

Preparticipation Physical Evaluations (PPE's) (Sports Physicals)

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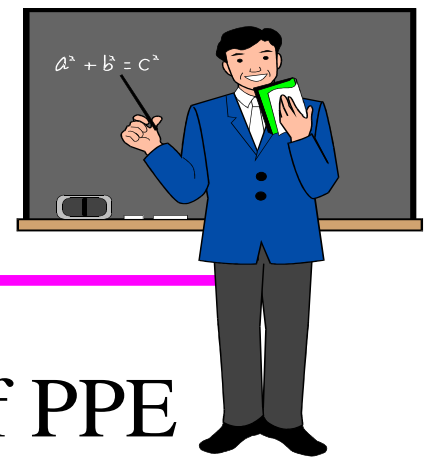
Case Example: Your first patient this p.m. is a 15 yo presenting for a “sports physical”

- ∪ What constitutes a “sports physical” ?
- ∪ What are your obligations -
 - minimal legal requirements?
 - How often?

The patient's mother talks to you in advance: concern about death of a student athlete

- ∪ What are the causes of sudden non-traumatic death in sports?
- ∪ How can you detect these conditions in advance - i.e. right now when you go in the exam room?

Goals of PPE Lecture



- u Review important components of PPE exam - including 2 minute MS exam
- u Discuss what abnormalities to look for – what problems make sports participation unsafe
- u Review evidence re: sudden death young adolescent athlete

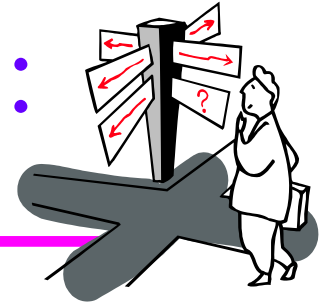
Main Controversies

- ∪ What are minimal standards for a sports physical exam?
- ∪ Sports physical vs. adolescent well child exam?
- ∪ Can health providers identify who is at risk for sudden death?



Minimal Stnds for PPE Exams:

The past



- (JAMA '98) Review: no universal standards –
set by states *where it exists*
- u 11 states have no standard form
 - u 10 states chiropractor can do
 - u only 17% high schools use PPE forms with all elements of AHA cardiac exam

Minimal Stnds for PPE Exams: The Present

- ∪ New AHA updated CV screening recs
- ∪ 2nd edition: “Preparticipation Physical Evaluation” AAFP, AAP,AMSSM, AOASM



Current Focus PPE exams: Maximize Safe Participation

- ∪ Contraindications for participation: “NC”
- ∪ Conditions allowing participation, but needing further evaluation: “CFU”
- ∪ Manageable conditions athlete could benefit from interventions that will help performance

Well Child vs. Sports Physical?

- u Well Child: Preventive Topics
- u Sports Physical: Target History/Physical to conditions that affect participation
- u Practicalities: when do we see adolescents?
 - Time for exam
 - Place
 - Knowledge of examiner
- u Ideal: Both / And

Where and How

u Office based

- Privacy
- Continuity
- More time and \$\$
- Variable PPE skills –
may not cover
necessary H&P items

u Station Based

- Sports oriented
- Time / \$ efficient
- Higher yield for ID
participation abnl's
- No continuity
- Little/no preventive
care attention

Timing of PPE

- ∪ 4 – 6 weeks before season starts
- ∪ Frequency:
 - AHA: H&P q 2 years during sports activity
 - Sports associations: before each new level
 - States: individualized: WA yearly starting in middle school

What constitutes a PPE?

