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## Scoliosis Screening: A Pause in the Chase

With well-intentioned enthusiasm, physicians and the public band together in crusades against disease. "Search-and-destroy" missions take shape to eradicate the preventable and to detect illness in silent stages before it compromises life or function, or disfigures the unsuspecting victim. The disease is evil; the hunters, good; the clarion sounds. What could be simpler?

But it is *not* simple. Screening carries its own forms of harm; the detection of disease is a blessing mixed with cost and anguish. Not all of those "detected" actually have the disease; not all of those who have the disease are helped by treatment; and not all of those helped by treatment would have escaped help but for the screening. The mere existence of unrecognized cases of illness is, by itself, insufficient reason to screen. The disease has many faces, and the hunt is not benign.

The paper by Morais, *et al,*[1] in this issue of the Journal reminds us again that the "search-and-destroy" reflex belongs in war movies, not in public policy. Scoliosis screening has spread dramatically in the United States since its earliest major demonstration projects,[2–4] and is now mandatory in many school systems. The result has been an increase in the number of children referred for specialty evaluations, follow-up examinations, and x-rays. Morais, *et al,* offer a quantitative analysis of the resulting referral rates and costs per treated case detected in the province of Quebec. They show that—as has been the case in other series—scoliosis significant enough to be treated is found in only one in 20 of the children with positive screenings, and that over one-third of the children referred for orthopedic examination are found to be entirely normal. Morais, *et al,* estimate the cost per treated scoliosis case at about $3,500 in 1979 Canadian dollars, and they judge school screening for scoliosis to be "not justified".

In fact, these researchers almost certainly *overestimate* the yield of screening, and *underestimate* the cost. The true yield of a screening effort is in the identification of cases which would have remained undetected without screening, or would have surfaced at a time when treatment would be less effective or more costly. Without much doubt, some of the cases found in the scoliosis screening program would have been found by pediatricians, parents, or through other means in a timely fashion. Thus the screening program cannot legitimately take credit for every case found; indeed, those patients who complied with follow-up after screening might well include those who would have been the most likely to discover the condition on their own.

The costs reported in the present paper are mainly the so-called direct costs: screening tests and diagnostic procedures. Not calculated explicitly are other resources used, such as the time of patients and families, later follow-up and treatment costs, and the psychological morbidity of those who worry unnecessarily about insignificant curves.[5]

The Morais paper, coupled with previous work, should fuel skepticism about the widespread adoption of mass scoliosis screening.[6,7] The costs and benefits deserve careful scrutiny and their estimation demands better data before the screening bandwagon rolls much further.

*Who benefits from scoliosis screening?* Enthusiasm for early detection of scoliosis rests largely on population-based demonstration data showing a decrease in back surgery rates as screening programs come into force[4]; the notion is that earlier detection permits bracing of curves which otherwise would have required surgery. However, that is only one plausible interpretation of the changing spectrum of

treatment; subtle changes in indications for surgery, for example, could produce the same shift in surgery rates.

Non-surgical treatment raises other issues. Bracing is not useful in all cases, and not all children who are braced would have developed functional or significant cosmetic problems without early bracing.[8,9] Some curves are stable, and some even regress spontaneously. Even those whose curves are arrested by bracing would in many cases have done equally well if they had been detected later without a screening program. As we evaluate screening for scoliosis, we must remind ourselves that the benefit of screening is not in detection alone but in the *advantageous early application of effective treatments*.

*Who is harmed?* The potential morbidity of labeling people with insignificant conditions has been documented for both heart murmurs[10] and hypertension.[11,12] The vast majority of children with positive forward bending tests on scoliosis screening have curvatures of no current or future significance, and yet they and their parents must adapt to a new label with the potential for insult to self-image and peace of mind. Enthusiasts for screening programs frequently underestimate the cost of false positive findings, and overestimate the benefit of true positives. If we define scoliosis to mean curvatures which compromise function or appearance without treatment, *almost all children with positive scoliosis screenings are false positives*.

One additional form of harm may accrue to children who do, indeed, have moderate curvatures but not severe enough to require bracing. In the Quebec experience, 51.7 per cent of the children with scoliosis were advised to do exercises. Are these children best thought of as false positives or as true positives? The answer should depend on the true effectiveness of exercise as a treatment for these curves. These children and families probably get the message that they have an abnormality and should engage in this therapy for their own good. But what evidence do we have that this invasion of the peace and comfort of the daily routine of these families has value? The effectiveness of exercise has, in fact, not been tested with rigor sufficient to prove its worth, and yet over 2 per cent of the entire screened population was placed on this treatment!

We may well have better uses for our time and dollars than screening for scoliosis. To make rational policy, we at least need better data on the psychological morbidity for false positives, the effectiveness of treatment of moderate curves, the worth of exercises, and the *marginal* contribution of screening compared with spontaneous detection rates. Without such data, the hunt is as likely to be leading us into the swamp as toward our quarry.

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# Maternal Serum AFP: Educating Physicians and the Public

Maternal serum alpha-fetoprotein (MSAFP) screening for neural tube defects seems to have come of age in the United States; but its genesis has ensured that its young adulthood will be a troubled one. A number of US centers already have considerable experience with MSAFP.[1] About one in every 700 (1 to 2 in 1,000) live births in the US is affected with a neural tube defect, the two major forms being anencephaly and spina bifida. Couples who have previously had an affected child have a 2–3 per cent risk of recurrence; but 90–95 per cent of all neural tube defects occur in families without such a history. Accordingly, an effective screening test for neural tube defects would have to screen all pregnant women. MSAFP, which measures elevated levels of alpha-fetoprotein in the pregnant woman's blood (usually at 16–18 weeks of gestation calculated from the first day of the last menses) is such a test. Unfortunately it does not detect all cases of neural tube defects, and while only 1 to 2 of every 1,000 pregnant women will be carrying an affected fetus, approximately 50 will show an elevated AFP level.

Because of these statistics, and the need for careful counseling and expert follow-up of all women with elevated levels (a multistage protocol is generally employed which consists of a retest if the initial value is elevated; followed by an ultrasound examination if the retest is also elevated; and then followed by an amniocentesis if the ultrasound does not provide an explanation for the serially elevated values, e.g., underestimation of gestational age, multiple pregnancy), considerable caution has been exercised in recommending this test be routinely performed only when adequate counseling and follow-up services are available. For example, while endorsing routine AFP testing for women "prone to these defects" (i.e., a positive family history), the American College of Obstetricians and Gynecologists (ACOG) concluded, in October 1982, that "routine maternal serum AFP screening of all gravida is of uncertain value" and that in areas where appropriate counseling and follow-up services are not available, "the program should not be implemented."[2]