
Adequacy of a Pre-Participation Examination Form: A Study of Hawaii Physicians

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Many states currently require a medical screening prior to participation in organized sports. The purpose of this study was to examine the adequacy of the existing pre-participation examination form in Hawaii. One hundred forty-eight physicians who perform school health/pre-participation physical examinations were surveyed. The results indirectly suggest that these physicians agreed that the form should be modified and improved (p, .001).

Introduction

It is generally believed that the pre-participation physical examination serves as a useful tool in the detection and prevention of unnecessary injury and illness in athletics.¹

Goldberg et al² reported that 15% of the 701 student athletes evaluated during a pre-participation examination study had

medical problems that warranted further evaluation or exclusion from sport participation. Among them, 9 students were prohibited from participation because of medical or orthopedic problems.

Pre-participation examinations are required for both scholastic and community-based sports programs in many states.³ This practice becomes imperative with the continually increasing numbers of participants in organized athletic activity. In fact, current estimates of national participation in youth sports programs is in excess of 20 million.^{4,5} Furthermore, more than half of the boys and a third of the girls at the high school level participate in organized athletic competition in various geographic areas.³ In fact, in the small state of Hawaii, there are more than 21,000 high school athletes who are participating in organized high school athletics.

In 1988, a national survey was conducted to assess the requirements for high school pre-participation physical examinations.³ The results of this study indicated that of the 45 states that replied, only 36 states have an official examination form and 35 states required a yearly examination. Among those 36 states that have an official examination form, only 25 included a medical history as part of the examination and only 3 of these 25 states list contraindications to participation. This study also showed that the High School Athletic Association of Hawaii requires a yearly pre-participation examination, has an official state form, has established examination guidelines, and requires a medical history as a part of the examination. However, in the Hawaii form, there were no criteria for exclusion from sports participation, such as hypertension, body fat content, heart murmur, etc.³ Furthermore, it was unclear from this study whether the physicians administering these examinations were satisfied with the existing format and guidelines for screening the athletes for sports participation.

The purpose of this study was to examine the adequacy of the existing pre-participation examinations form and guidelines in the state of Hawaii.

Methods

Four hundred fifty physicians were randomly selected from the Hawaii Medical Association membership directory. According to their similarities in practice type, each of the physicians was categorized in one of the following groups: Pediatricians (PD, n=90), family and general practitioners (FP, n=90), internists (IM, n=180), orthopedic and general surgeons (OGS, n=45), and physical and emergency medicine physicians (EM, n=45).

A pamphlet-type survey was constructed to include a cover letter, the health examination form, and a questionnaire. The cover letter requested that the respondent review and evaluate the

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health examination form (Fig 1) and respond to the 9 questions concerning the form (Table 1). The health examination form was a copy of the health examination form currently being utilized in Hawaii for the pre-participation examination. The form was identified as a "suggested" health form to eliminate subject bias. Respondents also were asked if they currently are performing school health/pre-participation physical examinations. The overall return rate was 43% (193/450). However, among these 193 physicians, only 148 actually perform school health/pre-participation physical examinations. Therefore, only the data from these 148 subjects were analyzed; chi-square contingency tests were used for statistical data analysis, the alpha level was set at $P < .001$.

Results

The chi-square statistical analysis showed that there were significant differences in response for 5 out of 9 questions regarding the possible changes in the health examination form ($P < .001$) (Table 1). Although these physicians did not indicate that the form should be more comprehensive, they significantly indicated that certain portions of the examination should be expanded. Specifically, they suggested that the musculoskeletal examination and laboratory work should be expanded and the maturational status should be included in the examination. It is of interest that although these physicians agreed to have modifications of the existing pre-participation examination, they did not believe that the improved form would contribute to injury prevention or would decrease injury exposure ($P < .001$). With occasional minor differences of opinion, the response for each of the questions was very similar between physician groups. Table 1 shows the responses for each of the 9 questions between physician groups.

Discussion

The results of this simple survey support the findings of other previous studies in the literature.^{1,3,6,7,9-11} The benefits of a complete and properly administered medical history are well established.^{2,6-7} In fact, the American Academy of Pediatrics had developed a pre-participation physical examination form which included an extensive health history and interim health history.⁸ As a result of a pre-participation examination study in Washington state, Smilkstein⁹ in 1981 suggested that a pre-participation examination, which includes a medical history, a functional examination for the cardiovascular and respiratory systems, and a sports-specific physical examination be given to the athletes. In 1982 Harvey¹⁰ also concluded that the pre-participation examination could be a useful tool in injury prevention if performed by a primary care physician and complemented with a cardiovascular and musculoskeletal fitness assessment. In 1985, McKeag¹ summarized that the essential components of a pre-participation examination should include a complete medical history, a thorough physical examination completed with a musculoskeletal, cardiovascular and psychological component, laboratory testing, and a maturation status. Feinstien et al¹³ also recommended that the pre-participation examination should focus on the cardiovascular and musculoskeletal systems following a complete medical history and that the examination contain an assessment of physical maturity and be applicable to both genders.

