
Pre-Participation Examination: A New Form for Hawaii

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A recent study examining the adequacy of the existing pre-participation physical examination (PPE) form in the State of Hawaii¹ suggested that the form be modified and expanded. The standards for a comprehensive PPE indicate that the screening should include an extensive medical history, assessment of height, weight, blood pressure, pulses, vision, cardiopulmonary (heart, and lungs), maturation, skin, abdominal, genitalia, and musculoskeletal function. Pursuant to the recommendation of this recent study and the accepted standards of the American Academy of Family Physicians, American Academy of Pediatrics, American Medical Society for Sports Medicine, American Orthopedic Society for Sports Medicine, and the American Osteopathic Academy of Sports Medicine, the PPE form utilized by the Hawaii High School Athletic Association has been drastically modified. The new form includes an expanded medical history, a maturational assessment (Tanner Stage), a complete musculoskeletal examination, and a participation clearance and recommendation.

Introduction

The primary purpose of the pre-participation physical examination (PPE) is to identify whether a student-athlete is at undue or inherent risk of potential injury or illness prior to his or her

participation in a specific sports activity. Following the results of a recent study that examined the adequacy of the existing PPE being used for screening student athletes in Hawaii,¹ a new PPE form (Figs 1, 2) was adopted by the Hawaii High School Athletic Association (HHSAA). The new PPE form is patterned after combined recommendations of the American Academy of Family Physicians, American Academy of Pediatrics, American Medical Society for Sports Medicine, American Orthopedic Society for Sport Medicine and the American Osteopathic Academy of Sports Medicine. The purpose of this article is to familiarize the Hawaii Medical community with the new HHSAA-PPE form and provide a brief overview of the goals and objectives of the specific evaluation.

Goals and Objectives of the PPE

The literature is clear on the goals and objectives of the PPE, which are to enhance and maintain the health and safety of students participating in high risk activities (organized athletics).²⁻⁷ The overall goals of the PPE are met through primary and secondary objectives. The primary objectives are: 1) *To detect any condition that may limit a student-athlete's participation.* This includes any medical conditions that might contraindicate participation in certain activities (eg, heart murmur consistent with hypertrophic cardiomyopathy may lead to increased risk for sudden death). 2) *To detect any condition that predisposes a student-athlete to injury during competition.* This includes past or present injury/illnesses, congenital or developmental anomalies, and a lack of general wellness (eg, an obese student-athlete may be at increased risk for heat-related illness, or a student-athlete with a musculoskeletal injury that has not been adequately rehabilitated). 3) *To meet any legal or insurance requirements.* The Hawaii High School Athletic Association and the Hawaii Department of Education require that all students participating in interscholastic activities complete a PPE.

The secondary objectives of the PPE are: 1) *To determine the general health and wellness of the student-athlete.* In some cases, the PPE might be the only medical screening that a student receives during his or her high school career. 2) *To counsel the athlete.* This could be the only opportunity that a student has to interface with a medical professional concerning relevant medical/health-related problems and allows the physician to explain any abnormal findings, discuss general health considerations, and discuss preventive health topics such as birth control, and testicular and breast self-examination. 3) *To assess maturity.* Although some controversy exists on the assessment of maturity,⁸⁻¹⁰ the fact remains that in Hawaii, student-athletes are engaging in organized high-velocity, collision-type activities which could predispose the immature athletes to a greater risk of injury.⁸ Furthermore, in situations of coed participation in collision/contact sports, such as

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football, wrestling, soccer, and judo, some form of maturity assessment might be warranted. 4) *To assess fitness levels and performance.* Although this is not an area that will be directly assessed by the physician during an office visit, the participation clearance may indicate the type of testing that a coaching staff should pursue, eg, if an athlete shows signs of obesity, he or she can be advised to participate in a slow-paced, structured fitness program, or if a student-athlete demonstrates muscular strength deficiencies, strength testing can be deferred until a rehabilitation program has been successfully completed.

Medical/Health History

A comprehensive medical or health history is the keystone to any medical evaluation. Some authors have indicated that a complete medical history can identify up to 74% of the pertinent medical problems affecting student-athletes.^{7,11} Additionally, the medical/health history can specifically direct the physician toward areas of major concerns which may predispose the student-athlete to athletic related injury/illness.

