

CARE OF THE WILDERNESS ATHLETE

Setting, Structure, and Timing of the Preparticipation Examination: The Wilderness Adventure Consultation

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Patients pursue wilderness experiences throughout the entire life cycle, and while outdoor pursuits are relatively safe, injuries do occur. Many of these adverse events can be anticipated, identified, and prevented through a wilderness preparticipation examination (PPE). To accomplish this, it is incumbent on the physician to assess the extrinsic and intrinsic factors faced by the patient and attempt to correct them to ensure an enjoyable experience in the outdoors. This article outlines the goals of the PPE along with identification of various risk factors that can influence a trip. Most injuries and rescues occur from underestimating the risks from extrinsic, environmental factors, and/or overestimating one's intrinsic skills. By matching the patient's fitness and skill level to the environment, the physician can help reduce the risk of serious injury.

Key words: PPE, wilderness, intrinsic factors, extrinsic factors, injury prevention

Introduction

Failure to prepare is preparing to fail.
—John Wooden

The basic skills required to do a complete physical examination are ingrained in physicians from the early years of medical school. Those skills are refined during primary care residencies so that physicians have a great deal of expertise in doing complete physical examinations for such things as annual physicals, school physicals, well-woman checks, well-child checks, and preoperative examinations. Although each of these examinations has different objectives, they share a common theme of being preventative in nature by identifying risk factors for future medical problems. In recent years, primary care sports medicine physicians have expanded this concept to the sports preparticipation examination (PPE). In addition to the identification of general health risks, the PPE assesses the demands of a specific sport and determines if the patient is medically able to participate in that particular

sport. The PPE combines the traditional rigorous understanding of pathophysiology with an appreciation for the physical requirements of various sports.

The wilderness PPE builds on the concepts of the PPE but has an additional requirement of understanding the environmental demands that the patient is entering into. In addition to the environmental aspect of the wilderness PPE, there is another area that separates this type of examination from the traditional sports PPE: patient age. Although the majority of patients who participate in organized sports requiring a sports PPE is limited to the ages 13 to 22 years (except for a small number of professional athletes), wilderness pursuits can be performed throughout the life cycle. A National Forest Service survey from 2005 to 2009 revealed that 41% of visitors to wilderness areas were between the ages of 40 and 60 years with 3% above the age of 70 years.¹ Owing to that, it is probable that every primary care physician will have patients who engage in outdoor pursuits, regardless of their geographic location or patient demographics. In addition to the changing demands of exercise with age, there is also the increased likelihood that older patients will have underlying diseases and medications that influence their ability to exercise and must be taken into account. Fortunately, the injury rates for most activities are relatively low, but injuries do occur, and there are risks that can be anticipated and mitigated. Thus, it is incumbent on all practitioners to become familiar with the basics of a

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wilderness PPE. Defining what types of activities should have a PPE and who should undergo evaluation is covered later in this article.

Methods

A PubMed search was initiated to identify articles with the key words wilderness PPE. Articles were assessed as to their relevance to injury prevention and outdoor experience.

Goals of the Preparticipation Examination

One of the similarities to the sports PPE is that there are multiple goals for the wilderness PPE. A common misperception is that the main purpose of the PPE is to disqualify athletes for whom participation represents unacceptable risks. If this were the only goal, then most PPEs would be considered failures. It is estimated that only 3% to 13% of those screened in sports PPEs require additional evaluation and the absolute disqualification rate is less than 1%.² Performing millions of sports PPE every year to discover the 1% who are disqualified would be a terrible waste of resources if this were the only reason for the examination. However, as a physician may evaluate and discuss many different health issues during a patient visit, there are also multiple goals that can be accomplished during the wilderness PPE, which rarely result in complete disqualification.

Although absolute disqualification is relatively uncommon, it is still important to identify those potentially fatal conditions in the wilderness PPE. The condition most commonly associated with all types of exercise is sudden cardiac death; however, there are many disorders that would preclude certain types of activities, and those will be discussed in this theme issue. Although underlying cardiac disorders such as hypertrophic cardiomyopathy are the most frequent causes of sudden death in young athletes, the majority of those seeking a wilderness PPE is older and would be most at risk for coronary artery disease.³

Ruling out risk factors for sudden cardiac death in patients younger than 21 years has been well studied through the traditional PPE for athletes. Questions should include family history of premature sudden death and exertional symptoms such as chest pain and syncope.⁴ For older patients, coronary artery disease is the main concern for sudden death. Fortunately, there are established guidelines to help determine who is at risk and the need for exercise stress testing.⁵ The key points for assessing risk are (1) cardiovascular risk factors, (2) baseline exercise capacity, and (3) anticipated exercise intensity. The major cardiovascular risks are well known and include hypertension, diabetes, adverse lipid profile, family history, and tobacco use.

The simplest method of assessing exercise capacity and planned exercise intensity is to use metabolic equivalents (METs). One metabolic equivalent is defined as the amount of oxygen consumed while sitting at rest and is equal to 3.5 mL oxygen per kilogram body weight \times minutes.⁶ By knowing a patient's baseline METs and their anticipated wilderness METs, the clinician can determine a patient's fitness relative to their expected demands. Table 1 lists the METs of some common outdoor pursuits. It is worth noting that light activity is considered from 1 to 4 METs, moderate intensity at 5 to 8 METs, and heavy exertion greater than 8 METs.⁶ One limitation of the METs calculations is that these are estimated at sea level. If the patient is doing similar activities at altitude, the energy expenditures can increase dramatically. By understanding a patient's functional baseline capacity, the clinician can determine appropriate training and the need for exercise testing. The American College of Sports Medicine and the American Heart Association have established guidelines for cardiovascular screening that provide an excellent reference.⁵ The key is determining the discrepancy between the actual fitness level of the patient and the expected demands. If the difference is large, then exercise stress testing should be considered along with a graduated training program to help the patient accommodate to the anticipated demands.

A further goal of the wilderness PPE is to satisfy liability requirements. Many types of programs and organized trips require a "medical clearance" by a physician before allowing people to participate in their

Table 1. METs of various activities

Activity	METs		
	Light	Moderate	Heavy
Alpine skiing	4	6	8
Backpacking at 5% slope carrying 20 kg, km/h	6	8	10
6.4	8		
7.2	9.6		
8	11.6		
9.6	13.1		
11.2	15.5		
Cross country skiing, km/h			
4	5.5		
6	7.7		
8	9.9		
10	12.2		
12	14.3		
14	16.5		
Mountaineering	7	8	10
Orienteering Jogging, km/h	8	10	12
9	8.8		
11	11.2		

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