Medical papers covering screening for cardiac conditions

Shown here are a few papers covering the subject of screening, most papers on this subject refer to sports persons engaged in regular competitive sport. We have put them in categories depending on our interpretation of the authors position regarding the value and effectiveness of (mainly pre-sports medicals) screening. Please let of know of other studies you find.

For:

*Trends in SCD in young competitive athletes after implementation of a preparticipation screening program*
Domenico Corrado et al
JAMA Oct 4, 2006-vol 296, No. 13 1593

*Overview*
Majority young athletes die of structural heart disease. Hypertrophic cardiomyopathy in USA and ARVC in Italy.

Italian law mandates (1982) preparticipation screening, all engaged in competitive sport must undergo a clinical evaluation.

Sudden death classified as death within one hour.

First line screening; family history, personal history, physical examination , 12 lead ekg. By qualified medical personal.

After first line screening there were 9% (3914) who were referred for further tests. Of these 2% (879) were disqualified. Most of the remaining 7% identified were false positives (3035).

*Protagonist: Routine screening of all athletes prior to participation in competitive sports should be mandatory to prevent sudden cardiac death*
Domenico Corrado, Gaetano Thiene
Heart Rhythm Society 10.1016/j.hrthm.2007.01.002

*Overview*
Bases argument on the Italian model.

*Electrocardiograms Should be Included in Preparticipation Screening of Athletes*
Robert J Myerburg, Victoria L Vetter
American Heart Assoc. 2007;116;2616-2626

Tentative:

*Sudden cardiac death in 15 – 35 year olds in Sweden during 92 – 99*
A Wisten et al
Journal of Internal Medicine 2002; 252; 529-536

*Overview*
Found an average of 1 in 100,000 SCD deaths. Of these 50% had preceding symptoms. Says that an Israeli study showed preceding symptoms in 54% of deaths.
36th Bethesda conference
Eligibility recommendations for competitive athletes with cardiovascular abnormalities
Barry Maron et al

Overview
Preparticipation screening:
Customary screening strategy in the US is confined to history taking and physical examination and is generally acknowledged to be limited in its power to identify important cardiovascular abnormalities.

The Italian system is unique requiring annual evaluations that routinely include a 12 lead ecg, personal history, family history and physical examination. The ecg has proved to be the most useful in identification of HCM in previously undiagnosed athletes. However such screening efforts are complicated by the substantial proportion of false-positive test results.

When a cardiovascular abnormality is suspected the diagnostic strategy should focus on the systematic exclusion of those conditions known to cause SCD; echo, ecg, history, physical examination. Additionally cardiac magnetic resonance imaging CMR, exercise testing, ambulatory Holter ecg, implanted loop recorder, tilt table, or electrophysiologic testing with programmed stimulation.

Athletes heart;
Systematic training may trigger physiologic adaptation. Increased wall thickening, enlarged ventricles etc. Clinical dilemmas are not infrequent due to this.

These new guidelines represent the most current consensus opinion of a distinguished group of cardiologists regarding the medical risk of participation in competitive sport by athletes.

Cardiovascular Preparticipation Screening of Competitive Athletes (1996)
Circulation 1996; 94:850-856 American Heart Association Inc.
ACC/AHA 2002 guideline update for exercise testing: summary article
J Am Coll Cardiolol, 2002; 40:1531-1540

Overview
A report of the American College of Cardiology/American Heart Association task force on practice guidelines (committee to update the 1997 exercise testing guidelines)
Recommendations
The AHA recommends some form of preparticipation cardiovascular screening. However it is not prudent to recommend routine use of such tests as 12 lead ECG, ECO or graded exercise testing for detection of young or older athletes.

Consequently conclude:
Complete and careful personal family history
Physical examination
Before organised sport for grades 9 through 12 (US school ages)
Repeat every 2 yrs
In intervening years an interim history should be obtained
Recommend tests for older athletes
Recommend screening performed by a healthcare worker with the requisite training, medical
skills and background to reliably obtain a detailed cardiovascular history, perform a physical
examination, and recognise heart disease. Necessary to establish a formal certification process
to demonstrate expertise in performing cardiovascular examinations.
Brachial blood pressure measurement in an environment conducive to optimal cardiac auscultation. The evaluation should emphasise certain elements critical to the detection of cardiovascular diseases know to cause SCD.