The responding physicians in this study agreed that the musculoskeletal portion of the examination should be expanded ($p <$

0.001). This is congruous with the findings and recommendations of previous authors which suggest that assessment of joint laxity, range of motion and strength assessment be included in the pre-participation examination.^{1,3,6,9,11} The physicians also noted that laboratory work needed to be expanded. The laboratory work on the existing form contained only one line for urinalysis. Some studies^{1,3,9} have concluded that the inclusion of blood work is an equally important aspect for screening for anemia and possible platelet disorders in certain populations. Maturational assessment also was suggested to be included in the examination portion of the present study. This assessment would allow the physician to properly advise the participants as to the type and level of sports activity (weightlifting, collision/contact, or endurance) that may be suitable for the individual participant's level of maturity.^{1,3}

The results of this study further show that although these physicians agreed that modifications are needed for the existing pre-participation examination, they did not believe that an improved form would make significant contributions to injury prevention and/or decrease injury exposure. These data suggest

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Table 1.—The Number of Responses for Each Question from the Physicians who were Performing School Health/Pre-Participation Physical Examinations

Question	Total Response		Physician by Group				
	Yes	n=148	PD n=42	FP n=37	IM n=57	OGS n=6	EM n=6
1. Should history be expanded?	Yes	75	23	20	24	3	5
	No	73	19	17	33	3	1
2. Could form be better organized?	Yes	72	28	16	21	2	5
	No	76	14	21	36	4	1
3. Should exam be more comprehensive?	Yes	63	21	19	16	3	4
	No	85	21	18	41	3	2
4. Should general exam be expanded?	Yes	115*	33	27	50	3	2
	No	33	9	10	7	3	4
5. Should musculoskeletal exam be expanded?	Yes	133*	38	32	54	5	4
	No	15	4	5	3	1	2
6. Should lab work be expanded?	Yes	106*	27	27	48	3	1
	No	42	15	10	9	3	5
7. Should maturational status be added?	Yes	122*	34	31	50	4	3
	No	26	8	6	7	2	3
8. Would an improved form decrease injury exposure?	Yes	73	27	16	23	4	3
	No	75	15	21	34	2	3
9. Would an improved form increase injury prevention?	Yes	43	17	11	8	4	3
	No	105*	25	26	49	2	3

PD=Pediatrician, FP=Family Practice, IM=Internal Medicine, OGS=Orthopedic and General Surgery, EM=Emergency Medicine.
*Chi-square contingency tests significant difference at 0.001 level.

Pre-Participation Examination

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that injury prevention is a very complicated problem and the pre-participation examination plays the role of providing valuable information for further decision-making. Additional efforts, athlete and parent education, coaching education, and conditioning, are desperately needed to provide a safe environment for youth athletic participation.

Several national medical associations, such as the American Academy of Pediatrics, the American Academy of Family Practice, the American Medical Society for Sports Medicine, and the American Orthopedic Society for Sports Medicine have developed their own more comprehensive and thorough pre-participation examination forms. The results of this study suggest that it might be time for other states that require school health/pre-participation physical examinations to re-evaluate the adequacy of their existing forms in order to provide better screening of student-athletes for sports activity. Furthermore, the results of this study, along with specific recommendations, have been presented to the Hawaii High School Athletic Association to better facilitate the screening of the high school student athletes within the state. It is hoped that a more complete and useful pre-participation examination form can be developed and used in the near future.

The major findings of this study suggest that the pre-participation physical examination form and guidelines, currently used in the state of Hawaii, could be improved to provide a complete and thorough screening of athletes for sports activity. The findings of the pre-participation history and physical examination may be used to reduce the risks of various athletic-related injuries by following existing "recommendations" for participation in competitive sports, such as those established by the American Academy of Pediatrics Committee on Sports Medicine.¹² Therefore, the examination should include a complete medical health history, a general physical assessment with basic cardiovascular examination, a complete musculoskeletal evaluation, more comprehensive laboratory work, and a maturational evaluation. Further, the examiner should be prepared to make a functional evaluation as to the athlete's physical ability to participate in certain sports. Finally, all athletes and parents should be counseled

as to any predisposing risks of injury that have been discovered during the examination process.

