Prof. Jaroslav Hruda

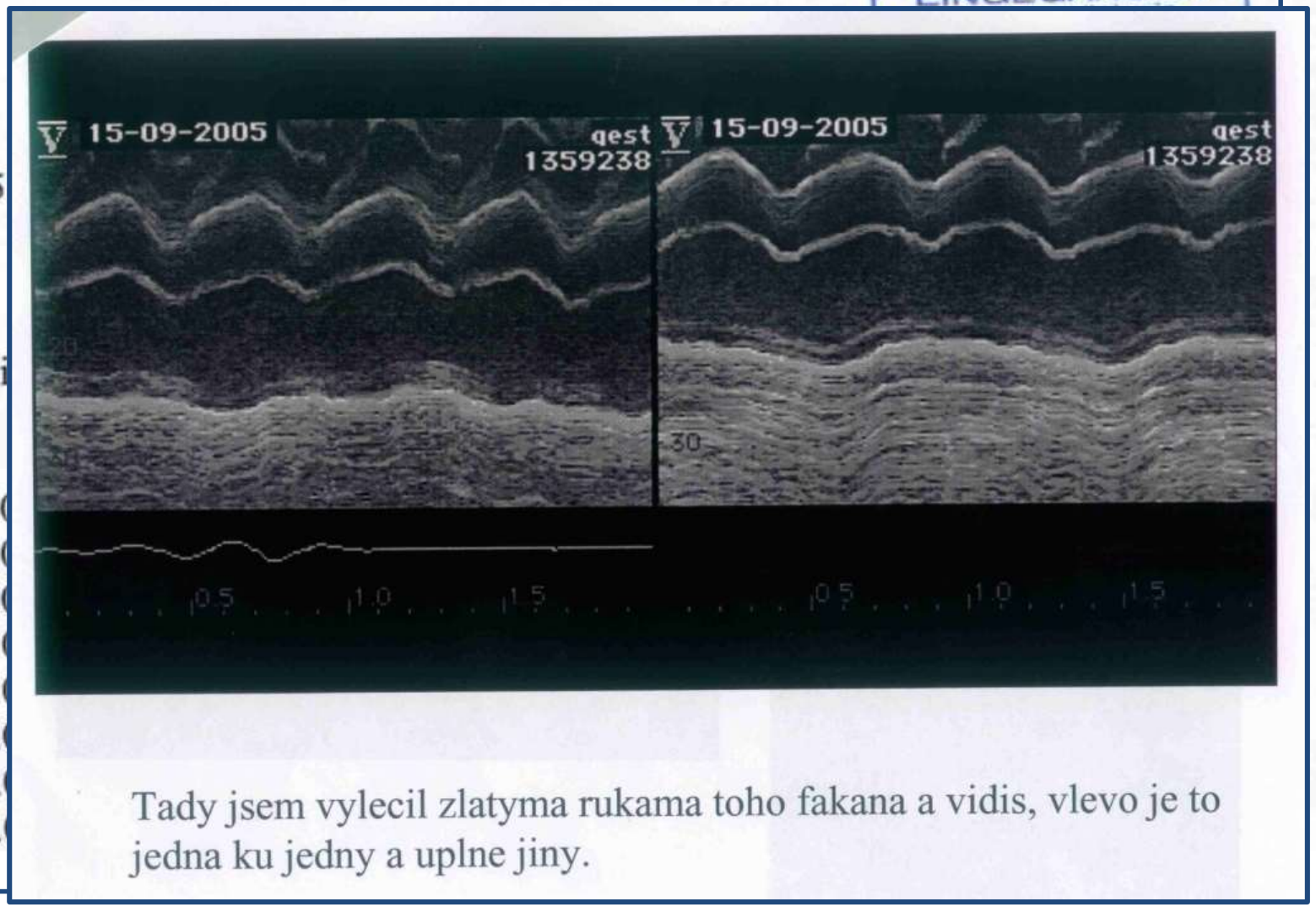
coby utajený, ale o to vášnivější arytmolog

EINGEGANGEN

Amsterdam, 27.10.05

Hele, Janyku,
Posilam Ti nasleduji

Cislo	Date
1,2,3	13.9.(
4,5	13.9.(
6,7	14.9.(
8	14.9.(
9	14.9.(
10	14.9.(
11	15.9.(
12	15.9.(



Tady jsem vylecil zlatyma rukama toho fakana a vidis, vlevo je to jedna ku jedny a uplne jiny.

Prevence náhlé srdeční smrti
Mýtus nebo realita?

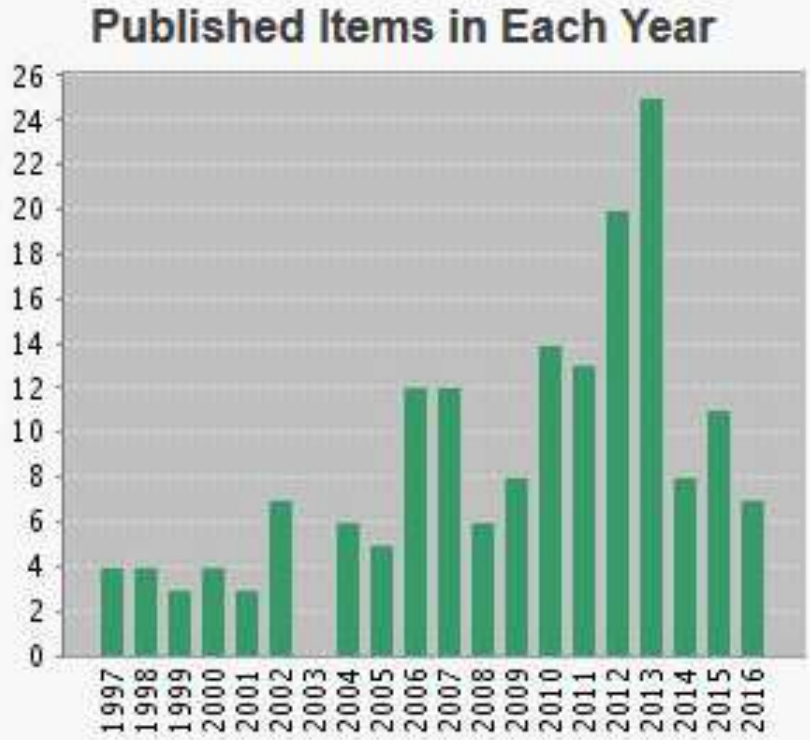
Jan Janoušek

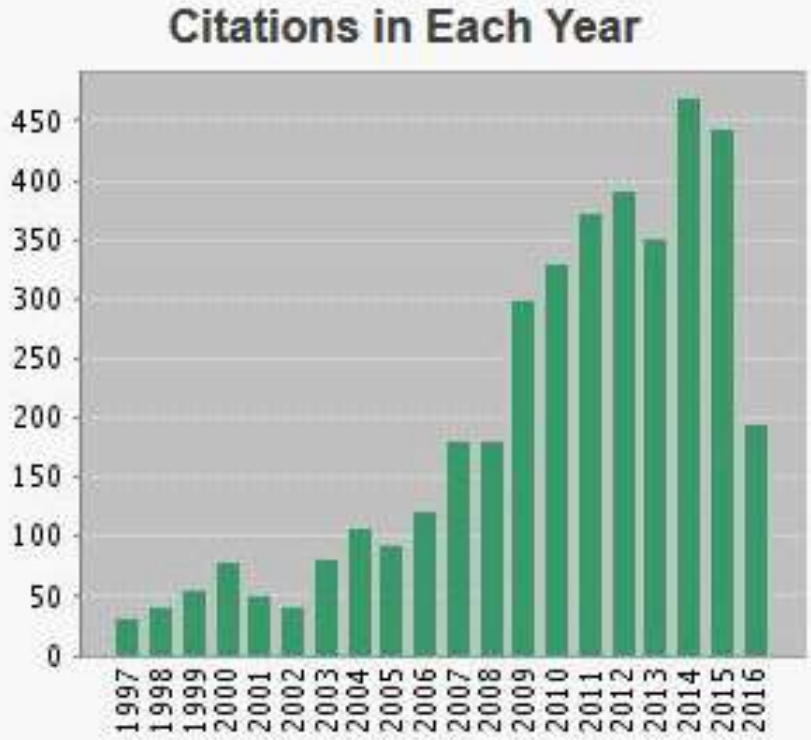
Dětské kardiocentrum 2. LF UK a FN Motol