- ⋮ **Targeted History:** 80% conditions that should restrict participation / need further evaluation in PMH/ROS/Family hx
- ⋮ **Targeted Physical Exam:** special emphasis on CV and Musculoskeletal system

History

- u CV Screen
- u Pulmonary
- u Neuro
- u Musculoskeletal
- u Skin
- u Vision
- u General
- u Adolescent Issues



Cardiovascular Screening: (Question 5)

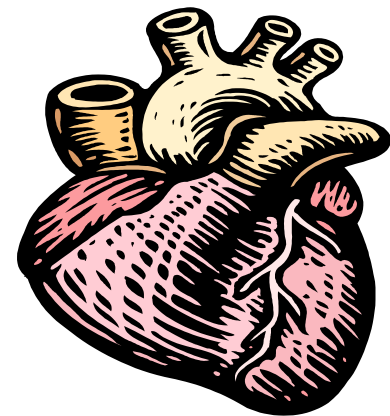
12 AHA consensus panel recs for PPE CV screen

By Hx

- ∪ FH premature death heart disease surviving relatives
- ∪ Personal hx heart dz
- ∪ Exertional chest pain
- ∪ Exertional SOB
- ∪ Personal hx Htn
- ∪ Excessive exercise fatigue
- ∪ Hx exercise syncope or murmur

On physical exam

- ∪ Heart Murmur
- ∪ Presence of femoral pulses
- ∪ Stigmata of Marfan's
- ∪ Blood pressure



Sudden Death (non-traumatic / young adult)

Incidence: 1/300,000 (Males 5:1)

∪ HCM: 36%

- asym septal hypertrophy
- systolic murmur loudest with decreased blood vol.
- death due to vent arrhythmia

∪ Congenital coronary anomalies: 19%

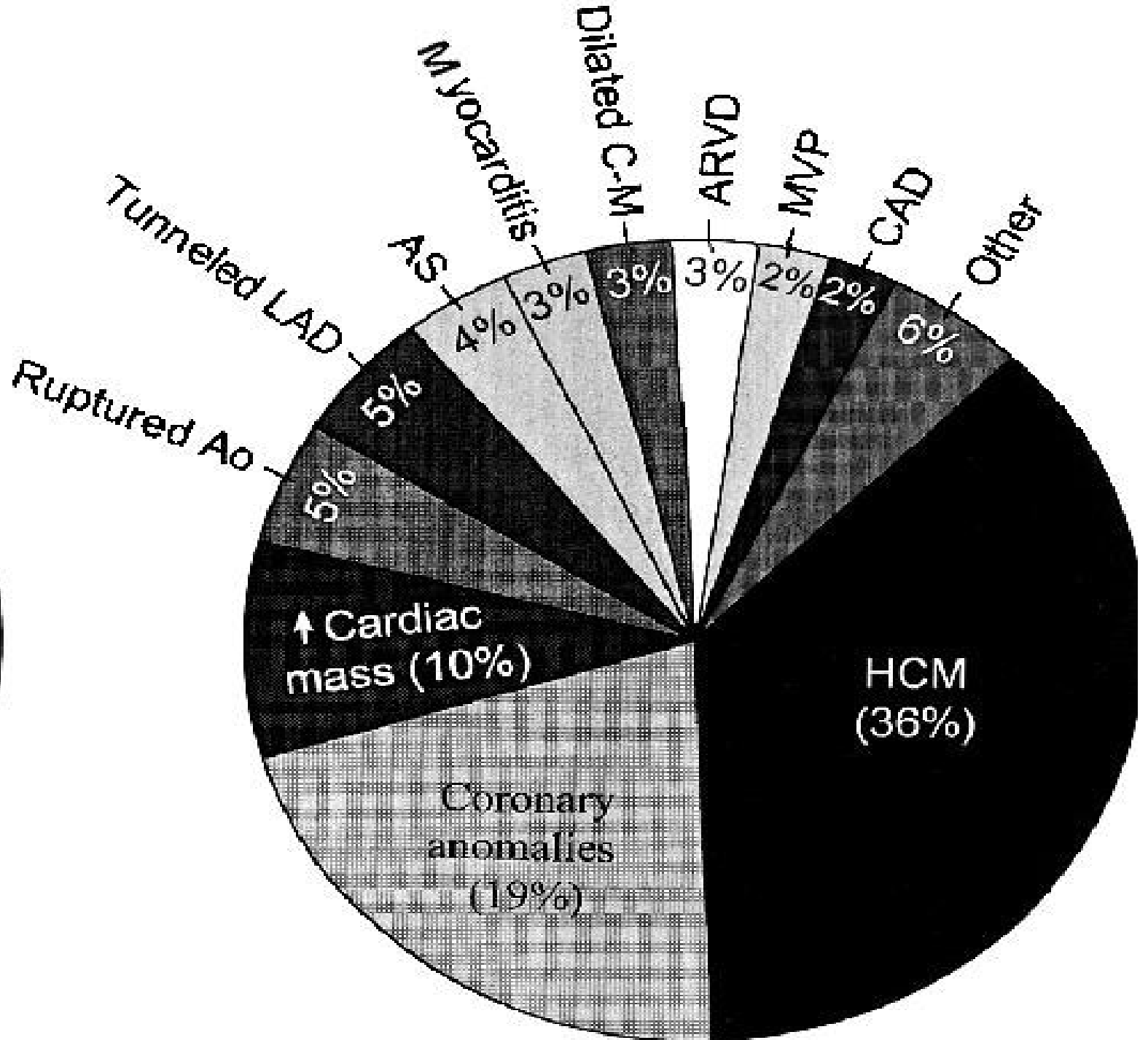
- L main from R sinus
 valsalva
- chest pain exercise, early fatigue, syncope

