



To screen or not to screen for adolescent idiopathic scoliosis?

Jacqueline Deurloo¹
Paul Verkerk¹

1: TNO Child Health, Leiden, The Netherlands





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° - 45° : brace
 - Cobb angle $\geq 45^\circ$ - 50° : 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

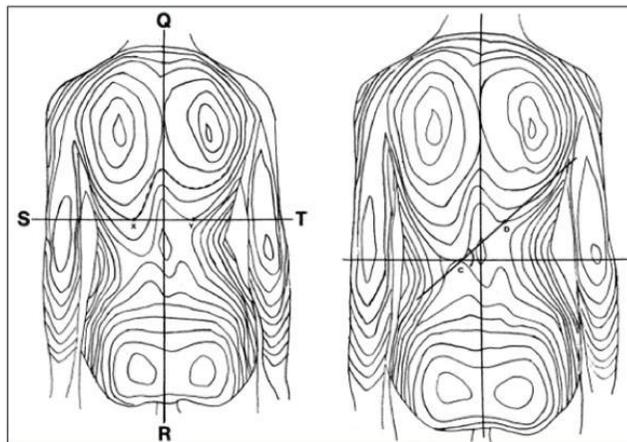
Normal spine



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?



Jacqueline.deurloo@tno.nl

Paul.verkerk@tno.nl