

# Cost and clinical effectiveness of the Hong Kong scoliosis screening programme

## Topic

The predictive value and cost-effectiveness of school screening for adolescent idiopathic scoliosis (AIS) has been challenged over the years. Unfortunately, these criticisms are often based on inadequately designed cross sectional studies. In 1995, the Hong Kong scoliosis screening programme was initiated by the Department of Orthopaedics & Traumatology of The University of Hong Kong, in collaboration with the Department of Health and later also the Chinese University of Hong Kong. Until now when we have financial support from the Research Grants Council/Central Policy Unit, the programme had not been systematically evaluated. Therefore, we aimed:

1. To estimate the cost of the Hong Kong scoliosis screening programme
2. To examine the clinical effectiveness of the screening programme
3. To study the epidemiology of scoliosis in Hong Kong
4. To examine if a more discriminative screening program can be performed on a more selected group of children
5. To study the outcome of screened cases, the cost of subsequent follow up and treatment



## Methods Used

We examined the detail data and followed up medical histories of a cohort of 115,190 students who were studying Primary 5 and screened in 1995/96 or 1996/97, up to their 19 years of age when they have completed their growth. The data were collected from the Duchess of Kent Children Hospital, Prince of Wales Hospital and Department of Health (DH) of Hong Kong.

## Summary of Findings

The total expenses in DH increased steadily from HK\$3 million in 1995/96 to HK\$19 million in 2005/06. The costs of screening and diagnosing 1 student during adolescence were HK\$140 and HK\$16, respectively. Of the 1311 referrals who attended the specialist hospitals for diagnosis, 264 and 39 had been braced and operated on, respectively. The medical care cost averaged HK\$270 per student screened.

Of the 115,190 screened students, 3228 (2.8%) were referred for radiography. Of which, 1406 (43.6%) had significant spinal curvature detected and 303 (9.4%) needed treatment. In students who had significant curvature treated in the specialist hospitals, 88.1% were detected by screening. Moreover, 80.0% of braced or operated students in the specialist hospitals were referred from the screening programme.

Among the 1406 students who displayed a significant spinal curvature during screening, 257 (18.3%) were boys and 336 (23.9%) were identified at 16 years or older, an observation against the previous suggestion of screening only 10-year-old girls. Skipping any currently used screening tests would run significant risk of a substantial reduction in the accuracy of the screening.

The prevalence of a significant spinal curvature during adolescence was 1.4%. Girls to Boys ratios were 4.5 for significant curvature. A risk classification rule identified four groups at different risk of curve progression was developed by using curvature at presentation, age, menarche status, and body height.

## Policy Implications and Recommendations

Based on a large group of students, the largest worldwide, who participated in the Hong Kong scoliosis screening programme and followed up longitudinally till age 19, we concluded that the programme is cost and clinically effective. Specifically, it outperforms screening programmes in other countries in its higher accuracy in detecting students with significant spinal curvature. Our study is the first that provides evidence based support for school scoliosis screening. These findings provide new and important information to the medical community, health authorities and international organisations with special interest in AIS. The screening protocol in Hong Kong could become a reference model for other countries, especially for the Chinese population. In addition, the classification rule derived from this study can discriminate patients at different risk levels of curve progression and help in the clinical management of the disorders.



## Selected publications Related to the Study

Fong DYT, Lee CF, Cheung KMC, Cheng JCY, Ng BKW, Lam TP, Mak KH, Yip PSF, Luk KDK. A meta-analysis of the clinical effectiveness of school scoliosis screening. *Spine* 35(10):1061-1071, 2010.

Luk KDK, Lee CF, Cheung KMC, Cheng JCY, Ng BKW, Lam TP, Mak KH, Yip PSF, Fong DYT. Clinical Effectiveness of School Screening for Adolescent Idiopathic Scoliosis: A Large Population-Based Retrospective Cohort Study. *Spine* 35(17):1607-1614, 2010.

Lee CF, Fong DYT, Cheung KMC, Cheng JCY, Ng BKW, Lam TP, Mak KH, Yip PSF, Luk KDK. Costs of School Scoliosis Screening: A Large Population-based Study. *Spine* 35(26):2266-2272, 2010.

Lee CF, Fong DYT, Cheung KMC, Cheng JCY, Ng BKW, Lam TP, Mak KH, Yip PSF, Luk KDK. Referral criteria for school scoliosis screening: Assessment and recommendations based on a large longitudinally followed cohort. *Spine* 35(25):E1492-1498, 2010.

## Biography of Principal Investigator

Daniel Y.T. Fong, Assistant Professor at the School of Nursing, The University of Hong Kong. His research interests are biostatistics in health research, adolescent idiopathic scoliosis, analysis and validation of patient reported outcomes, and inter-disciplinary research.