The new HHSAA-PPE contains a one-page, 31-question, comprehensive medical/health history (Fig 1). The 31 questions are encompassed into 15 basic categories: 1) *Hospitalization/Surgery*; 2) *Medications*; 3) *Allergies*; 4) *Cardiovascular/Hypertension*; 5) *Skin*; 6) *Neurological/Head*; 7) *Heat Illness*; 8) *Respiratory*; 9) *Special Requirements*; 10) *Vision*; 11) *Musculoskeletal/Ligamentous*; 12) *Other Medical Related Problems*; 13) *Recent Medical Problems*; 14) *Immunization*; and 15) *Menstruation*. In each of the 15 categories, specific questions are asked to aid the physician in the identification of any particular problems or anomalies that might place the student-athlete at increased risk for athletic-related injury/illness.

The usefulness of this questionnaire can be illustrated in the area of "cardiovascular" questioning. Whereas more than 95% of sudden deaths in athletes involved the cardiovascular area, this history form asks 8 specific questions regarding potentially dangerous cardiovascular conditions. For example, "exertional syncope" could indicate underlying hypertrophic cardiomyopathy, conductive abnormalities, or valvular anomalies. Furthermore, "chest palpitation" could signify electrophysiological arrhythmia, such as Wolff-Parkinson-White syndrome. Overall, section 4 is designed to help the physician identify congenital heart conditions that could lead to sudden death, such as Marfan's syndrome or prolonged QT syndrome.

Another area of specific concern to the physician during the HHSAA-PPE

history review is the "neurological/head" category. It is important to note whether seizures or headaches have occurred during or as a result of exercise. Furthermore, a history of prior head trauma can alert the physician to a predisposition of the *second impact syndrome*.¹³⁻¹⁵ Repetitive episodes of traumatic neuropraxia of the upper extremities can indicate that the student-athlete suffers from congenital cervical spinal stenosis, cervical instability, or intervertebral disc protrusion. These student-athletes might warrant a more thorough evaluation, eg, plain x-rays, computerized tomographic myelography, and/or magnetic resonance imaging.

Physical Examination

Once the medical/health history has been reviewed by the physician, the general physical examination can be individually tailored to focus on specific areas of concern that can predispose the student-athlete to athletic-related injuries/illness, eg, exercised-induced bronchospasm. Specific changes in the physical examination portion of the new HHSAA-PPE involve the

Fig 1.—HHSAA PPE Medical History Form

Medical History		Date _____
Name _____	Sex _____ Age _____	Date of birth _____
Grade _____	Sport(s) _____	
Personal physician _____	Address _____	Physician's phone _____
Explain "Yes" answers below:		Yes No
1. Have you ever been hospitalized?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had surgery?	<input type="checkbox"/>	<input type="checkbox"/>
2. Are you presently taking any medications or pills?	<input type="checkbox"/>	<input type="checkbox"/>
3. Do you have any allergies (medicine, bees or other stinging insects)?	<input type="checkbox"/>	<input type="checkbox"/>
4. Have you ever passes out during or after exercise?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever been dizzy during or after exercise?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had chest pain during or after exercise?	<input type="checkbox"/>	<input type="checkbox"/>
Do you tire more quickly than your friends during exercise?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had high blood pressure?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever been told that you have a heart murmur?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had racing of your heart or skipped heartbeats?	<input type="checkbox"/>	<input type="checkbox"/>
Has anyone in your family died of heart problems or a sudden death before age 50?	<input type="checkbox"/>	<input type="checkbox"/>
5. Do you have any skin problems (itching, rashes, acne)?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have you ever had a head injury?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever been knocked out or unconscious?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had a seizure?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had a stinger, burner or pinched nerve?	<input type="checkbox"/>	<input type="checkbox"/>
7. Have you ever had heat or muscle cramps?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever been dizzy or passed out in the heat?	<input type="checkbox"/>	<input type="checkbox"/>
8. Do you have trouble breathing or do you cough during or after activity?	<input type="checkbox"/>	<input type="checkbox"/>
9. Do you use any special equipment (pads, braces, neck rolls, mouth guard, eye guards, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>
10. Have you had any problems with your eyes or vision?	<input type="checkbox"/>	<input type="checkbox"/>
Do you wear glasses or contacts or protective eye wear?	<input type="checkbox"/>	<input type="checkbox"/>
11. Have you ever sprained/strained, dislocated, fractured, broken or had repeated swelling or other injuries of any bones or joints?	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Head <input type="checkbox"/> Shoulder <input type="checkbox"/> Thigh <input type="checkbox"/> Neck <input type="checkbox"/> Elbow <input type="checkbox"/> Knee <input type="checkbox"/> Chest		
<input type="checkbox"/> Forearm <input type="checkbox"/> Shin/calf <input type="checkbox"/> Back <input type="checkbox"/> Wrist <input type="checkbox"/> Ankle <input type="checkbox"/> Hip <input type="checkbox"/> Hand <input type="checkbox"/> Foot		
12. Have you had any other medical problems (infectious mononucleosis, diabetes, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>
13. Have you had a medical problem or injury since your last evaluation?	<input type="checkbox"/>	<input type="checkbox"/>
14. When was your last tetanus shot?		
When was your last measles immunization?		
15. When was your first menstrual period?		
When was your last menstrual period?		
What was the longest time between your periods last year?		
Explain "Yes" answers:		

