Source of Admissions for Tuberculosis to Five Massachusetts Sanatoriums

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DESPITE the downward spiral of tuberculosis over the past few decades this disease cannot yet be disregarded as a public health problem. In Massachusetts, for example, 1,097 new active cases were reported during 1963. Furthermore, 2,456 patients were admitted to tuberculosis sanatoriums for diagnosis or treatment during that year. Notwithstanding the social and economic losses to the patients, their families, and their communities, this represents a cost of $6,655,000 solely for hospitalization, according to data of the statistical and fiscal sections, State division of tuberculosis control. In addition, there is the financial burden of community control activities borne by official and voluntary health agencies.

Yet the rapid decrease in tuberculosis among the general population has necessitated major changes in the approach to tuberculosis control. As in the final stages of any disease, each individual case assumes greater significance. Mass techniques, such as the familiar community X-ray surveys, are no longer applicable to present-day disease patterns. Emphasis must now be placed on careful epidemiologic investigation of each new case and close supervision of those already known. The tools are at hand to make the eventual eradication of tuberculosis in the United States a definite possibility if appropriate control measures are taken (*1*).

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In an effort to develop case-oriented programs suited to current needs, the division of tuberculosis control, Massachusetts Department of Public Health, undertook an analysis of factors leading to recognition and hospitalization of tuberculosis patients. It was hoped that the analysis would bring into focus areas where concentration of efforts would yield more productive casefinding and earlier diagnosis with consequently shorter periods of hospitalization and disability. The following information was sought on each patient: age, sex, source of referral to sanitorium, duration of symptoms prior to admission, bacteriological status on admission, and history of contact with tuberculosis cases.

Selection of Sample and Review of Cases

Virtually all tuberculosis patients in Massachusetts are hospitalized in five regional sanatoriums. Since there is no charge to patients in these hospitals, the cost being shared by the State and the place of residence, few patients are hospitalized privately. The only Veterans Administration facility for such patients in the State was closed several years ago.

The sample of 274 patients in this study was drawn from the population of the five sanatoriums with the exception of the pediatric unit. No attempt was made to differentiate between hospitals; rather, it was decided to have each hospital contribute an approximately equal rather than a proportionate number of patients so that the results would not be weighted in favor of the larger sanatoriums. All patients in

the study were hospitalized at some point between February 1 and April 30, 1964. In four hospitals patients were selected alphabetically from central or ward inpatient records. In the fifth, this method would have introduced considerable bias, since new patients and old patients are separated upon admission and not assigned to beds at random as in the other hospitals. Instead, consecutive admissions for February 1964 were chosen for review.

Following are the numbers of patients from each hospital: Boston Sanatorium, 51; Middlesex County Sanatorium, 60; Norfolk County Sanatorium, 50; Worcester County Sanatorium, 53; Western Massachusetts Hospital, 60. The variation in numbers is due to the fact that records were pulled to the completion of an alphabetical section.

That this is a representative sample, at least in terms of age and sex, is shown by comparison with the total sanatorium admissions for 1963 (table 1). Differences between the samples and this universe were within the range of expected error.

Information for the study was obtained from the admission data, the patients' history, and the initial laboratory reports included in the hospital record.

Results

Source of referral. Eight general categories of sources of referral were found on review of the records. The categories are listed in decreasing order of occurrence in table 2.

The majority of patients were discovered because they had sought medical attention for symptoms referrable to tuberculosis. In fact, 66.8 percent of the 178 with previously unsuspected disease were first identified this way. The second largest group (31.8 percent) were ex-patients who showed evidence of reactivation during subsequent supervision. Together, these two categories comprised three-fourths of the sample group.

Screening programs of all kinds yielded only 12.8 percent of all admissions and 19.8 percent of the previously unrecognized cases, with each type of survey contributing very little.

Had children been included, the number of patients identified as the result of contact exam-

Table 1. Comparison of study sample with all 1963 admissions to Massachusetts sanatoriums, by age and sex

