A Successful Supervised Outpatient Short-Course Tuberculosis Treatment Program in an Open Refugee Camp on the Thai-Cambodian Border

STEVEN H. MILES and ROBERT B. MAAT

Introduction

Short-course isoniazid- and rifampin-based therapies have revolutionized the treatment of tuberculosis (1, 2). Although many of the initial trials of short-course protocols were performed in developing nations, little is written about tuberculosis treatment in refugee camps (3). Those of the 8 million refugees and 6 million displaced persons living in camps or detention centers experience crowding and deprivation that results in a high incidence of tuberculosis, an incidence that is well documented in Asian refugees (4).

There are a variety of obstacles to tuberculosis treatment in refugee camps, especially in “open” camps lacking the controlled perimeters of enclosed detention centers. Refugees are highly transient, moving to reunite families, to seek better emigration or economic opportunities, and also in response to war, political, and criminal forces. Many refugees lack socioeducational backgrounds that would facilitate understanding of the need for treatment beyond the period of acute illness. Financial resources for refugee relief are limited, and relief agencies often lack experience in supervising lengthy therapies. Political realities, including relocations for camp consolidation or for emigration processing, the desire that refugee health services be no better than those available to impoverished local citizens, and the fear that tuberculosis treatment will attract additional refugees, place additional constraints on programming.

This article describes the operation of a tuberculosis treatment program at the Nong Samet refugee camp on the Thai-Cambodian border (figure 1). Nong Samet, with 45,000 Cambodian refugees, is open to the interior of Cambodia, and its people move back and forth through the militarily active area to other camps and to Cambodia. From 1979 to 1980, refugees with tuberculosis were moved from the border to a closed detention center within Thailand for treatment, a practice discontinued when it was noted that only 6% completed 6 months of therapy (Guillamot P, “T.B. Problems on the Border.” International Committee of the Red Cross). Treatment resumed in 1981 when the American Refugee Committee received permission to attempt treatment on site at the Nong Samet camp. Refugees at Nong Samet receive medical care in thatch buildings from a small expatriate medical staff and 50 trained refugees. There is no electricity; patients needing radiographs are transported 15 miles to a camp in Thailand.

Methods

Program Design

There were 58 patients with pulmonary tuberculosis who began therapy during the period from the program’s inception in August 1981 until 18 months before the study was closed in September 1983 (to allow for 12 months of follow-up after completion of the 6-months course of therapy). All patients were symptomatic, had presented themselves to the general clinic or hospital for therapy, and had at least 2 sputum smears with acid-fast bacilli. All but 2, who were too debilitated to transport, had radiographs compatible with pulmonary tuberculosis. None had received prior professional treatment or were known to have extrapulmonary disease at the onset of therapy.

Drugs were administered daily at a special clinic without the long wait of the general clinic. A bilingual physician’s assistant (B.M.) screened patients and directly supervised their therapy. Several interviews were conducted before treatment to confirm camp residence and access to food for the patient and family. The disease, treatment, and necessity for completing therapy was discussed extensively with the patient and family. After these discussions, the patient signed or thumbprinted a treatment contract, in Cambodian, reading, “I know that I have tuberculosis and that I can die of this disease. I know that I will need to take medicine every day for 6 months to cure my tuberculosis. I know that other people can catch tuberculosis from me if I stop taking my drugs. I want my tuberculosis cured. I am asking you to give me medicine. I promise to live in Nong Samet Camp and visit the clinic every day for 6 months.” Copies of this contract and daily treatment calendars were kept by the clinic and patient.

Refugees were treated for 2 months with daily isoniazid, rifampin, streptomycin, and pyrazinamide followed by 4 months of daily isoniazid and rifampin (5). This protocol was