References

1. McKeag DB. Preseason physical examination for the prevention of sports injuries. *Sports Med.* 1985; 2:413-431.
2. Goldberg B, Saraniti A, Witman P, et al. Participation sports assessment—an objective evaluation. *Pediatr.* 1980;66:736-745.
3. Greydanus D. Pediatrics and the teenage athlete. *Adolesc Health Update.* 1990;2:1-5.
4. Smith N. Some health care needs of young athletes. In: Oski FA, ed. *Yearbook in Pediatrics.* St Louis, Missouri: Mosby-Year Book; 1981:186-227.
5. Feinstein RA, Soileau EJ, Daniel WA. A national survey of pre-participation physical examination requirements. *Phys Sports Med.* 1988;16:51-59.
6. DuRant RH, Seymore C, Linder CW, et al. The pre-participation examination of athletes. Comparison of single and multiple examiners. *Am J Dis Child.* 1985;139: 657-661.
7. Linder CW, Durant RH, Seklecki RM, et al. Pre-participation health screening of young athletes. Results of 1268 examinations. *Am J Sports Med.* 1981;9:187-193.
8. American Academy of Pediatrics. Sports participation health record (form). Evanston IL, 1990.
9. Smilkstein G. Health evaluation of high school athletes. *Phys Sports Med.* 1981;9:73-80.
10. Harvey J. The Pre-participation examination of the child athlete. In: *Clinic Sport Med.* Symposium on Pediatric and Adolescent Sports Medicine. 1982;1:353-368.
11. DuRant RH, Pendergrast RA, Seymore C, et al. Findings from the Pre-participation athletic examination and athletic injuries. *Sports Med.* 1992;146:85-91.
12. American Academy of Pediatrics Committee on Sports Medicine. Recommendations for participation in competitive sports. *Pediatrics.* 1988;81:737-739.

Fig 1.—Suggested Health Examination Form

(Cooperatively prepared by the National Federation of State High School Associations and the Committee on Medical Aspects of Sports of the American Medical Association.) Health examination for athletes should be rendered after August 1 preceding school year concerned.

(Please print) Name of Student _____ City and School _____

Grade _____ Age _____ Height _____ Weight _____ Blood Pressure _____

Significant Past Illness or Injury _____

Eyes _____ R20/____ ; L20/____ ; Ears _____ Hearing R ____/15; L ____/15

Respiratory _____

Cardiovascular _____

Liver _____ Spleen _____ Hernia _____

Musculoskeletal _____ Skin _____

Neurological _____ Genitalia _____

Laboratory: Urinalysis _____ Other: _____

Comments _____

Completed Immunizations: Polio _____ Tetanus _____

Date _____ Date _____

"I certify that I have on this date examined this student and that, on the basis of the examination requested by the school authorities and the student's medical history as furnished to me, I have found no reason which would make it medically inadvisable for this student to compete in supervised athletic activities, EXCEPT THOSE CROSSED OUT BELOW."

Baseball	Football	Rowing	Softball	Track
Basketball	Hockey	Skating	Speedball	Volleyball
Cross Country	Golf	Skiing	Swimming	*Wrestling
Field Hockey	Gymnastics	Soccer	Tennis	Others

*Estimate Desirable weight level _____ Pounds

Date of Examination: _____ Signed: _____

Examining Physician _____

Physician's Address _____ Telephone _____

Student Participation And Parental Approval Form

Name of student: _____ Name of School: _____

First _____ Last _____ Middle Initial _____

Date: _____ Date of Birth: _____ Place of Birth: _____

Health and Accident Insurance Carrier: _____

This application to compete in interscholastic athletics for the above high school is entirely voluntary on my part and is made with the understanding that I have not violated any of the eligibility rules and regulations of the State Association.

Signature of Student: _____

Parent's or Guardian's Permission

"I hereby give my consent for the above named student (1) to represent his school in athletic activities except those crossed out on this form by the examining physician, providing that such athletic activities are approved by the State Association; (2) to accompany any school team of which he is a member on any of its local or out-of-town trips. I authorize the school to obtain, through a physician of its own course, any emergency medical care that may become reasonably necessary for the student in the course of such athletic activities or such travel. I also agree not to hold the school or anyone acting in its behalf responsible for any injury occurring to the above named student in the course of such athletic activities or such travel."

Signature of Parent or Guardian _____

Date: _____ Address: _____ (Street) _____ (City) _____ (Zip) _____

Note: This form is to be filled out completely and filed in the office of the high school principal or superintendent of schools before student is allowed to practice and/or compete.