Age in years	Males				Females			
	Sample		All admissions		Sample		All admissions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
15–19	1	0. 4	13	0. 6	3	1. 1	20	0. 9
20–24	5	1. 8	31	1. 3	5	1. 8	35	1. 5
25–29	4	1. 5	45	1. 9	4	1. 5	43	1. 8
30–34	6	2. 2	65	2. 8	7	2. 5	47	2. 0
35–39	7	2. 6	92	3. 9	5	1. 8	40	1. 7
40–44	17	6. 2	128	5. 4	8	2. 9	66	2. 8
45–49	16	5. 8	189	8. 0	7	2. 5	55	2. 3
50–54	28	10. 2	244	10. 3	4	1. 5	58	2. 3
55–59	32	11. 6	262	11. 1	5	1. 8	47	2. 0
60–64	34	12. 4	252	10. 7	8	2. 9	37	1. 6
65–69	15	5. 5	127	5. 4	7	2. 5	38	1. 6
70–74	14	5. 1	159	6. 7	1	. 4	28	1. 2
75–79	12	4. 4	87	3. 7	4	1. 5	40	1. 7
80 or more	6	2. 2	69	2. 9	6	2. 2	37	1. 6
Unknown	3	1. 1	9	. 4	0		2	. 1
Total	200	72. 9	1, 772	74. 9	74	27. 1	593	25. 1
Mean age	56. 3		55. 8		50. 3		50. 2	
Median age	57. 5				48. 5			

Table 2. Source of referral of patients in study sample

Source of referral	Number	Percent	Previously unrecognized	Percent of previously unrecognized
Physician, because of symptoms	119	43.4	119	66.8
Ex-patient routinely followed by sanatorium	87	31.8	----	----
Routine chest film survey	35	12.8	35	19.8
Hospital admission program	13	4.8	----	----
Employee health program	9	3.3	----	----
Nursing home survey	4	1.5	----	----
Part of routine physical examination	3	1.2	----	----
Community X-ray survey	2	.7	----	----
X-ray survey of jails	2	.7	----	----
School personnel certification	1	.4	----	----
X-ray survey of State mental hospitals	1	.4	----	----
Examined as contact to person with active tuberculosis	10	3.6	10	5.6
Tuberculosis found incidentally on X-ray for other reasons	9	3.3	9	5.0
Routinely followed for suspicious X-ray findings	6	2.1	----	----
Alien with known or suspected tuberculosis admitted by arrangement with Department of Immigration	4	1.5	1	.6
Self-referral for X-ray because of symptoms	4	1.5	4	2.2
Total	[1] 274	100.0	178	100.0

[1] Includes 178 persons with previously unrecognized tuberculosis including new diagnoses and ex-patients lost to supervision.

ination would undoubtedly be higher. Reports from the Los Angeles City Health Department (*2*) and the Public Health Service (*3*) indicate that examination of contacts yields two to three times as many children as adults. When figures for adults only are used, the number of contact cases in this study compares favorably with that in the Public Health Service study. Thus although the 10 cases, or 3.6 percent, seems a small number at first glance, it probably does not reflect a lack of thoroughness of contact followup but rather a deficiency in the study itself.

Seventeen of those discovered because of symptoms or suspicious X-ray findings either were ex-patients or had had evidence of pathology in the past but had for one reason or another been lost to supervision.

Duration of symptoms. Information on the duration of symptoms was taken from the patient's admission history and is undoubtedly affected by the tendency of human memory to distort time. Since the error is usually one of underestimation rather than overestimation, the actual duration of symptoms may well be longer than that the patients reported. The data (table 3) were obtained only for persons who were not under supervision at the time of diagnosis, that is, newly diagnosed patients and ex-patients lost to supervision.

Although close to one-third of the patients did not date the start of their illness, the impression left by many of their histories was one of vague symptoms over a prolonged, indefinite period. Such phrases as "chronic productive cough, gradual weight loss, and increasing fatigue for a long time" were typical. One-fourth of the patients were asymptomatic when discovered either through surveys or incidentally. Of the remainder, more than half had been ill to some degree for 3 months or more before admission. A dramatic episode, such as hemopty-

Table 3. Duration of symptoms before admission of patients with previously unsuspected tuberculosis in study sample

Duration of symptoms	Patients	
	Number	Percent
None	45	25.0
Less than 1 week	4	2.3
1–4 weeks	17	9.7
1–3 months	15	8.5
3–6 months	12	6.8
6–12 months	12	6.8
1 year or more	20	11.4
Unknown	53	29.5
Total	178	100.0

sis, usually brought prompt admission. It was not uncommon, though, to find that many patients with protracted symptoms had sought medical attention several times before a diagnosis was made.

Bacteriological status on admission. Because the decision to include this information was made after completion of the review of cases at one hospital, only four of the sanatoriums are represented. Patients under regular supervision were excluded since they are promptly admitted upon presumptive evidence of reactivation, often before they have a chance to become positive.