Norský olympijský plavec Dale Oen (†26) zemřel náhle na srdeční zástavu

Web of Science

Hledané výrazy: *Screening* AND *Sudden* AND *Death*





Praha DNES
Najdete nás i na **Facebooku**
facebook.com/PrahaDnes

IKEM šokuje výzkumem, sportovní lékaři ho ztrhali

IKEM půl roku testoval stovku sportovců. Výsledky jej vyděsily.

IK+E M | NÁHLÉ ÚMRTÍ HROZÍ I ZDÁNLIVĚ ZDRAVÝM, MLADÝM A AKTIVNÍM LIDEM
Tisková zpráva 7. 2. 2017

Sportovní lékaři: Nejsme blbci

CONTROVERSIES IN CARDIOVASCULAR MEDICINE

Should Electrocardiographic (ECG) Screening of All Infants, Children, and Teenagers be Performed?

Pro

Electrocardiographic Screening of All Infants, Children, and Teenagers Should Be Performed

Victoria L. Vetter, MD, MPH

CONTROVERSIES IN CARDIOVASCULAR MEDICINE

Should Electrocardiographic (ECG) Screening of All Infants, Children, and Teenagers be Performed?

Kontra

Electrocardiographic Screening Should Not Be Implemented for Children and Adolescents Between Ages 1 and 19 in the United States

Richard A. Friedman, MD, MBA

388

VYHLÁŠKA

ze dne 28. listopadu 2013,

kterou se mění vyhláška č. 388/2011 Sb., o provedení některých ustanovení zákona o poskytování dávek osobám se zdravotním postižením, ve znění pozdějších předpisů

(2) Pro účely této vyhlášky se rozumí

a) výkonnostním sportovcem osoba, která

1. vykonává výkonnostní spor
sportovních soutěžích nebo
a

2. je registrována v organizaci
pravu výkonnostních spo
organizuje sportovní soutěž

(3) Vstupní lékařská prohlídka vedle základního vyšetření obsahuje,

a) jde-li o výkonnostního sportovce nebo uchazeče ke vzdělávání ve sportovní škole,

1. zjištění základní antropometrie,

2. standardní klidové elektrokardiografické vyšetření

Incidence náhlé srdeční smrti ve věku 1-18 let

(na 100.000 osobo-roků)

European Heart Journal Advance Access published December 15, 2013

European Heart Journal
doi:10.1093/eurheartj/eht509

CLINICAL RESEARCH
Prevention and epidemiology

Sudden cardiac death in children (1–18 years): symptoms and causes of death in a nationwide setting

Bo Gregers Winkel*, Bjarke Risgaard, Golnaz Sadjadieh, Henning Bundgaard, Stig Haunsø, and Jacob Tfelt-Hansen

As for activity, the most common activity was sleep 41% and normal activities of daily living 41%. Moderate or vigorous activity was seen in only 16%.

Pilmer CM et al. HeartRhythm 2014

Comparison of the Frequency of Sudden Cardiovascular Deaths in Young Competitive Athletes Versus Nonathletes: Should We Really Screen Only Athletes?

Barry J. Maron, MD[a,*], Tammy S. Haas, RN[a], Emily R. Duncanson, MD[b], Ross F. Garberich, MS[a], Andrew M. Baker, MD[c], and Shannon Mackey-Bojack, MD[b]

Am J Cardiol 2016

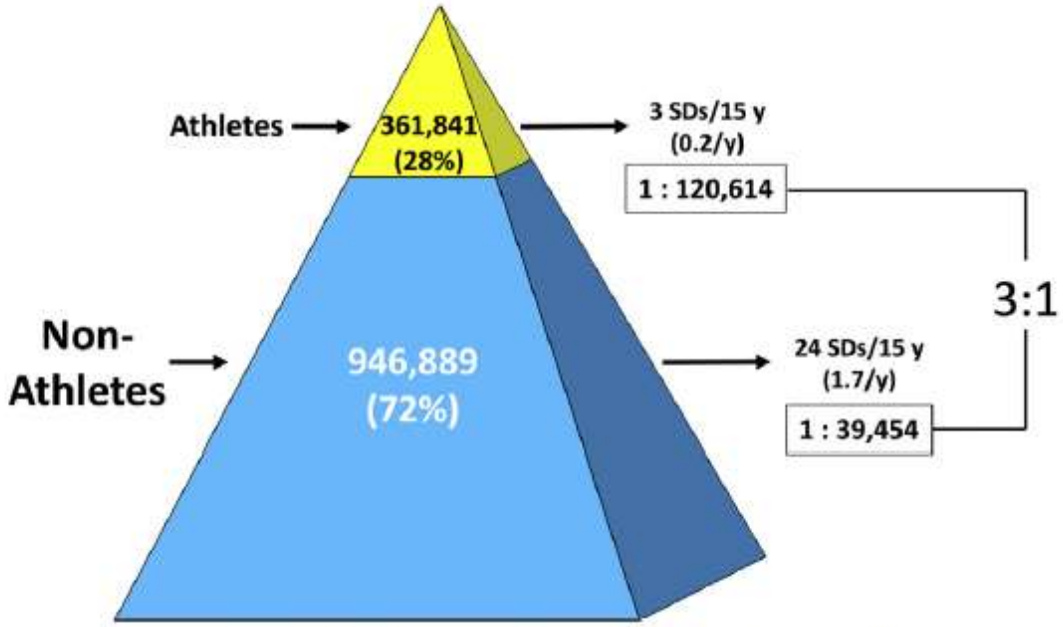


Figure 1. Incidence of sudden death in high school and college students comparing competitive athletes and nonathletes, 2000 to 2014, in Hennepin County, Minnesota. Nonathletes greatly exceed athletes in person-years and the number of SDs due to genetic and/or congenital heart disease (i.e., 3:1). SDs = sudden deaths; y = year.

Epidemiology and Outcomes From Out-of-Hospital Cardiac Arrest in Children

The Resuscitation Outcomes Consortium Epistry–Cardiac Arrest

Dianne L. Atkins, MD; Siobhan Everson-Stewart, MS; Gena K. Sears, BSN;
Mohamud Daya, MD, MS; Martin H. Osmond, MD, CM, FRCPC;
Craig R. Warden, MD, MPH; Robert A. Berg, MD;
the Resuscitation Outcomes Consortium Investigators

Table 1. Patient Characteristics

Characteristic	Infants (n=277)	Children (n=154)	Adolescents (n=193)
Age, mean (SD), y	0.3 (0.2)	4.2 (3.0)	16.4 (2.1)
Age, median (Q1, Q3), y	0.2 (0.1, 0.4)	3.0 (1.6, 7.0)	17.0 (15.0, 18.0)
Male, n (%)*	160 (59)	92 (60)	134 (69)
Incidence/100 000 person-y (95% CI)	72.71 (62.02–83.39)	3.73 (3.02–4.43)	6.37 (5.30–7.44)
EMS treated, n (%)	232 (84)	135 (88)	136 (70)
No EMS treatment, n (%)	45 (16)	19 (12)	57 (30)

*Percentage is of those known.