∪ Myocarditis / cardiomyopathy

- coxsackie B 50%
- CHF sx's, unexplained resting tachycardia

∪ Other

- Marfan's
- Aortic aneurysms, A.S.
- coarctation
- Long QT, WPW
- MVP



Dilemmas in Prevention Sudden Death

- u Retrospective Study JAMA¹⁹⁹⁶ Maron, et al
 - 158 cases, 85% CV
 - 115 had PPE exam, 4% suspicion CV dz
 - 1% with CV abnormality identified prior death
- u HCM: 1 / 500 – multiple genes, phenotypes
 - Most pts have non-obstructive form: soft or no murmur
 - Few athletes have sx's before sudden death (21%)
 - Up to 85% young athletes have innocent flow murmurs
- u Coronary anomalies
 - Most deaths: athlete asymptomatic previously (one study, up to 30% had chest pain with exertion prev)

Dilemmas in Prevention Sudden Death

Screening Challenges

- ∪ Incidence: 1/300,000 (Males 5:1)
- ∪ Screening problems
 - low incidence makes for low specificity: need screen 200,000 Asx athletes to detect 500 at risk and 1 potential death
 - **IF** had tool 99% sens/spec - would have PPV of 0.5% (1 true (+) Test out of 2,000, 1,999 false (+))
- ∪ Poor cost effective ratios – if general screen
 - Echo: HCM only, 250,000 per case, false +'s
 - ECG: low specificity, athletes heart confusion

Conflicting Expectations

- ∪ Low dz prevalence, low sensitivity of exam findings
- ∪ Poor screening accuracy
- ∪ Costs
- ∪ Practical considerations
- ∪ Society Expectations
- ∪ Issue of acceptable risks



Consensus??

(Sci Adv comm AHA)



“Careful personal and family history, focused CV exam is the most current practical screen...

.... at minimum before participation in high school and college, then q2 yrs during high school, and interim yearly hx, BP screen college

... other testing:echo,ECG in Asx nl athletes not cost effective, high rate false +

Other History ROS

- u **General (Q # 1, 2)**

- Looking for unpaired organs, recent mono, sickle cell

- u **Meds / Supplements (Q #3)**

- **Other substance abuse: etoh, tobacco,**
- **illicit drug use**
- **Performance enhancing drug use**

