Screening for Chest Disease in College Students: Policies of Student Health Services Regarding the Use of Routine Screening Chest Radiographs and Tuberculin Skin Tests

SAMUEL S. FAGER, MD, GAIL B. SLAP, MD, DEBORAH S. KITZ, BA, AND JOHN M. EISENBERG, MD, MBA

Abstract: We conducted a survey of college health services to determine their policies regarding the use of screening chest radiographs and tuberculin skin tests. Pre-enrollment chest radiographs are prescribed for all incoming students by 24 per cent of the 531 respondents and for health professions students, foreign students, and intercollegiate athletes only by an additional 20 per cent, 19 per cent, and 6 per cent, respectively. Periodic chest radiography is conducted for all students by 7 per cent of the respondents and for health professions students, foreign students, and intercollegiate athletes only by an additional 22 per cent, 16 per cent, and 8 per cent, respectively. Pre-enrollment tuberculin skin tests are prescribed for all incoming students by 52 per cent of the respondents and for health professions students, foreign students, and intercollegiate athletes only by an additional 48 per cent, 29 per cent, and 9 per cent, respectively. Periodic tuberculin skin testing is conducted for all students by 27 per cent of the respondents and for health professions students, foreign students, and intercollegiate athletes only by an additional 48 per cent, 23 per cent, and 16 per cent, respectively. We estimate from these data that 723,000 incoming students in the United States received screening chest radiographs in 1979 with estimated charges totaling between $7 million and $27 million. There may be 0.05 to 0.33 induced cases of lung cancer, leukemia, thyroid cancer, and female breast cancer over a 20-year period among this group of students exposed to ionizing radiation. (Am J Public Health 1984; 74:143-146.)

Introduction

Chest radiographs account for $1.5 billion of health care costs and 45 per cent of all radiologic studies performed in the United States.1 Concern about the cost of medical care and the biologic risk of diagnostic radiation has led numerous authors to question the value of widely used screening and diagnostic radiologic procedures.2-4 In particular, several authors have suggested that screening chest radiographs in pediatric and young adult populations are not clinically useful.5-8 The marked decrease in the incidence of tuberculosis in the past 50 years9 and the availability of standardized tuberculin skin tests10 have made chest radiography unnecessary as a screen for tuberculosis.

This study was designed to: determine the policies of American colleges and universities regarding the use of screening chest radiographs and tuberculin skin tests; and estimate the economic and health impacts of performing these radiographs.

Methods

A questionnaire was sent to the directors of 624 student health services listed by the American College Health Association. Institutions that did not respond to two mailings of the questionnaire were sent postcards asking only whether
Results

Questionnaires were completed by 408 (65 per cent) institutions and another 123 (20 per cent) institutions returned postcard responses. The total number of respondents was 531 (85 per cent). No significant differences in mean student body size were found among the three groups of schools: those that completed the questionnaire, those that returned the postcard response, and those that did not respond to the survey. Of the 408 questionnaire responses, 178 were completed by physicians, 202 by nurses, and 38 by other personnel. Information was not available on who completed the remaining 113 questionnaires. Student's t-test of proportions indicated that there were no differences between questionnaire and postcard respondents regarding screening policies for all incoming students.

Separate items on the questionnaire and postcard asked about the requirements and recommendations for pre-enrollment radiographs and tuberculin skin tests. However, some respondents indicated that their institutions both require and recommend screening. Because of this apparent confusion, we assumed that incoming students at institutions that recommend screening obtained the test. In addition, in order to avoid confusion for the reader, we refer to these policies as "prescribe screening" for the remainder of the article. All analyses were performed on this combined response.

Chest Radiographs

Table 1 indicates that pre-enrollment chest radiographs are prescribed for all incoming students by 127 respondents (24 per cent). Fifty-two institutions require screening chest radiographs, 11 require and recommend the radiographs, and 64 schools only recommend radiographs. Among the special groups of incoming students, chest radiographs are most frequently prescribed for health professions and foreign students.

Periodic chest radiographs for all students are prescribed by 28 respondents. In addition, when periodic chest radiographs are prescribed for specific groups of students, incoming health professions students are the most frequently targeted group for this screening (Table 2).

Of the 408 questionnaire respondents, 94 (23 per cent) answered that they believe the radiographs to be useful in detecting disease in student health populations. The clinical problems indicated as likely to be detected were tuberculosis by 91 respondents (22 per cent), cardiomegaly by 61 (15 per cent), lung cancer by 48 (12 per cent), congenital heart defects by 46 (11 per cent), fungal disease by 38 (9 per cent), connective tissue disease by 30 (7 per cent), and adenopathy by 29 (7 per cent). Pre-enrollment screening chest radiographs were thought to be useful for establishing baseline data by 108 questionnaire respondents (26 per cent) and for legal protection by 54 (13 per cent).