Of the 137 newly diagnosed patients in the four hospitals, 108 or 78.8 percent were positive on admission. This is particularly significant in view of the findings of Swayne and Tepper (*2*) that more than twice as many persons with active tuberculosis will be found among the contacts of a tuberculosis patient with positive sputum than among those in contact with a patient with negative sputum. They give the actual rates as 9.3 and 4.3 per 100 index cases respectively. Thus, the longer a person with positive sputum remains unidentified in the community, the greater the potential for infection of others.

History of contact. Again, for the reason mentioned previously, only four hospitals are represented. Although fairly close and prolonged contact with persons having active tuberculosis must obviously have occurred at some point in their lives, only 33 of the 137 new patients gave a definite history of such an association. The extent to which this information existed in the record appeared to depend somewhat on the thoroughness of the interviewer, however, for the variation between hospitals ranged from 21 out of 40 to 4 out of 42 patients with a known contact.

Age and sex distribution. Male patients outnumbered females three to one. In fact, more than 60 percent of the sample was made up of men 40 years or over. Below 30 years, the sexes were approximately equal in number. For males the mean age was 56.3 years; the median, 57.5. For females the mean age was 50.3 years and the median, 48.5. The distribution curve for males rises suddenly at age group 40–44 and reaches a definite peak at age group 60–64, while the curve for females is much flatter with no real peak (see chart). Comparison of the sample with all 1963 admissions to the five hospitals reflects the same patterns of age and sex distributions.

Discussion

Perhaps the most significant finding to emerge from this study is that despite widespread conscientious casefinding programs specifically directed toward high-incidence groups, which are conducted by official and voluntary health agencies, the majority of patients with previously unsuspected tuberculosis were first recognized only after they had sought medical attention because of symptoms. Often, too, the diagnosis was made only after the patient had been ill for some time and had become a source of contagion to the community.

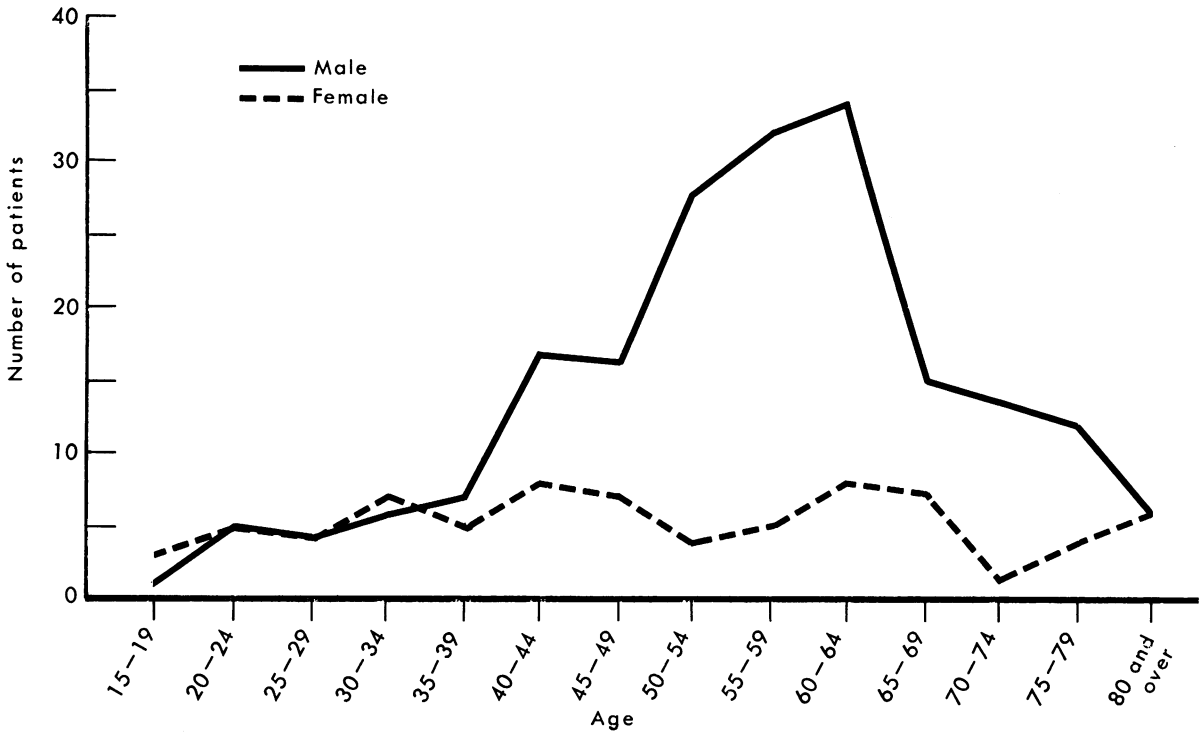
The burden of early diagnosis, then, is on the practicing physician whether in a private office or hospital clinic, and any effective attempts to eradicate tuberculosis must take this fact into consideration.

