



# To screen or not to screen for adolescent idiopathic scoliosis?

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## Adolescent Idiopathic Scoliosis (AIS)

- Three-dimensional curvature of the spine
- Severity measured with Cobb angle
- Prevalence:
  - Cobb angle  $\geq 10^\circ$ : 2-3% of adolescents
  - Cobb angle  $\geq 30^\circ$ : 0.01-0.3% of adolescents
- Treatment:
  - Cobb angle  $25^\circ$ - $45^\circ$ : brace
  - Cobb angle  $\geq 45^\circ$ - $50^\circ$ : surgery





## Screening for AIS

- Subject of debate for many years
- Points of criticism:
  - Inaccuracy of the screening test
  - Unpredictable natural history
  - Insufficient evidence for brace treatment →  
RCT: Weinstein 2013



## Criteria UK National Screening Committee

- Based on Wilson and Jungner's classic criteria
- 22 criteria:
  - The condition
  - The test
  - The treatment
  - The screening programme



## Methods

- Literature review:
  - January 2000 - April 2015
  - Systematic reviews or guidelines
  - PubMed: primary studies
  - Snowball method





## Methods

- Screening methods suitable for public health settings
  - Forward Bending Test (FBT)
  - Scoliometer
  - NOT Moiré topography

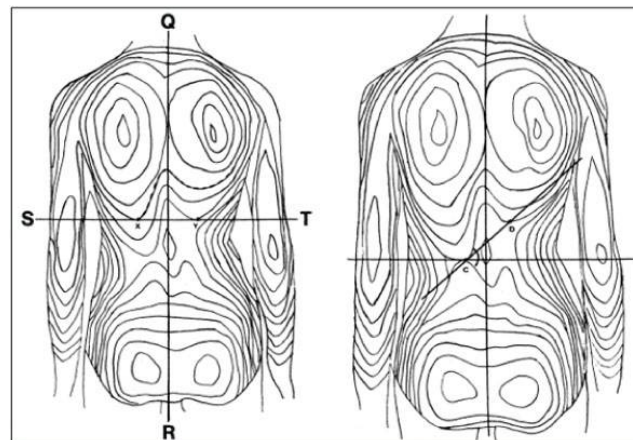
Normal spine



Deformity from scoliosis



ADAM.







## The condition

### ❖ *An important health problem*

- Prevalence:
  - Cobb angle  $\geq 10^\circ$ : 2-3% of adolescents
  - Cobb angle  $\geq 30^\circ$ : 0.01-0.3% of adolescents
- Treatment:
  - 10% of patients requires brace treatment
  - 0.1-0.3% of patients requires surgical treatment



## The condition

- ❖ *Epidemiology and natural history, including development from latent to declared disease, adequately understood*
- 5% of patients with Cobb angle  $\geq 10^\circ$  shows progression to  $\geq 30^\circ$
- Reliable prediction as to which curves will show progression not possible





## The test

- ❖ *A simple, safe, precise and validated screening test*
- Forward bending test + scoliometer: simple and safe
- Positive predictive values:
  - 5.6% for curves of  $>20^\circ$
  - 2.6% for (brace or surgical) treatment
- Sensitivity:
  - 64% for curves of  $>20^\circ$
  - 56% for (brace or surgical) treatment



## The test

- ❖ *Distribution of test values known and a suitable cut-off level defined and agreed*
- FBT: no referral values with high enough sensitivity and a specificity for screening
- High specificity will negatively influence the sensitivity and vice versa.



## The treatment

- ❖ *An effective treatment, with evidence of early treatment leading to better outcomes.*
- Brace treatment: subject of discussion
- RCT 2013 (Weinstein):
  - rate of treatment success
    - 75% after bracing
    - 42% after observation
- brace wear compliance



## The screening programme

- ❖ *Evidence from high quality RCT's that screening programme is effective (reducing mortality/morbidity)*
- No RCT's
- Case-control study:
  - 108 surgically treated patients, 216 healthy controls
  - Patients: higher chance brace treatment
  - More cases than controls were screened
    - 80.5% of cases
    - 74% of controls



## The screening programme

- ❖ *Benefit from the screening programme outweighs the physical and psychological harm*
- Negative effects of screening:
  - False positive results
  - False negative results
  - Monitoring in mild scoliosis (95% unnecessary)
- Negative results of (brace) treatment



## The screening programme

- ❖ *The screening programme should cost effective*
  - Costs per screened adolescent: \$0.62 to \$61.03
  - Costs per adolescent needing treatment: \$10,836
  - Keeping 1 patient from the need for surgery:
    - € 130,000
    - ±5800 children would need to be screened



## Conclusion

No evidence to support that screening has more beneficial effects than not screening

- Low validity of the screening test
- Unpredictable natural history
- Disadvantages: high number false positives/negatives
- Cost-effectiveness not clear





# Questions?



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