I hereby state that, to the best of my knowledge, my answers to the above questions are correct.		
Signature of athlete _____		
Signature of parent/guardian _____		

addition of a maturation evaluation and a thorough musculoskeletal examination (Fig 2).

During the genitourinary portion of the PPE, the physician might want to perform the maturational evaluation of Tanner stage. Alternatively, this evaluation can be performed by patient

self-assessment. Literature indicates that self-rating of pubic hair and breast stage development correlates well with that of a physician's examination.⁸⁻¹⁰ This practice may be particularly useful in female athletes, who rarely receive a complete genitalia evaluation as part of a PPE. Figure 3 is a useful tool in the

determination of Tanner staging (Reprinted with the permission of the American Medical Society for Sports Medicine).

The musculoskeletal evaluation portion of the physical examination represents the most drastic change in the new HHSAA-PPE form (Fig 2). This 13-point musculoskeletal evaluation allows the physician to specifically assess an individual's joint range of motion, integrity, and muscular function. The specific recommended tests are outlined in Table 1. All evaluation should assess active, passive, and resistive ranges of joint motion. "Active range" should always be performed first. If the student-athlete's active range of motion is complete, "end-feel," an objective determination by the examiner, may be assessed at the terminal range of motion. The resistive strength test should be performed in all appropriate active ranges of motion. All musculoskeletal testing should be performed and compared to the contralateral side.

Determining Clearance

Without question, the single most-important aspect of the PPE is the determination of clearance. The new HHSAA-PPE form has an expanded participation clearance portion (Fig 2). When determining clearance for a specific problem, a physician should consider the following questions: 1) Does the existing condition place the student-athlete at increased risk of injury/illness? 2) Are other participants at increased risk of injury/illness because of this condition? 3) Can the student-athlete safely participate with appropriate treatment (eg, medication, rehabilitation, bracing, wrapping, or padding)? 4) Can the student-athlete participate on a limited basis during the initiation of treatment? 5) If clearance is denied for certain activities, are there any other activities in which that student-athlete may safely participate? Alternative activities should be explored for

Table 2.—Classification of Sport¹⁶

CONTACT		NON CONTACT		
Contact/collision	Limited contact/impact	Strenuous	Moderately strenuous	Non strenuous
Boxing	Baseball	Aerobic dance	Badminton	Archery
Field hockey	Basketball	Crew	Curling	Golf
Football	Bicycling	Fencing	Table tennis	Riflery
Ice hockey	Diving	Field events		
Lacrosse	Field (high jump, pole vault)	(discus, javelin, shot put)		
Martial arts	Gymnastics	Running/track		
Rodeo	Horseback riding	Swimming		
Soccer	Skating (ice, roller)	Weight lifting		
Wrestling	Skiing (cross country, downhill, water)			
	Softball			
	Squash/handball			
	Volleyball			

Fig 2.—HHSAA PPE Physical Examination Form

Physical Examination

Height _____ Weight _____ BP ____ / ____ Pulse _____

Vision R 20/____ L 20/____ Corrected: Y N Pupils _____

	Normal	Abnormal findings	Initial
Cardiopulmonary			
Pulses			
Heart			
Lungs			
Abdominal			
E. N. T.			
Skin			
Genitalia			
Tanner stage	1	2	3 4 5
Musculoskeletal			
Neck			
Shoulder			
Elbow			
Wrist			
Hand			
Back			
Knee			
Ankle			
Foot			
Other			

Clearance:

A. Cleared

B. Cleared after completing evaluation/rehabilitation for: _____

C. Not cleared for: Collision

Contact

Noncontact _____ Strenuous _____ Moderately strenuous _____ Nonstrenuous

Due to: _____

Recommendation: _____

Name of physician _____ Date _____

Address _____ Phone _____

Signature of physician _____

those student-athletes that may be restricted in some way. Tables 2 and 3 present the classifications of sports and the recommendation for participation in competitive sports, respectively.¹⁶ These tables may serve as useful resources when determining a student-athlete's participation eligibility.