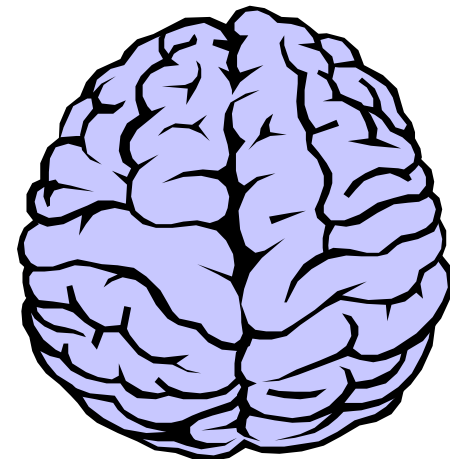


- u **Skin (Q # 6)**

- Infectious lesions – close contact sports

- u **Neuro (Q# 7)**

- 2nd impact syndrome
- Poor sz control
- Cervical /Brachial plexus injuries, transient quadraplegia



Other History ROS

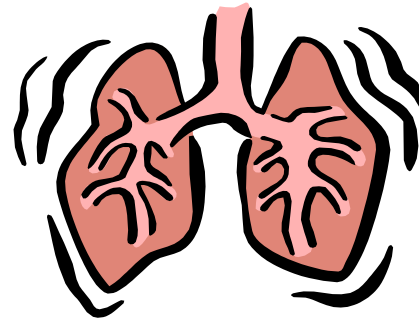
- u **Heat Suceptibility (Q # 8)**

- Prevention issues

- u **Pulmonary (Q#9)**

- Undiagnosed EIA:

FEV1 before/after 75% max exercise, see $\geq 15\%$ dec at 5 - 10 minutes



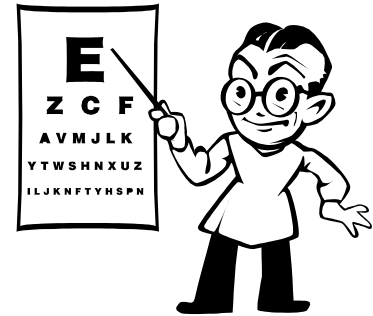
- u **Musculoskeletal (Q # 10, 12)**

- Acute / sxmatic fracture, strain, instability
- Distant (now asx) injury not totally back to nl

Other History ROS

u **Eyes (Q # 11)**

- Issue of damage to borderline vision
- Incidental dx need for glasses



u **Adolescent Issues (Q # 13, 14)**

- Eating disorders
- Home / School fx – WCC issues
- Significant + response: f/u and/or refer

u **Menstrual Abnormalities**

- Female athlete triad
- Contraception / STD

Physical Exam Caveats

- ∪ Vitals: nurse do ahead of time (school)
- ∪ Efficiency: do everything you can in each position
- ∪ Repeat essential Q's during exam each area
 - Heart: so, no syncope, CP. Lungs: no EIA sxs
 - study: 37% athletes admitted probs in repeat Q's during physical exam itself

Physical Exam: Review V.S.

u **Blood Pressure:** exclude “severe” Htn

Classification of Hypertension by Age in Children and Adolescents§

Magnitude of Hypertension*

	Mild Stage 1	Moderate Stage 2	Severe Stage 3	Very Severe Stage 4
Child (6 to 9 yr) [†]				
Systolic	120-124	125-129	130-139	≥140
Diastolic	75-79	80-84	85-89	≥90
Child (10 to 12 yr) [†]				
Systolic	125-129	130-134	135-144	≥145
Diastolic	80-84	85-89	90-94	≥95
Adolescent (13 to 15 yr) [†]				
Systolic	135-139	140-149	150-159	≥160
Diastolic	85-89	90-94	95-99	≥100
Adolescent (16 to 18 yr) [†]				
Systolic	140-149	150-159	160-179	≥180
Diastolic	90-94	95-99	100-109	≥110

u **Vision:** exclude if best corrected > 20/40

u **Pupils:** congenital anisocoria

u **Ht / Wt:** under/overwt, Marfan’s

Physical Exam: Standing

- u ENT

- Pupils
- Teeth / Throat

- u Heart: HCM murmur

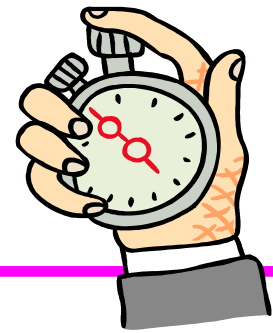
- Increases w/ lower preload (Valsalva, rise to stand)
- Decreases w/ more preload (squatting)