SUMMARY The operation of a tuberculosis treatment program in an open refugee camp of 45,000 refugees on the Thai-Cambodian border is described. Fifty-eight patients received 6 months of supervised daily, outpatient therapy with a protocol employing isoniazid, rifampin, streptomycin, and pyrazinamide. Patient compliance was high, with only 15 of 10,209 patient days being missed, despite a high incidence of minor side effects. Three patients died, 4 defaulted, and 1 moved to another camp for treatment. The therapies of 4 patients were extended because of the need for reduced doses of medications, the development of extrapulmonary disease, treatment failure, and slow resolution of infiltrates on radiographs. There was 1 late relapse. This report demonstrates the feasibility of integrating short-course therapies with program designs to produce high compliance under difficult field conditions.
chosen for its duration, efficacy in the context of the pretreatment drug resistance common in Asian refugees (5-8), and success with patients prematurely defaulting from therapy (5, 9). Daily medication doses were: isoniazid, 5 to 10 mg/kg, 300 mg maximum; rifampin, 10 to 20 mg/kg, 600 mg maximum; streptomycin, 15 to 20 mg/kg, 1 g maximum; pyrazinamide, 35 mg/kg, 2,000 mg maximum, as simplified in table 1. Pyridoxine, 10 mg, was given each day.

After receiving each day's medications, each patient's treatment calendar was initialed, entitling him or her to a supplementary hot meal. Patients failing to come to morning therapy were contacted for further discussion of the therapy. This became an infrequent event, as a camaraderie developed among the patients. At the completion of therapy, each patient received a small laminated card detailing their treatment in Cambodian and in English. Patients were asked to return every 3 months for examination and collection of 3 sputum smears. Compliance was determined by examining treatment calendars. “Total patient days of therapy” is the sum of the number of therapy days for all patients until their completion of therapy, default from treatment, or death.

Results

The 58 patients ranged in age from 10 to 64 yr, with an average age of 35 yr. A bell-shaped age distribution reflected a strongly age-related risk of disease offset by a strongly youth-skewed refugee population; 45% were male. Twelve (21%) of the patients had moved to Nong Samet, some from several hundred kilometers away, for the purpose of receiving treatment. Long-term residents had lived at Nong Samet for an average of 18 months. Most admitted to self medication with folk therapies and antibiotics, and several recalled using antitubercular agents or pyridoxine for a few weeks. Twenty-two (38%) admitted using streptomycin for courses ranging from 5 injections to 150 injections over 30 months, with a typical course being 2 wk of daily half-gram injections.

Compliance was very high; patients failed to come to the clinic on only 15 of the 10,209 total patient days of therapy. Four patients defaulted from therapy after 43, 103, 145, 165 days (figure 2). Another patient moved to a detention center in Thailand where therapy was completed.

A majority (71%) experienced minor side effects. A third (34%) developed arthralgia or arthritis in the second month of therapy, which was treated with rest or aspirin and which resolved by the fourth month. Four (7%) experienced transient nausea and anorexia in the first weeks of therapy. Half (45%) experienced distal or perioral paresthesias in the first 2 months of therapy. A fourth (24%) reported pruritis in the first month of therapy, which, when severe, was treated with diphenhydramine.

Four patients required major modification of the standard program protocol. A 29-yr-old woman required surgical drainage of a tubercular psoas abscess discovered during therapy. Two years after 9 months of therapy, she is healthy and pregnant. A 31-yr-old woman became icteric in the first month of therapy; as a precautionary measure, we reduced her dose of isoniazid until the presumed viral hepatitis cleared and then extended her therapy to 9 months. A 50-yr-old man developed vertigo that required reduction of streptomycin. He remained smear-positive throughout therapy whenever a positive culture was obtained. After another year of 4-drug therapy, a biopsy of an inflamed elbow found noncaseating, granulomatous lymphadenitis. A 59-yr-old man, with a good clinical response to therapy, had “active infiltrates” on a follow-up radiograph and was treated for 9 months. Ten patients

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**TABLE 1**

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Isoniazid (mg)</th>
<th>Rifampin (mg)</th>
<th>Streptomycin (mg)</th>
<th>Pyrazinamide (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20+</td>
<td>150</td>
<td>300</td>
<td>300</td>
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<tr>
<td>30+</td>
<td>200</td>
<td>450</td>
<td>500</td>
<td>1,000</td>
</tr>
<tr>
<td>40+</td>
<td>300</td>
<td>600</td>
<td>750</td>
<td>1,500</td>
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<tr>
<td>50+</td>
<td>300</td>
<td>600</td>
<td>1,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

*Pyridoxine, 10 mg, was also given each day.*

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Fig. 2. Default and death during treatment and follow-up. * indicates exclusion of 4 patients whose therapies were extended.
had medications increased to adjust for weight gains during therapy.