We estimate that, in 1979, 723,000 incoming students at United States colleges and universities received screening chest radiographs. The estimated range of expenses for these radiographs is $7,233,000 to $26,764,000. We estimated that 0.3 or fewer induced cases of lung cancer, leukemia, thyroid cancer, and female breast cancer will occur among the 723,000 students over a 20-year period as a result of receiving the chest radiograph.

Tuberculin Skin Tests

As shown in Table 3, tuberculin skin tests are prescribed for all incoming students by 274 respondents (52 per cent). Tuberculin skin tests are required by 190 institutions, required and recommended by 40 institutions, and recommended by 44 institutions. Of the questionnaire respondents who do not prescribe screening for all students, 83 (48 per cent) indicated that their institutions also prescribe pre-enrollment skin tests for health professions students.

Periodic tuberculin skin tests are prescribed for all students by 111 institutions (27 per cent). When periodic screening is conducted for particular groups of students, health professions students are most frequently screened (Table 4).

Discussion

The results of our study indicate that, despite evidence that screening chest radiographs for young adults is not efficacious, pre-enrollment and periodic radiographic screening remain prevalent in United States colleges and universities.

Studies which have evaluated screening programs for the general population have found that chest radiographs rarely detect treatable conditions or conditions which require medical intervention.4,7-20 In hospitalized patients under 29 years of age, no serious new abnormalities were found or only suspected abnormalities were confirmed.5,21 Routine chest radiographs of children hospitalized for non-trauma or non-thoracic surgical procedures rarely detected abnormalities that were clinically significant or were not

<table>
<thead>
<tr>
<th>TABLE 1—Policy of Institutions on Pre-enrollment Chest Radiographs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prescribe Pre-Enrollment Chest Radiograph</strong></td>
</tr>
<tr>
<td><strong>Number of Institutions</strong></td>
</tr>
<tr>
<td>All Incoming Students</td>
</tr>
<tr>
<td>Health Professions Students</td>
</tr>
<tr>
<td>Foreign Students</td>
</tr>
<tr>
<td>Intercollegiate Athletes</td>
</tr>
<tr>
<td>Other Groups</td>
</tr>
</tbody>
</table>

*For all incoming students, based on 531 responses to questionnaire and postcard. For all other categories, based on 408 responses to questionnaire.

**Percentages for specific groups of students were calculated based on the number of schools that screen specific groups but do not screen all students. For example, 20% of schools that do not screen all students do screen health professions students.

***Institutions that screen all incoming students or do not enroll students in specific groups.
suspected from the history and physical examination.22-24 Of
11,000 screening chest radiographs performed on students at
one university, only five cases of serious disease were
found; the authors concluded that screening chest radiographs
should not be used for college students.3 Finkel suggests that screening chest radiographs may be appropri-
ate for students from lower socioeconomic groups but are
not justified for all incoming students.15-16

The American Thoracic Society recommends that the
PPD-Mantoux skin test, not chest radiographs, be used for
tuberculosis screening and that only high-risk individuals
receive repetitive, routine screening.25 Despite this recom-
mand, over half (52 per cent) of the schools in our survey screen all incoming students and over one-fourth (27
per cent) screen all students periodically.

There are four potential biases in this study. First, we
assumed that all students entering institutions that recom-
mended chest radiographs actually received radiographs.
Although we may have over estimated the number of stu-
dents receiving the radiographs, it was our intention to
determine the potential impact of student health service
policies if these policies were implemented.

Second, we did not calculate nationwide estimates of the
number of incoming health professions, foreign, or
intercollegiate athlete students who received chest radi-
graphs. Nor did we estimate the number of students who
have periodic radiographic screening. Therefore, we may
have underestimated the number of students exposed to
chest radiographs and the expenses associated with these
examinations.

Third, it is possible that the screening policies of non-
respondents are different from those of respondents. Given
the 85 per cent response rate, however, it seems likely that
our results do reflect policies at American institutions. It
also is possible that policies of institutions that are affiliated
with the American College Health Association are different
from policies of institutions that are not affiliated with this
organization. There are approximately 3,200 colleges and
universities in the US.11 Since there is a great diversity in
the size of student bodies, location, and organization of the
student health services among ACHA-affiliated institutions,
it seems unlikely that the 624 institutions included in our
survey significantly misrepresent the characteristics of all
colleges and universities.

Fourth, the estimated cost may be greater than the true
economic cost of screening and may be less than charges for
chest radiography in some communities.