Circulation. 2009;119:1484-1491

Kardiovaskulární screening k detekci onemocnění s rizikem náhlé srdeční smrti u dětí a mladistvých

Akceptovaný (nepotvrzený) standard

- *Anamnéza*
- *Fyzikální vyšetření*

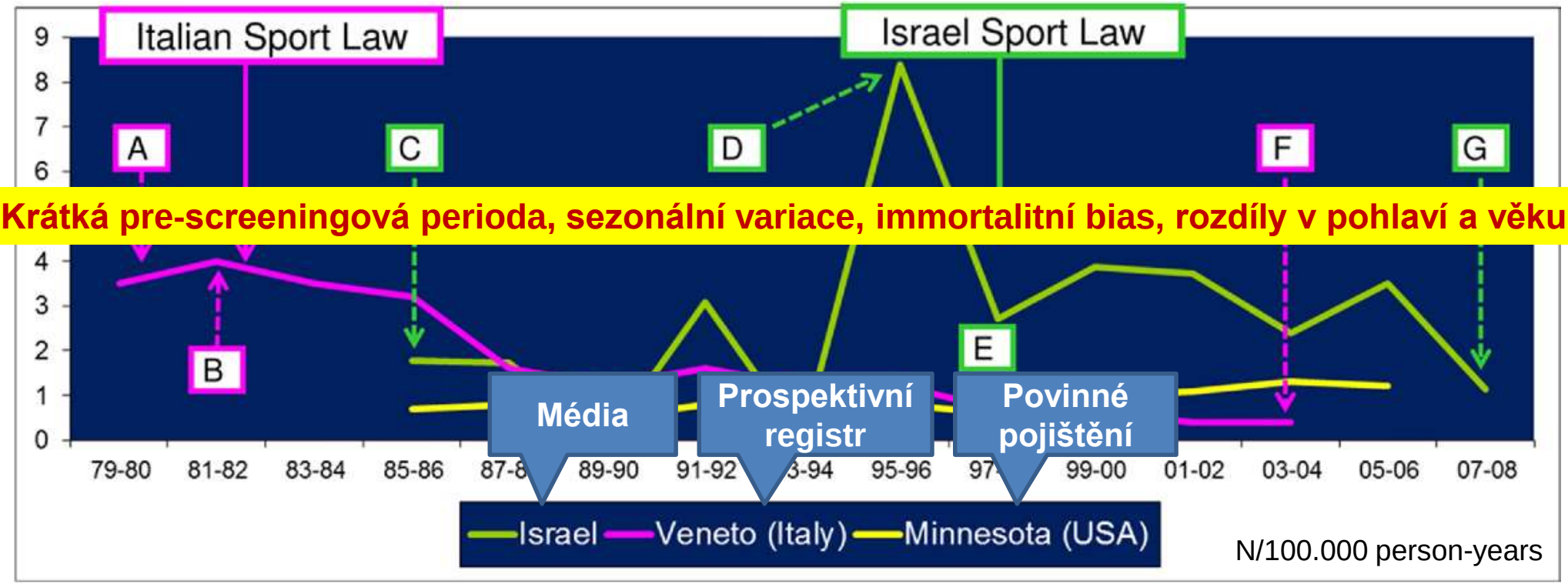
Alternativní/další screeningové možnosti

- *EKG*
- *ECHO*
- *Genetika*

Effect of pre-participačního screeningu

Roční incidence náhlé srdeční smrti u sportovců

Steinwill A et al. JACC 2011



Krátká pre-screeningová perioda, sezonální variace, immortalitní bias, rozdíly v pohlaví a věku

Screeningová strategie:

Israel: anamnéza, fyzikální vyš., klidové a zátěžové EKG *Steinwill A et al. JACC 2011*

Italy, Veneto: anamnéza, fyzikální vyš., klidové EKG *Corrado D et al. JAMA 2006*

Minnesota: anamnéza, fyzikální vyš. *Maron BJ et al. Am J Cardiol 2009*

EKG screening
Výsledky

N = 42.386, Itálie, Benátská oblast

Screening: anamnéza, fyzikální vyš., klidové EKG

- Pozitivní screening – další vyšetření: 3.914 (9%)
- Kardiovaskulární onemocnění: 879 (2%)
- Potenciálně letální – zákaz sportu: 91 (0.2%)

Falešně pozitivní nálezy: 8.8 %[1]

Mohou být sníženy na 2.5 % pomocí zlepšení EKG kritérií a tréninkem[2]

[1]*Corrado D et al. JAMA 2006*
[2]*Marek J et al. Heart Rhythm J 2011*

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 69, NO. 8, 2017

ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2017.01.015

Pro věk: (12) 16 – 30 (>30) let

CURRENT OPINION

FIGURE 1 International Consensus Standards for Electrocardiographic Interpretati

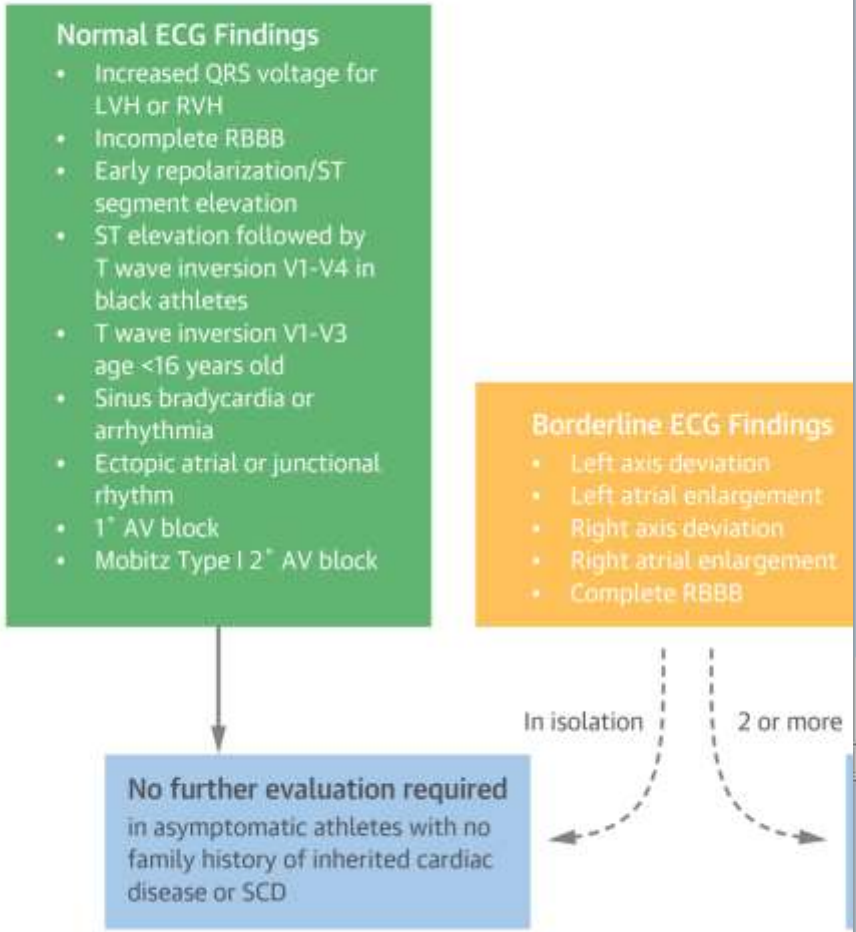


TABLE 1 International Consensus Standards for Electrocardiographic Interpretation in Athletes: Definitions of ECG Criteria

Abnormal ECG findings in athletes

These ECG findings are unrelated to regular training or expected physiologic adaptation to exercise, may suggest the presence of pathologic cardiovascular disease, and require further diagnostic investigation.