Conclusion

The PPE can serve as a great opportunity for the physician to positively affect the health care of student-athletes. The HHSAA's willingness to review physicians concerns about the existing PPE forms, and to consequently adopt a new PPE form, clearly demonstrates its concern for the health and safety of the student-athletes participating in organized high school athletic programs in Hawaii. We are confident that the new HHSAA-PPE will have a positive impact on the overall standard of athletic health care in Hawaii. More information concerning the PPE can be obtained by contacting any of the following organizations and requesting a copy of their monograph on the Pre-participation Physical Evaluation: American Academy of Family Physicians, American Academy of Pediatrics, American Medical Society for Sports Medicine, American Orthopedic Society for Sports Medicine, and the American Osteopathic Academy of Sports Medicine.

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Table 1.—Musculoskeletal Evaluation by Body Part

Body Part	Function	Range of Motion	End Feel	
Neck	Flexion	80-90° (chin to chest)	Tissue stretch for all 4 planes	
	Extension	70° (nose & forehead horizontal)		
	Lateral Flexion	20-45° (ear to shoulder)		
	Rotation (axial)	70-90° (chin to shoulder)		
Shoulder	Flexion	180°	Tissue stretch	
	Extension	50-60°	Tissue stretch	
	Abduction	180°	Tissue stretch	
	Adduction w/ Flexion	50-70°	Tissue approx.	
	Internal Rotation	60-100°	Tissue stretch	
	External Rotation	80-90°	Tissue stretch	
Elbow	Flexion	140-150°	Tissue approx.	
	Extension	0-10°		
	Supination	90°	Tissue stretch	
	Pronation	90° (75° forearm/15° wrist)	Tissue stretch	
Wrist	Flexion	80-90°	Tissue stretch	
	Extension	70-90°	Tissue stretch	
	Radial Deviation	15°	Bone to bone	
	Ulnar Deviation	30-45°	Bone to bone	
Hand/Finger	Flexion:	MCP	85-90°	Tissue stretch
		PIP	100-115°	
		DIP	80-90°	
	Extension:	MCP	30-45°	Tissue stretch
		PIP	0°	
		DIP	10-20°	
	Abduction	20-30°	Tissue stretch	
	Adduction	0°		
Back	Flexion	40-60°	Tissue stretch in all 4 planes	
	Extension	20-35°		
	Lateral Flexion	15-20°		
	Rotation	3-18°		
Hip	Flexion (supine/knee flex.)	110-120°	Tissue stretch in all 6 planes	
	Extension (prone/knee ext.)	10-15°		
	Abduction (supine/knee ext.)	15-20°		
	Adduction (supine/knee ext.)	30°		
	Ext. Rotation (Knee flexed)	40-60°		
	Int. Rotation (Knee flexed)	30-40°		
Knee	Flexion	135°	Tissue stretch in all 4 planes	
	Extension	0-15°		
	Internal Rotation	20-30°		
	External Rotation	30-40°		
Ankle/Foot	Plantarflexion	50° (flexion)	Tissue stretch in all planes	
	Dorsiflexion	20° (extension)		
	Supination	45-60°		
	Pronation	15-30°		
	Toe Extension	1 st Ray: 70°, 2 ^{nd-5th} : 40°		
	Toe Flexion	1 st Ray: 45-90, 2 ^{nd-5th} : 40°		