- u Lungs

- u Skin

- u (Male GU exam)

The 2 minute ortho exam



Prosp blinded study of 2 min ortho exam:

Hx alone detected 91% injuries

For physical exam alone (blinded to hx)

Sensitivity PE: 50%

PPV: 40%

Specificity PE: 97%

NPV: 98%

Mssg: use Hx with PE for best evaluation

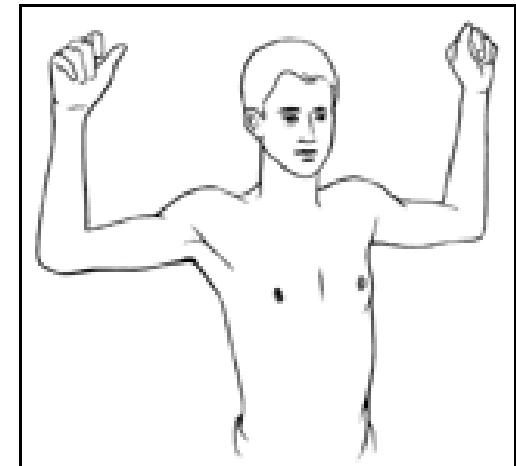
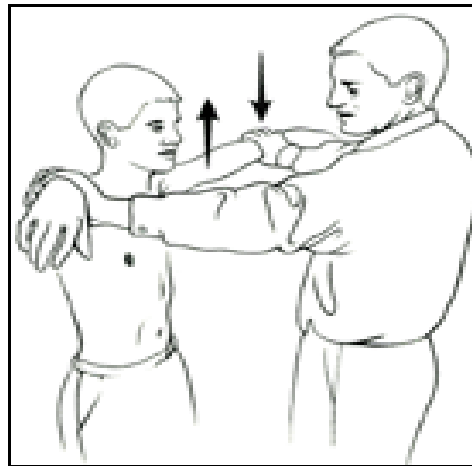
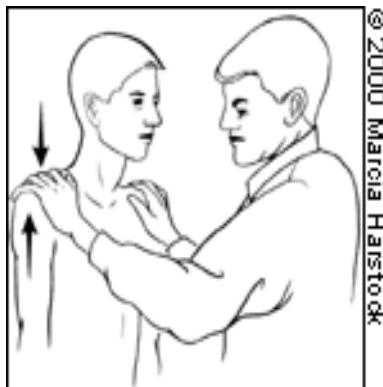