ECG abnormality	Definition
T wave inversion	≥1 mm in depth in two or more contiguous leads; excludes leads aVR, III, and V_1
• Anterior	• V_2-V_4
	– excludes: black athletes with J-point elevation and convex ST-segment elevation followed by TWI in V_2-V_4; athletes age <16 with TWI in V_1-V_3; and biphasic T waves in only V_3
• Lateral	• I and AVL, V_5 and/or V_6 (only one lead of TWI required in V_5 or V_6)
• Inferolateral	• II and aVF, V_5-V_6, I and AVL
• Inferior	• II and aVF
ST-segment depression	≥0.5 mm in depth in two or more contiguous leads
Pathologic Q waves	Q/R ratio ≥0.25 or ≥40 ms in duration in two or more leads (excluding III and aVR)
Complete left bundle branch block	QRS ≥120 ms, predominantly negative QRS complex in lead V_1 (QS or rS), and upright notched or slurred R wave in leads I and V_6
Profound nonspecific intra-ventricular conduction delay	Any QRS duration ≥140 ms
Epsilon wave	Distinct low amplitude signal (small positive deflection or notch) between the end of the QRS complex and onset of the T-wave in leads V_1-V_3
Ventricular pre-excitation	PR interval <120 ms with a delta wave (slurred upstroke in the QRS complex) and wide QRS (≥120 ms)
Prolonged QT interval*	QTc ≥470 ms (male)
	QTc ≥480 ms (female)
	QTc ≥500 ms (marked QT prolongation)
Brugada Type 1 pattern	Coved pattern: initial ST-segment elevation ≥2 mm (high take-off) with downsloping ST-segment elevation followed by a negative symmetric T-wave in ≥ 1 leads in V_1-V_3
Profound sinus bradycardia	<30 beats/min or sinus pauses ≥3 s
Profound 1° AV block	≥400 ms
Mobitz Type II 2° AV block	Intermittently non-conducted P waves with a fixed PR interval
3° AV block	Complete heart block
Atrial tachyarrhythmias	Supraventricular tachycardia, atrial fibrillation, atrial flutter
PVC	≥2 PVCs per 10 s tracing
Ventricular arrhythmias	Couplets, triplets, and non-sustained ventricular tachycardia

Borderline ECG findings in athletes

These ECG findings in isolation likely do not represent pathologic cardiovascular disease in athletes, but the presence of two or more borderline findings may warrant additional investigation until further data become available.

ECG abnormality	Definition
Left axis deviation	−30° to −90°
Left atrial enlargement	Prolonged P wave duration of >120 ms in leads I or II with negative portion of the P-wave ≥1 mm in depth and ≥40 ms in duration in lead V_1
Right axis deviation	>120°
Right atrial enlargement	P-wave ≥2.5 mm in II, III, or aVF
Complete right bundle branch block	rSR′ pattern in lead V1 and a S wave wider than R wave in lead V_6 with QRS duration ≥120 ms

Europace (2015) 17, 1435–1440
doi:10.1093/europace/euu385

Variability in interpretation of the electrocardiogram in young athletes: an unrecognized obstacle for electrocardiogram-based screening protocols

Benjamin Berte[1], Mattias Duytschaever[1,2], Juliana Elices[1†], V
Liesbeth Timmers[2], Frédéric Van Heuverswyn[2], Roland Stro
Karel Watteyne[3], Elke Vandensteen[3], Yves Vandekerckhove

[1]Department of Cardiology, Sint-Jan Hospital Bruges, Ruddershove 10, 8000 Bruges, Belgium; [2]Heart Center, Ghent University H
Rehabilitation and Sports Medicine, Sint-Jan Hospital Bruges, Bruges, Belgium