Certainly tuberculosis must be ruled out in any patient, particularly men over 40 years of age, with any type of respiratory symptoms, cough, hoarseness, or general fatigue and malaise with gradual weight loss persisting for more than a month. An additional history of contact to tuberculosis should create a high index of suspicion, though its absence is not significant.

More frequent and prompt use of the tuberculin test and chest X-ray as part of the initial diagnostic workup may save weeks of hospitalization and prevent further spread of infection.

To carry this recommendation one step further, a routine tuberculin test for every new patient may well be a valuable procedure since at least 75 percent of the new cases in the future will probably arise from the so-called "infected reservoir" of positive reactors (*4*, *5*). Newer techniques such as the Tine tuberculin test compare favorably with the standard intradermal or Mantoux test (*6*) and can easily be administered and interpreted by an office or clinic nurse with a little preliminary instruction. Persons who show evidence of infection by a positive test should have an initial chest X-ray and one periodically thereafter for the rest of

Age and sex distribution of sample group



their lives, particularly at times of physical or emotional stress.

The physician who first sees the tuberculosis patient can also be instrumental in securing proper followup of contacts, since he usually enjoys a rapport with the patient and his family which the health departments lack. His advice and recommendations, therefore, are more apt to be heeded. Particularly is this important when the index case is positive at the time of diagnosis. No control program can hope to be successful without the cooperation and participation of all members of the medical profession, not solely those primarily concerned with preventive medicine and public health.

Ex-patients under supervision present no threat to public health. However, the fact that this group comprised 31.2 percent of the admissions in this sample underscores the relapsing, lifelong nature of this disease and the importance of maintaining adequate facilities for followup care for the ex-patient after discharge. The current practice of relatively short hospitalization followed by months or years of chemotherapy on an ambulatory basis makes the provision of outpatient services equally, if not more, important than the provision of hospital beds.

The age and sex distribution of both the sample and the 1963 admissions follows a pattern which has become typical in fairly recent years. Tuberculosis, once a disease of young women, is now primarily a disease of older men. Yet the 251 women of childbearing age admitted to sanatoriums for tuberculosis during 1963 cannot be lightly dismissed. Apart from the social disruption of the family created by prolonged absence of the mother from the home, young children particularly susceptible to the more serious complications of this disease are more likely to be among the close contacts of this group. In the planning of future control programs, these women should be considered.

Summary

The majority of 274 patients hospitalized in the five tuberculosis sanatoriums in Massachusetts during a 3-month period in 1964 were admitted because they developed symptoms and sought medical attention or, as ex-patients, they had shown evidence of reactivation. One hundred seventy-eight with previously unsuspected

disease were discovered because of illness, often after prolonged duration of symptoms. Only 12.8 percent of the entire sample and 19.8 percent of the previously unsuspected cases were identified through routine screening programs.

Of 137 persons with previously unknown tuberculosis in 4 of the hospitals, 78.8 percent were bacteriologically positive on admission. A known contact was mentioned in only 33 medical histories.

In the sample, men outnumbered women three to one and about 60 percent of the group were men aged 40 or over. The age and sex distributions of the group were characteristic of present-day tuberculosis prevalence.

Because practicing physicians in private offices or clinics seem to bear the burden of early diagnosis, frequent, routine, and prompt use of the tuberculin test and chest X-ray by practitioners was recommended. Also, the 31.8 percent of the sample who were ex-patients under supervision point to the importance of adequate followup facilities for outpatients.

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Conditions for Hospitals' Participation in Medicare

Conditions for participation of hospitals in Medicare have been announced by Secretary of Health, Education, and Welfare John W. Gardner. They are based on recommendations of the Health Insurance Benefits Advisory Council, appointed by President Johnson on November 11, 1965, and modeled after the requirements of the Joint Commission on the Accreditation of Hospitals.

State agencies will use guidelines incorporated in the statement of conditions to determine which hospitals qualify as providers of services. The agencies may recommend a hospital for participation if:

1. It is accredited by the Joint Commission and has or will have a utilization review in effect by July 1, 1966, or
2. It is operating in accordance with the conditions of participation with no significant deficiencies, or
3. It is found to have deficiencies but is making reasonable plans and efforts to correct them and is rendering adequate care, without hazard to the health and safety of patients.

To assure that older people in isolated areas will have access to hospital care, special approvals may be granted for a limited time to hospitals meeting only minimum statutory requirements but having no deficiencies that would place health and safety of patients in jeopardy.