2 minute Musculoskeletal Exam

u Neck

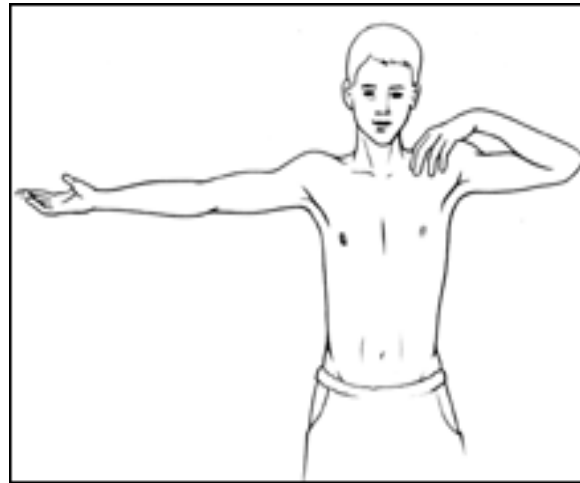


u Shoulders



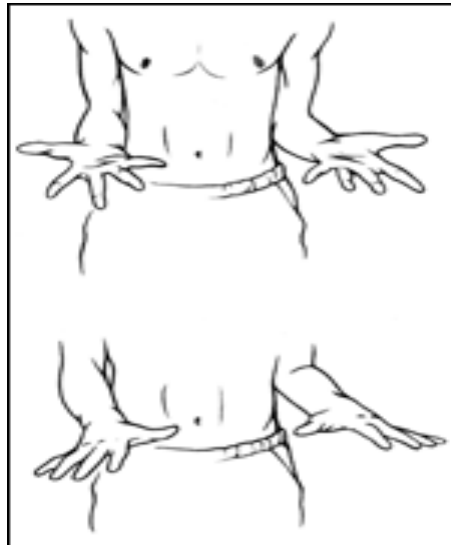
2 minute Musculoskeletal Exam

u **Elbow**



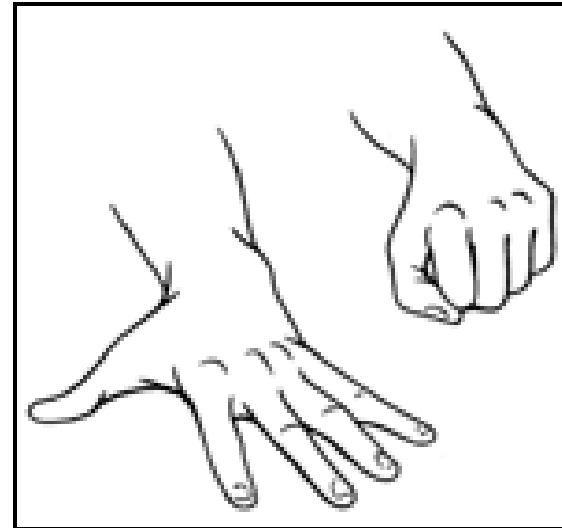
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u **Wrist**



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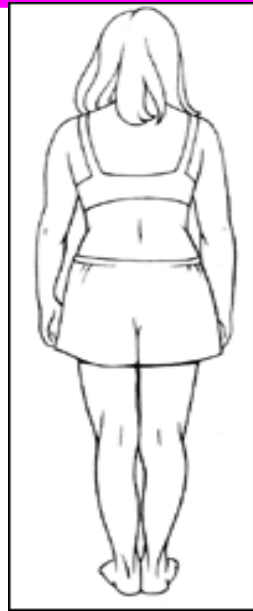
u **Hand**



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2 minute Musculoskeletal Exam

Back



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Lower Ext



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Physical Exam: Supine

- ∪ Abdomen:

- Organomegaly
- Femoral Pulse

- ∪ Knee

- Lachman's

- ∪ Ankle

- Anterior Drawer
- Resist Eversion

Screening Labs

u Zippo

Clearance to Play



- u School based PPE's: goal is to determine safety to participate – not definitive Dx:
 - Cleared - no probs seen
 - Cleared with f/u: minor probs needing further eval / tx but safe to start play
 - NC - play contraindicated until further eval

Clearance to Play

- u Mayo clinic study 2,700 athletes:
 - 2% NC
 - 12% CFU
- u Largest study 10,000 athletes:
 - vision and Htn leading causes of referrals and disqualifications
 - CV concerns, MS c/o's, Asthma
- u Local Middle school Hilltop PPE's:
 - CFU: vision, EIA sx's
 - NC: musculoskeletal

Clearance to Play: Making Decision

- ∪ Type / Severity Injury / Problem
- ∪ Sport / Activity
 - Position
 - Protective Equipment available
 - Can limited participation be allowed, or alternate sport?
- ∪ Sequelae / Complications of play / further injury
- ∪ Athlete Interest / Parent understanding risks
- ∪ **Table 7 Preparticipation Physical Eval and Handout “Determining Clearance”**

Summary

- u PPE: sports/activity specific Hx/Physical Goal: detect problems that would impact athletic participation
 - National Standard (states variable)
 - Pay attention high risk areas: CV, Neuro, MS
- u Risk: most athletes nl, most exams nl - can give perception no value to PPE
- u Challenge to us: make exam value to athlete
 - Health Q's, counsel items of interest to athlete: training techniques, nutrition, wt control
 - Sneak in adolescent health maintenance issues