Nesouhlas je signifikantní i s jasně specifikovanými kritérii

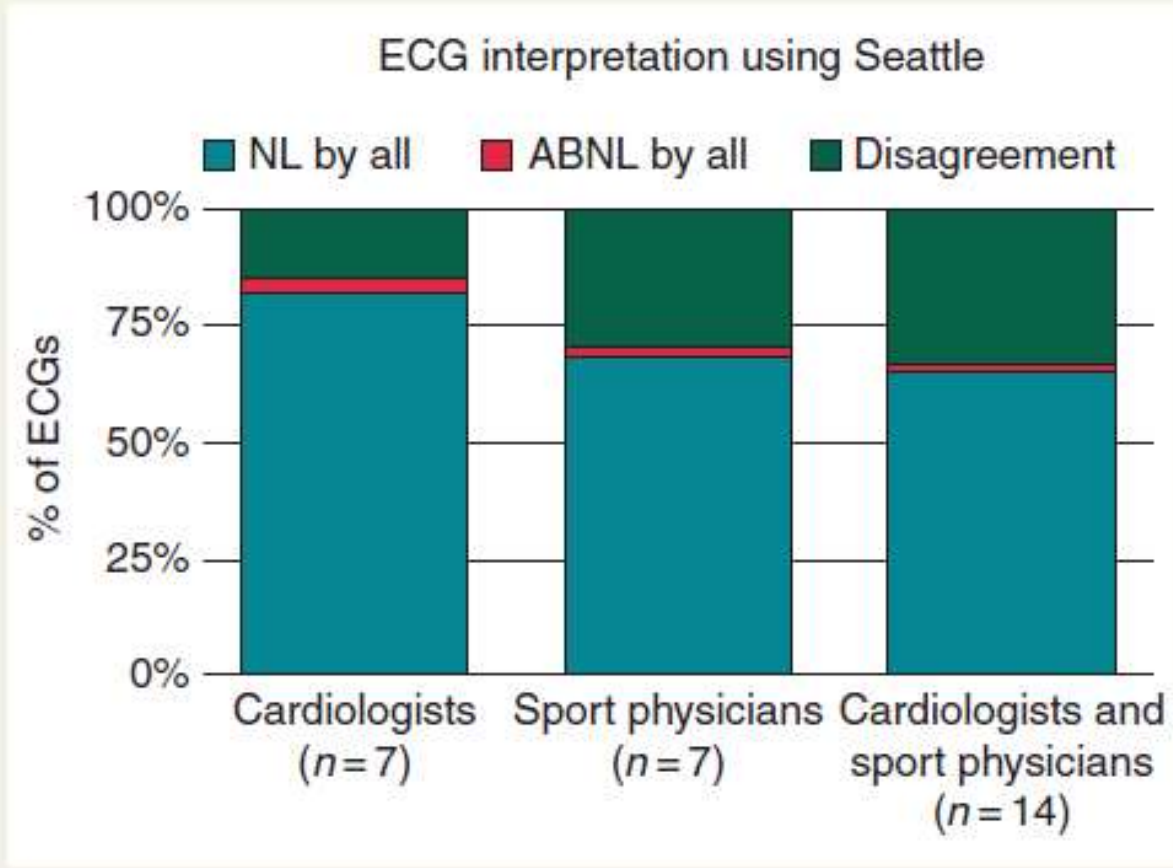


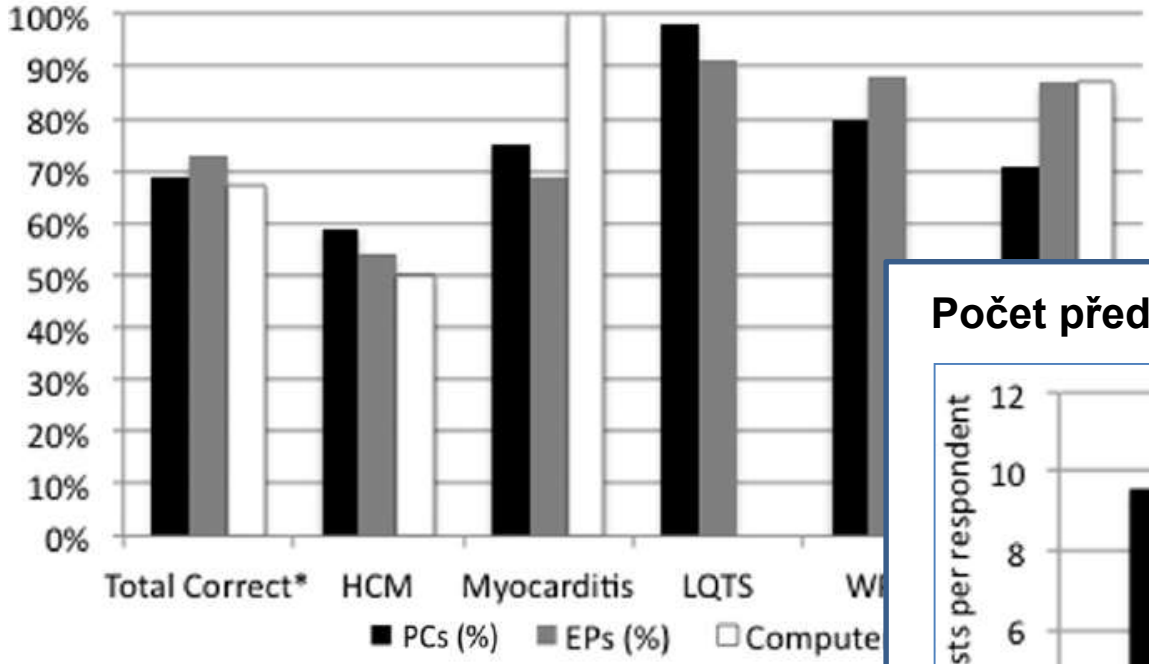
Figure 2 Electrocardiogram interpretation by cardiologists and sport physicians using Seattle criteria.

THE JOURNAL OF PEDIATRICS • www.jpeds.com CLINICAL AND LABORATORY OBSERVATIONS (J Pediatr 2013;163:1775-7).

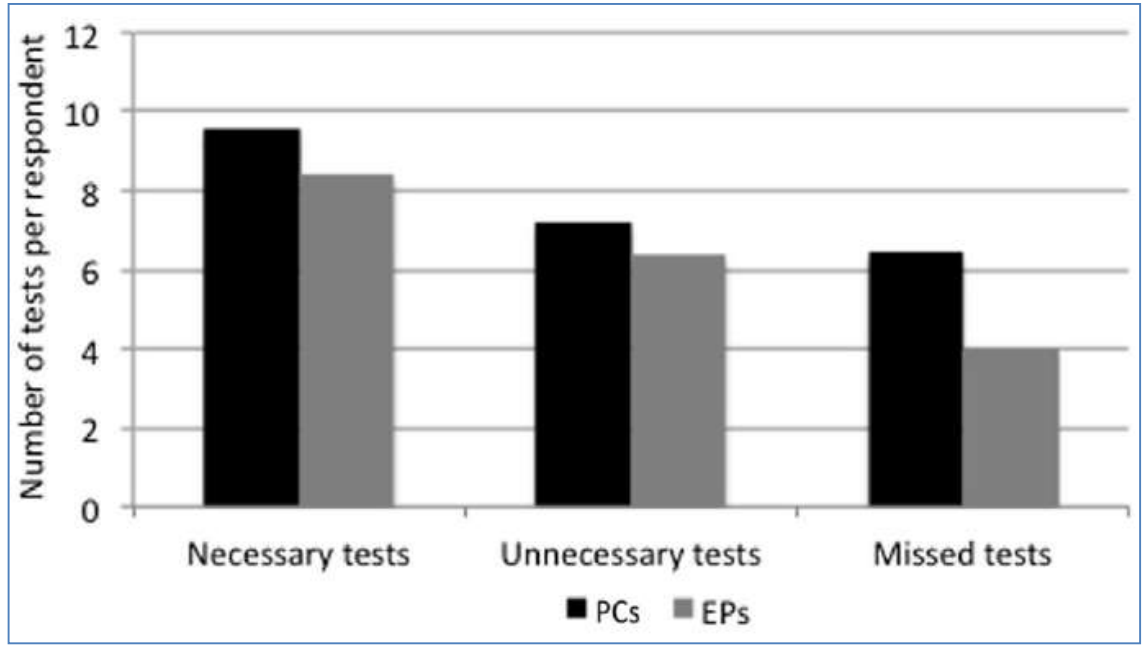
Do Pediatric Electrophysiologists Read Pre-Participation Screening Electrocardiograms More Accurately than General Pediatric Cardiologists?

Anna L. Harbison, MD[1], Allison C. Hill, MD[2], Kara S. Motonaga, MD[1], Christina Y. Miyake, MD[1], and Anne M. Dubin, MD[1]