ACC/AHA/ESC 2006 Guidelines for Management of Patients with Ventricular Arrhythmia and
the Prevention of Sudden Cardiac Death
2006; 114:000-000

Overview
The American College of Cardiology Foundation and American Heart Association updated
guidelines with input from the European Society of Cardiology

HCM
Risk stratification; This relatively low incidence creates a challenge for risk stratification since
the false-positives results for any stratifier may overwhelm the true-positive results. (ie., the
number of people who will test and give an incorrect positive result will be high compared
with the number of correct positive results.)

Ventricular arrhythmia and sudden death related to specific populations
Athletes;
Recommendations
Class 1
1. Preparticipation history and physical examination, including family history of premature or
SCD and specific evidence of cardiovascular disease such as cardiomyopathies and ion channel
abnormalities is recommended in athletes.

2. Athletes presenting with rhythm disorders, structural heart disease, or other signs or
symptoms suspicious for cardiovascular disorders, should be evaluated as any other patient but
with recognition of the potential uniqueness of their activity.

3. Athletes presenting with syncope should be carefully evaluated to uncover underlying
cardiovascular disease or rhythm disorder.

4. Athletes with serious symptoms should cease competition while cardiovascular
abnormalities are being fully evaluated.

Class 2 b
Twelve lead ECG and possible echocardiography may be considered as preparticipation
screening for heart disorders in athletes.

It is generally accepted that preparticipation screening for medical conditions should be a
requirement for clearance to participate in competitive athletics, but there are no uniformly
accepted standards for screening.
The major causes of SCD in athletes are HCM 36% and coronary artery abnormalities 19%, arrhythmogenic RV cardiomyopathy, and myocarditis.

Screening of athletes is a difficult task. The low incidence of anomalies makes screening not cost effective, although one study has suggested that ECG screening is more cost effective than echocardiographic screening (265,266).

Against:

Protecting athletes from SCD
Paul Thompson, Ben Levine
JAMA Oct 4, 2006-vol 296, No. 13 1648

Overview
Says the Domenica Corrado paper does not prove value of routine screening or establish the importance of routine ecg’s in the screening process.
Suggests that over recent years health professionals’ increased awareness due to the higher profile of exercise related deaths will have had some effect in reducing the number of deaths. The study started with a very high death rate in athletes compared to other similar studies, 1 per year in 27,000. This will make the improvements over the years look better than they should be. Other studies recognise 1 person per 100,000.

An International Multidisciplinary Symposium for physiologists, cardiologists, sports scientists and physicians Dec 2002
5th One-day Conference of the Institute of Sports Medicine

Overview
The issue of generalised screening of the young athlete population is controversial and, given current healthcare resources, it is also impractical. Within the athletic population, in addition to targeting those with a family background of premature coronary disease, there is also the possibility to focus on those with cardiac-related symptoms. In this regard, the main issue is whether cardiovascular adaptation seen in the healthy young athlete can be distinguished from the frontiers of the inherited conditions which could cause problems.

Antagonist: Routine screening of all athletes prior to participation in competitive sports should be mandatory to prevent sudden cardiac death

Sami Viskin
Heart Rhythm Society 10.1016/j.hrthm.2007.01.003

Overview
Argues that the changes in an athletes heart due to exercise make it difficult to distinguish between the effects of these changes and cardiac conditions. Quotes example in Nevada where 6000 high school youths were screened for three years using ECG tests following the sudden death of a basket ball player from HCM. The screening did not identify any cases of HCM. A cost model is put forward suggesting that $1,320,000 would have to be spent per life saved if the a screening program similar to the Italian were introduced.
An Electrocardiogram Should not be Included in Routine Preparticipation Screening of Young Athletes

Bernard R Chaitman
American Heart Assoc. 2007;16;2610-2615

Recommendations and Considerations Related to Preparticipation Screening for Cardiovascular Abnormalities in Competitive Athletes: 2007 Update

Barry J Maron et. al.
American Heart Assoc. March 12, 2007. DOI: 10.1161/circulaionaha.107.181423

Conclusion
A large preparticipation screening initiative for US athletes that mandates a 12-lead ECG, such as that proposed by the ESC and IOC, is probably impractical and would require considerable resources that do not currently exist...

European Prospective
Viewpoint: Preventing Sudden Arrhythmic Deaths
American Heart Assoc. 2007;116;F67-F72
Mark Nicholls writes following his talk with Professor William McKenna:-

In terms of prevention, Professor McKenna, along with the Department of Health, believes screening the entire population to assess the risk of SADS is not feasible.

The article continues suggesting a more focused approach.