goal is a collaboration between patient and practitioner that results in the construction of meaning. Different than the mono-directional or transaction that historically occurs, harmonics cannot happen without two participants responding to one another and building from the information provided by each side.” We propose that this approach is of central importance to the pre-movement assessment and subsequent development and implementation of an individualized movement plan. Lastly, specific approaches to communication, such as motivational interviewing⁵⁰⁻⁵³, can help to provide a proven framework for bi-directional communication and increase the likelihood of achieving a health harmonic.

What defines a qualified healthcare professional with respect to the pre-movement assessment?

Individuals engaging the healthcare system and seeking guidance on the safety and importance of moving more should receive this guidance from healthcare professionals whose education and practice experiences deem them competent. It is beyond the scope of this perspectives paper to define a qualified healthcare professional with respect to a pre-movement assessment. Physicians, nurses, physical therapists and exercise scientists, receiving a graduate or professional degree with subsequent appropriate clinical experiences, are examples of healthcare professionals that should have the necessary background. A recent American Heart Association Scientific Statement described the educational background and practical experiences on non-physician healthcare professionals that would be qualified to oversee a clinical exercise testing laboratory⁵⁴; the exercise test is an ideal opportunity to counsel an individual on moving more.^{9, 55} A majority of the educational and practical competencies set forth in this statement have relevance to the current perspectives paper. Future work should be directed toward more specifically defining the educational and practical experiences needed to be considered competent in performing a pre-movement assessment and prescribing an individualized movement plan.

Conclusions

Moving more throughout each and every day is now considered a vital part of one's personal healthcare plan; exercise and more broadly *movement is medicine*. The risk of adverse events with physical exertion is extremely low from a population perspective although transient risk increases with certain poor health phenotypes coupled with higher exertional intensities. As such, some individuals should undergo additional tests and assessments prior to initiating a

movement plan, particularly those with active signs and symptoms of chronic disease that are preparing to embark on activities that entail higher intensities of physical exertion. Once an individual engages the healthcare system, either through their own volition or encouraged to do so, qualified healthcare professionals have the responsibility to conduct a pre-movement assessment that is rooted in clinically sound judgement.

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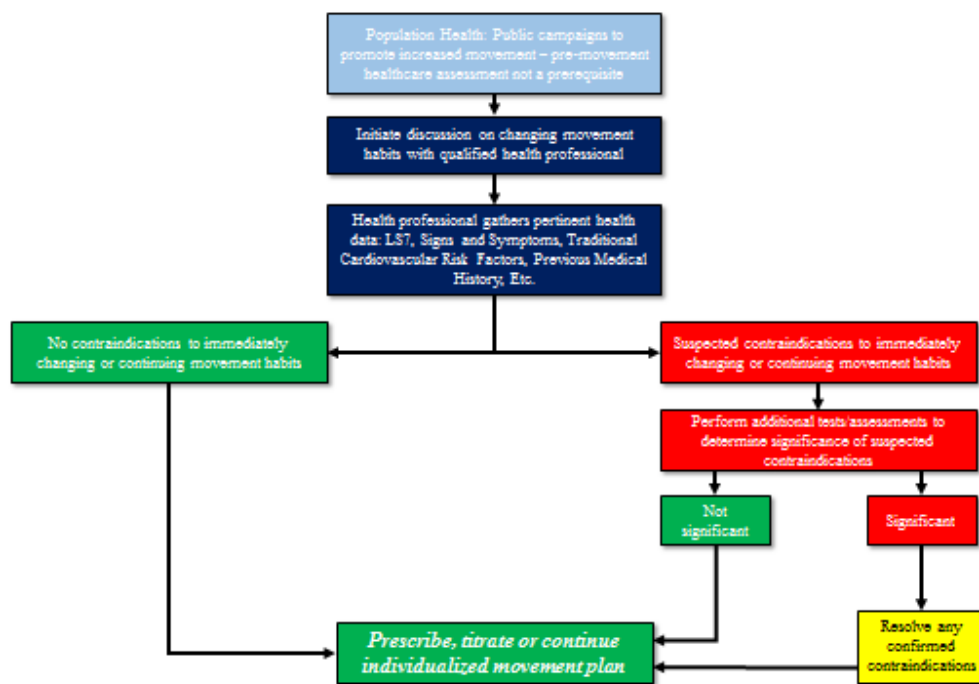
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Figure 1: Pre-Movement Assessment Algorithm

Legend: LS7, life's simple 7

Table 1: Key Components of a Pre-Movement Assessment

Established cardiovascular risk factors	Signs and symptoms suggestive of cardiovascular, pulmonary or metabolic disease/dysfunction	Confirmed diagnosis of one or more chronic disease
<ul style="list-style-type: none"> • Family history of premature cardiovascular disease • Active or recently (i.e. previous 6 months) quit tobacco use • Sedentary lifestyle • Obesity • Hypertension • Dyslipidemia • Elevated blood sugar 	<ul style="list-style-type: none"> • Pain or discomfort in areas suggestive of ischemia - chest, neck, jaw, arms, etc. • Shortness of breath with light physical exertion • History of dizziness or syncopal episodes • Orthopnea or paroxysmal nocturnal dyspnea • Ankle edema • Heart palpitations or runs of tachycardia • Intermittent claudication • Heart murmur • Unusual fatigue or shortness of breath with light to moderate intensity physical exertion 	<ul style="list-style-type: none"> • Cardiovascular disease • Respiratory disease • Metabolic disease • Certain cancers • Renal disease



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