Procento správné EKG interpretace

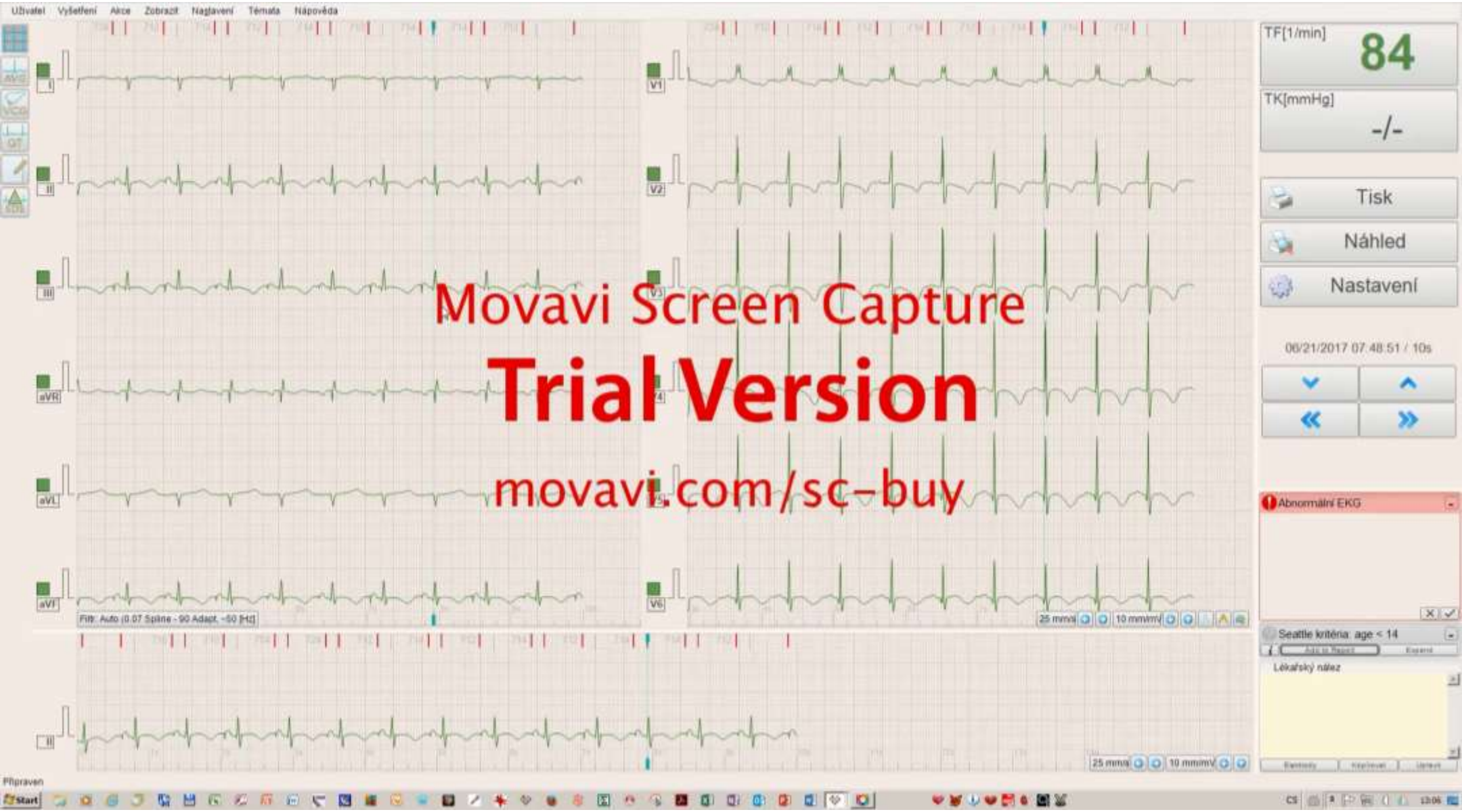


Počet předepsaných diagnostických testů/ 1 hodnotitel



Semi-automatická analýza EKG kritérií (BTL CardioPoint 2.23, Med. Technologies CZ, a.s.)

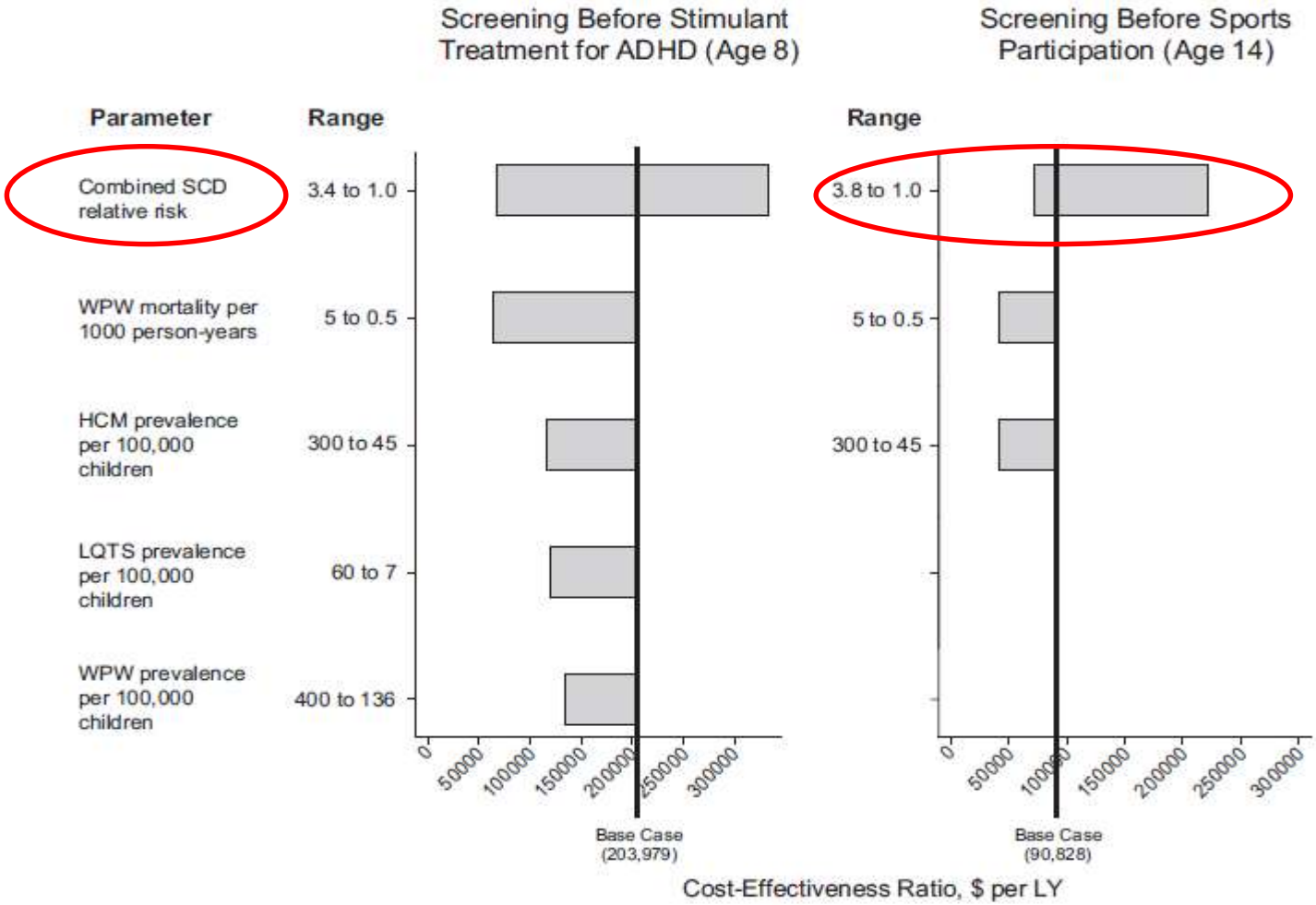
Projekt TAČR TA 02011258: Náhlá srdeční smrt u dětí a mladistvých



Costs and Benefits of Targeted Screening for Causes of Sudden Cardiac Death in Children and Adolescents

Circulation 2012

Laurel K. Leslie, MD, MPH; Joshua T. Cohen, PhD; Jane W. Newburger, MD, MPH; Mark E. Alexander, MD; John B. Wong, MD; Elizabeth D. Sherwin, MD; Angie Mae Rodday, MS; Susan K. Parsons, MD, MRP; John K. Triedman, MD



Předpoklady efektivního screeningu

Screening for Sudden Cardiac Death in the Young : Report From a National Heart, Lung, and Blood Institute Working Group *Kaltman JR et al. Circulation 2011*