Table 3.—Recommendations for Participation in Competitive Sports¹⁶

	Contact/ collision	CONTACT Limited contact/impact	Sirenuous	NON CONTACT Moderately sirenuous	Non sirenuous
Atlantoaxial Instability	No	No	Yes*	Yes	Yes
* Swimming (no butterfly, breast-stroke or diving starts)					
Acute Illnesses	*		*	*	*
* Needs individual assessment (e.g. contagiousness to others risk of worsening illness)					
Cardiovascular					
Carditis	No	No	No	No	No
Hypertension					
Mild	Yes	Yes	Yes	Yes	Yes
Moderate	*	*	*	*	*
Severe	*	*	*	*	*
Congenital heart disease	†	†	†	†	†
* Needs individual assessment					
† Patients with mild forms can be allowed a full range of physical activities; patients with mild or severe forms or who are post-operative should be evaluated by a physician.					
Eyes					
Absence or loss of function of one eye	*	*	*	*	*
Detached retina	†	†	†	†	†
* ASTM Approved eye guards may allow the competitor to participate in most sports, but this must be judged on an individual basis					
† Consult ophthalmologist					
Inguinal hernia	Yes	Yes	Yes	Yes	Yes
Kidney (absence of one)	No	Yes	Yes	Yes	Yes
Liver (enlarged)	No	No	Yes	Yes	Yes
Musculoskeletal disorders	*	*	*	*	*
* Needs individual assessment					
Neurologic					
Hx of serious head or spine trauma*		*	Yes	Yes	Yes
Convulsive disorder					
Well controlled	Yes	Yes	Yes	Yes	Yes
Poorly controlled	No	No	Yes†	Yes	Yes††
* Needs individual assessment					
† No swimming or weightlifting					
†† No archery or riflery					
Ovary (absence of one)	Yes	Yes	Yes	Yes	Yes
Respiratory					
Pulmonary insufficiency	*	*	*	*	Yes
Asthma	Yes	Yes	Yes	Yes	Yes
* May be allowed to compete if oxygenation remains satisfactory during a graded stress test					
Sickle cell traits	Yes	Yes	Yes	Yes	Yes
Skin (Boils, herpes, impetigo, scabies)	*	*	Yes	Yes	Yes
* No gymnastics w/mats, martial arts, wrestling or contact sports until no longer contagious					
Spleen (enlarged)	No	No	No	Yes	Yes
Testicle (absent or undescended)	Yes*	Yes*	Yes	Yes	Yes
* Certain sports may require protective cup					

Fig 3.— Determination of Tanner Stage. Reprinted with the permission of the American Medical Society for Sports Medicine

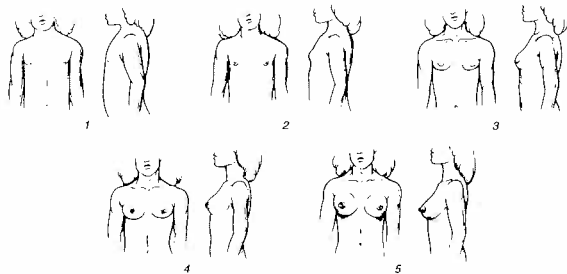


Figure 1. Tanner stages—breast.

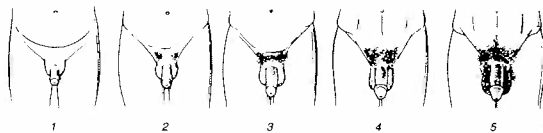


Figure 2. Tanner stages—pelvic (male).

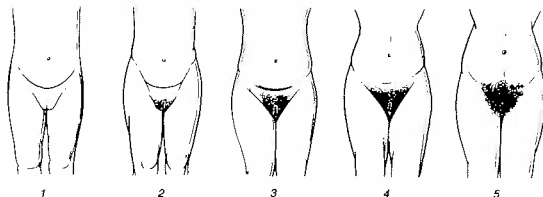
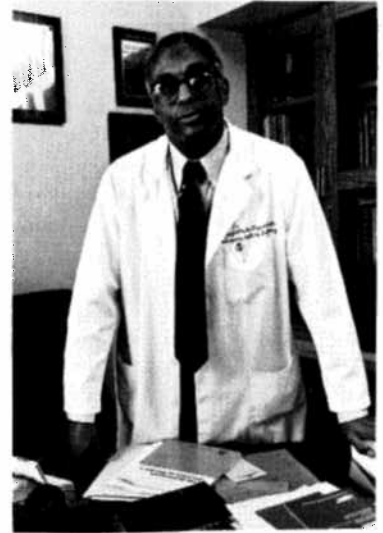


Figure 2. Tanner stages—pelvic (female).

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The warning signs for colorectal cancer are a change in bowel habits and blood in the stool.

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Checkup Guidelines for men and women over 50 without symptoms:

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- stool blood test annually
- procto exam every 3 to 5 years after 2 negative tests 1 year apart.

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