Despite these potential biases, our results suggest that
many students are receiving chest radiographs at substantial
cost with questionable benefits. Furthermore, many stu-
dents at low risk for tuberculosis continue to receive repeti-
tive, routine tuberculosis skin testing.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Institutions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Incoming Students</td>
<td>531</td>
</tr>
<tr>
<td>Health Professions Students</td>
<td>408</td>
</tr>
<tr>
<td>Foreign Students</td>
<td>408</td>
</tr>
<tr>
<td>Intercollegiate Athletes</td>
<td>408</td>
</tr>
<tr>
<td>Other Groups</td>
<td>408</td>
</tr>
</tbody>
</table>

*For all incoming students, based on 531 responses to questionnaire and postcard. For all other categories, based on 408 responses
to questionnaire.

**Percentages for specific groups of students were calculated based on the number of schools that screen specific groups but do not
screen all students. For example, 48% of schools that do not screen all students do screen health professions students.

***Institutions that screen all incoming students or do not enroll students in specific groups.

TABLE 2—Policy of Institutions on Periodic Chest Radiographs (N = 408)

<table>
<thead>
<tr>
<th>Group</th>
<th>Prescribe</th>
<th>Require or Recommend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annually</td>
<td>Biannually</td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>All Incoming Students</td>
<td>7 (2)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Health Professions Students</td>
<td>56 (11)</td>
<td>10 (3)</td>
</tr>
<tr>
<td>Foreign Students</td>
<td>26 (4)</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Intercollegiate Athletes</td>
<td>11 (3)</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Other Groups</td>
<td>8 (2)</td>
<td>4 (1)</td>
</tr>
</tbody>
</table>

*Institutions that do not enroll students in specific groups or did not complete the question were excluded from the calculations.

**Percentages for specific groups of students were calculated based on the number of schools that screen specific groups but do not screen all students. For example, 22% of schools that do not periodically screen all students do periodically screen health professions students. Rounding accounts for differences between the actual sum of percentages and total percentage listed.

TABLE 3—Policy of Institutions on Pre-enrollment Tuberculin Skin Tests

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Institutions*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prescribe Pre-Enrollment Tuberculin Skin Test</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>All Incoming Students</td>
<td>531</td>
</tr>
<tr>
<td>Health Professions Students</td>
<td>408</td>
</tr>
<tr>
<td>Foreign Students</td>
<td>408</td>
</tr>
<tr>
<td>Intercollegiate Athletes</td>
<td>408</td>
</tr>
<tr>
<td>Other Groups</td>
<td>408</td>
</tr>
</tbody>
</table>

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screen all students. For example, 48% of schools that do not screen all students do screen health professions students.

***Institutions that screen all incoming students or do not enroll students in specific groups.

TABLE 4—Policy of Institutions on Periodic Tuberculin Skin Tests (N = 408)

<table>
<thead>
<tr>
<th>Group</th>
<th>Require or Recommend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
</tr>
<tr>
<td>All Incoming Students</td>
<td>35 (9)</td>
</tr>
<tr>
<td>Health Professions Students</td>
<td>97 (35)</td>
</tr>
<tr>
<td>Foreign Students</td>
<td>26 (9)</td>
</tr>
<tr>
<td>Intercollegiate Athletes</td>
<td>23 (8)</td>
</tr>
<tr>
<td>Other Groups</td>
<td>25 (9)</td>
</tr>
</tbody>
</table>

*Institutions that do not enroll students in specific groups or did not complete the question were excluded from the calculations.

**Percentages for specific groups of students were calculated based on the number of schools that screen specific groups but do not screen all students. For example, 48% of schools that do not periodically screen all students do periodically screen health professions students. Rounding accounts for differences between the actual sum of percentages and total percentage listed.
REFERENCES


ACKNOWLEDGMENTS

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1984 International Study Tour to Japan: A Focus on Health and Aging

An international study tour to Japan will be conducted July 11-25, 1984. A comprehensive view of the health care system with an emphasis on services for the older adult in Japan will include visits to the Metropolitan Tokyo Research Institute for the Aged, National Institute of Public Health, Ministry of Health, Life Planning Center, Universities, Hospitals, Public Health Departments, and Long Term Care Facilities. The study tour will be co-directed by Dr. Geri Marr Burdman, University of Washington and Drs. Kiyoka Koizumi and Margaret F. Dosch, University of Wisconsin. Continuing education credit available for health and social service professionals. For further information, contact:

Dr. Margaret F. Dosch
Mitchell Hall, Room 206
University of Wisconsin-La Crosse
La Crosse, WI 54601
608/785-8162