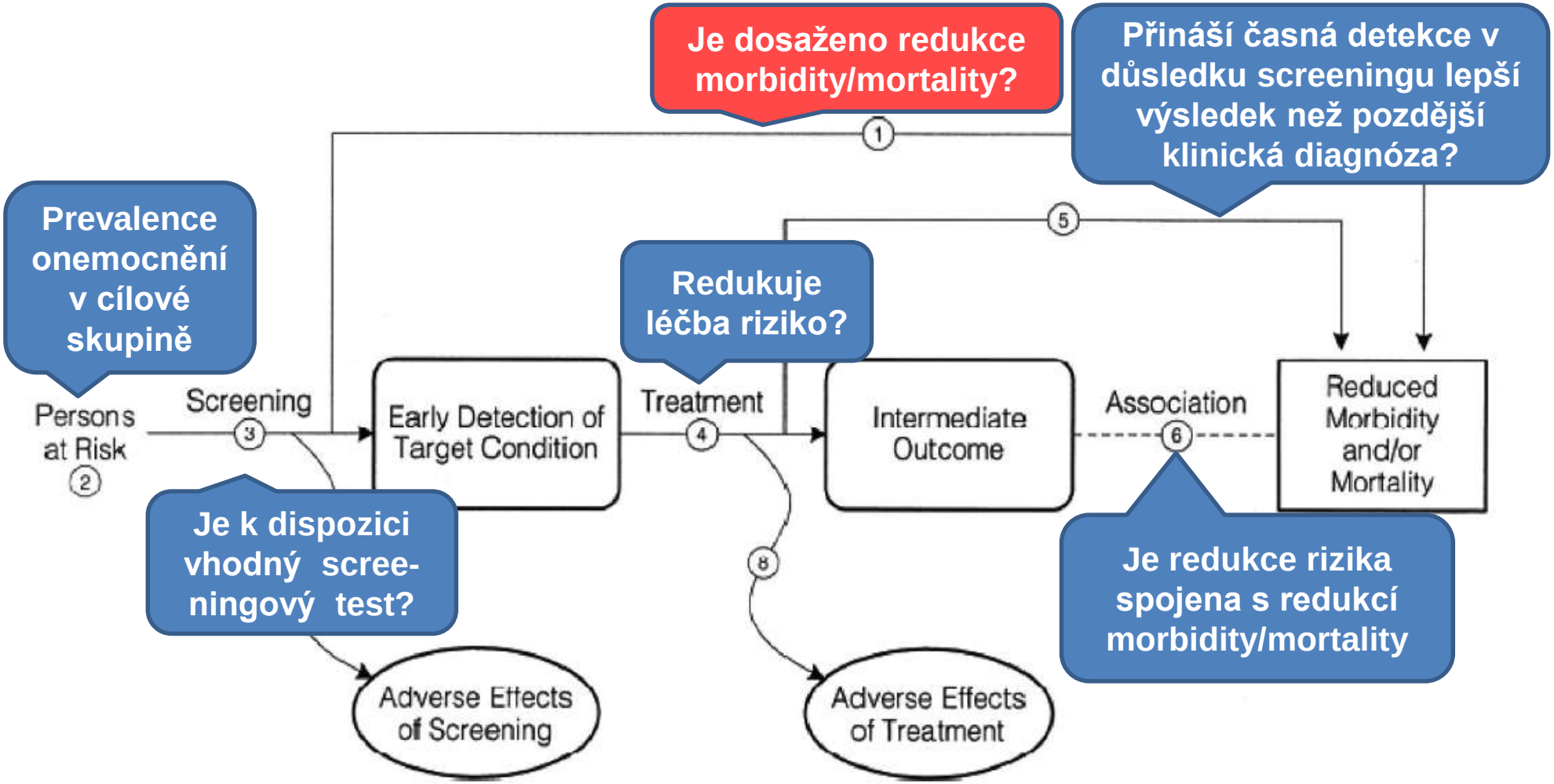


Figure. US Preventive Services Task Force's analytic framework for screening.

Sports-related sudden cardiac death: How to prove an effect of preparticipation screening?

HeartRhythm 2016

Bjarke Risgaard, MD, PhD, Jacob Tfelt-Hansen, MD, DMSc, Bo Gregers Winkel, MD, PhD

Perspektiva randomizované studie
(1-roční sledování)

the numbers of individuals required, assuming an 80% chance of detecting a change in the end point, is nearly 8 million athletes.[22]

22. Sealed Envelope | Power calculator for binary outcome superiority trial. https://www.sealedenvelope.com/power/binary-superiority/. Published January 18, 2015. Accessed February 5, 2016.

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
VOL. ■, NO. ■, 2014

ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2014.05.006
PUBLISHED BY ELSEVIER INC.

SCIENTIFIC STATEMENT

Assessment of the 12-Lead Electrocardiogram as a Screening Test for Detection of Cardiovascular Disease in Healthy General Populations

4. **Mandatory and universal mass screening with 12-lead ECGs in large general populations of young healthy people 12 to 25 years of age (including on a national basis in the United States) to identify genetic/congenital and other cardiovascular abnormalities is not recommended for athletes and nonathletes alike** ***(Class III, no evidence of benefit; Level of Evidence C).***

Europace (2017) 19, 139–163
doi:10.1093/europace/euw243

Pre-participation cardiovascular evaluation for athletic participants to prevent sudden death: Position paper from the EHRA and the EACPR, branches of the ESC. Endorsed by APHRS, HRS, and SOLAECE

However, the scope of the PPE is not merely limited to prevention of SCD but extends to the identification and appropriate management of those CV conditions that may worsen because of intensive athletic training, as well as PPE may be the time for primary prevention of CV disease and improvement of CV health

Protocol of the preparticipation evaluation

The protocol of PPE including clinical history, physical examination, and 12-lead ECG demonstrates to have superior diagnostic capability than just clinical history and physical examination

Europace (2017) 19, 139–163
doi:10.1093/europace/euw243

Pre-participation cardiovascular evaluation for athletic participants to prevent sudden death: Position paper from the EHRA and the EACPR, branches of the ESC. Endorsed by APHRS, HRS, and SOLAECE

Available data suggests that routine echocardiography or other imaging modalities do not add substantial diagnostic power to the PPE as a mass screening technique and do not appear to be cost/effective.

It goes far beyond the scope of the document to suggest global national PPE programmes.

Journal of Pediatric Cardiology and Cardiac Surgery 1(1): 45–48 (2017)

Review

〈Clinical Science: Sudden Cardiac Death〉

JSPCCS
特定非営利活動法人
日本小児循環器学会
Japanese Society of Pediatric Cardiology and Cardiac Surgery

Screening for Sudden Cardiac Death in Children: Useful Tool or Wishful Thinking?

Jan Janoušek, MD, PhD and Peter Kubuš, MD, PhD

- Dostupné studie nedokládají jednoznačně pozitivní efekt plošného EKG screeningu na snížení výskytu náhlé srdeční smrti u dětí a mladistvých
- Jiné strategie soutěžící o zdroje a potenciálně efektivnější
  - Rodinný screening u probandů s náhlou srdeční smrti/detekovanými maligními arytmiemi
  - Automatické externí defibrilátory

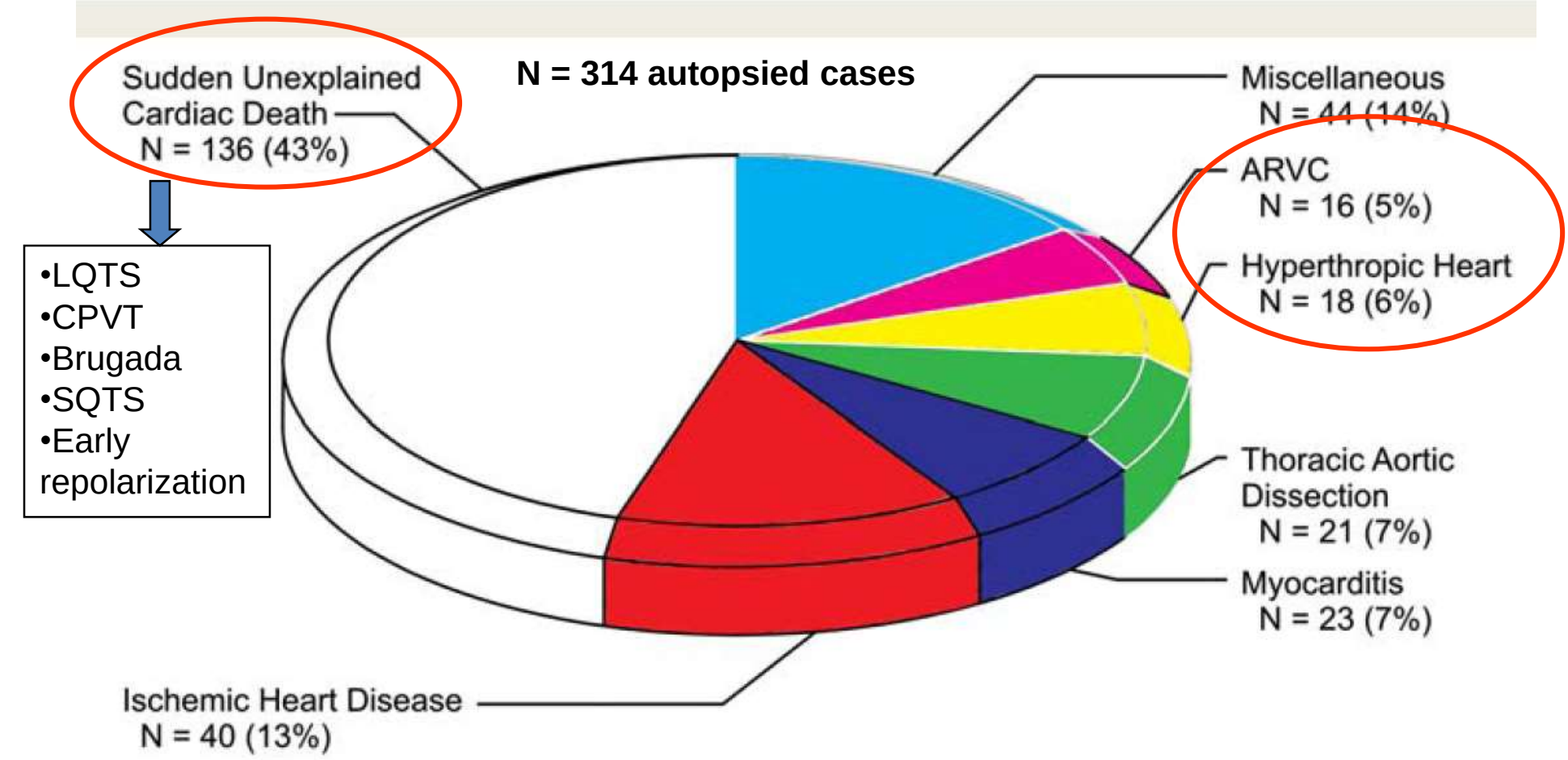
European Heart Journal (2011) 32, 983–990
doi:10.1093/eurheartj/ehq428

CLINICAL RESEARCH
Arrhythmia/electrophysiology

Nationwide study of sudden cardiac death in persons aged 1–35 years

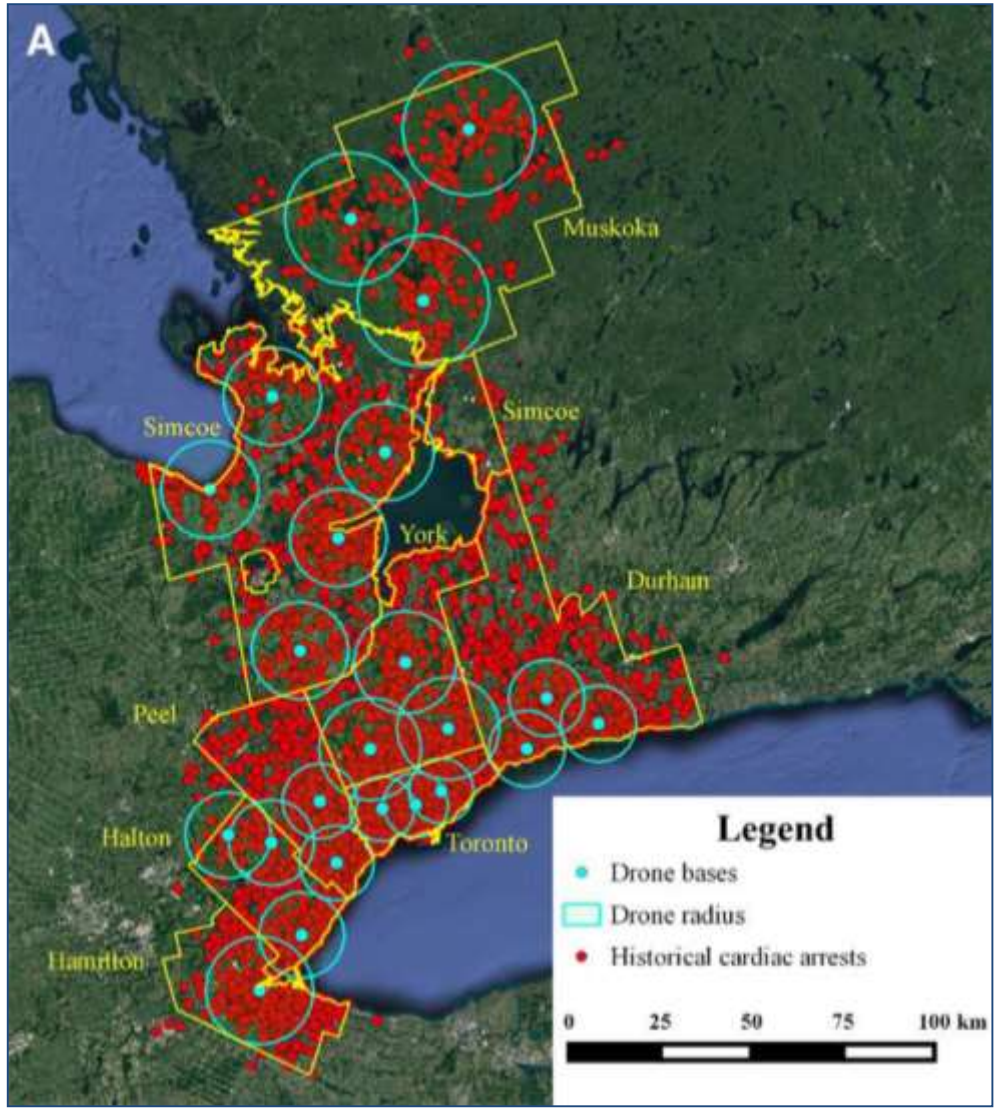
Bo Gregers Winkel[1,2*], Anders Gaarsdal Holst[1,2], Juliane Theilade[1,2],

Denmark, 2000-2006



Optimizing a Drone Network to Deliver Automated External Defibrillators

Justin J. Boutilier, BSc



Circulation. 2017;135:2454–2465.

Další směry

- Identifikace cílů
  - Detekce neklinického srdečního onemocnění x jedinců s rizikem NSS
- Kultivace EKG kritérií
  - Optimální balance mezi sensitivitou a specificitou
  - Automatizovaná EKG analýza
- Nelimitovat screening na sportovce?
- Zkoumání rizik screeningu
  - Náklady / Vyřazení ze sportu/ Psychologické následky
- Možnost falešně pozitivních nálezů musí být upřímně komunikována
  - Compliance se screeningem?
- Kontrolované studie v definovaných populacích/oblastech
  (kojenci, Japonsko, Philadelphie….)


HLEDÁTE JEHLU V KUPCE SENA?
V POHODĚ