Three patients died during therapy, including 2 bed-bound, middle-aged women in the first month of therapy and a young man, probably with a coexisting malignancy, with major weight loss during his 11 wk of therapy.

Compliance with follow-up is shown in figure 2. Patients completing therapy gained 5.2 kg from their initial weight of 41 kg (p < 0.001 by matched-pair t test). The only treatment failure has been described. All patients were smear-negative 3, 6, 9, and 12 months after therapy. An intoxicated man died from aspirating vomitus. Nine patients developed chronic bronchitis or bronchiectasis. A man with a normal year of follow-up returned 16 months after therapy with active smear-positive disease. Those lost to follow-up reportedly left Nong Samet to return to Cambodia.

**Discussion**

Our objective was to demonstrate the possibility of effectively treating tuberculosis in an open refugee camp. Given the primitive and unstable nature of the Nong Samet camp and the remote possibility for adequate follow-up in Cambodia, we did not believe that the trial of an untreated therapy was justifiable; thus, we selected a therapy that had been tested in Africa and Singapore, albeit by studies excluding noncompliant patients from analysis.

Our program design resulted in very high rates of daily compliance, with 51 of 55 surviving patients completing full courses of therapy, in sharp contrast with the dismal experience of moving refugees to a closed detention center for therapy and to some programs in underdeveloped nations (10, 11) where two thirds defaulted from therapy, the majority within the first few months. Sbarbaro (12, 13) concluded that poor compliance may be expected in a third to half of patients and noted that “there have been no reports of successful outpatient programs in which long-term daily supervised treatment was the keystone of the therapeutic program.” He recommends that treatment programs: (1) be familiar with the patient’s home, family, and community; (2) provide continuous care by a single staff member; (3) be mobile within the patient’s community; (4) provide inducements for therapy; (5) provide accessible programming with monitoring for early detection of noncompliant patients.

We believe that there are 5 reasons for the success of this program.

First, the treatment protocol facilitated compliance by its duration, its lack of major adverse effects, and its use of injections. Six-months therapies ask a psychologically different kind of patient commitment (14) that reduces premature defaulting from therapy (15, 16). Our patients rapidly developed a sense of well being, and side effects, though common, were minor. We found less hepatotoxicity than did studies that biochemically monitored hepatic injury (17), about as much as those noting hepatitis as a clinical complaint (18). Pyrazinamide-induced arthralgias are a self-limited phenomenon (19) that should not require reduction of this crucial medication. The high incidence of transient paresthesias may partially reflect cultural ways of relating to medical staff and did not seem to affect compliance. The refugees believed strongly in the special efficacy of injected medications; 2 months of daily injections may have raised compliance (20).

Second, our program was convenient and accessible. Aside from the convenience of the separate clinic, the program was also “culturally accessible” in that the clinical supervisor (B.M.) was present, bilingual, and familiar with the patients, their camp, and its society.

Third, the program had no cost to refugees. Drugs were free, and the dependency of refugees on relief meant that wages were not lost and jobs were not jeopardized by program participation, as noted in other studies (10-12).

Fourth, our assistance with establishing access to food rations and ensuring a stable camp residence decreased refugee transience and demonstrated our concern for the patient’s total well being. This also gave us a way to meet family members and enlist their support for the treatment program. About half of the patients took advantage of the inducement of a supplemental meal.

Fifth, we believe that the requirement for a signed treatment contract contributed to compliance by emphasizing the seriousness of the educational dialogue and the mutual commitment that would be required.

Ease of program administration is critical to the establishment of treatment programs in developing countries. Our clinic requires a part-time physician’s assistant, a trained refugee assistant, and a sputum smear laboratory capable of treating 60 patients. Our simple clinical algorithms defining patient care have been adapted for use in other camps. However, a few patients (those with major side effects, extrapulmonary disease, or treatment failure) require professional intervention beyond that provided by standard algorithms. Furthermore, the on-site presence of a personable professional probably helps maintain patient compliance. The expertise required for radiography, the handling of sputum smears, and the development and interpretation of clinical algorithms is an additional obstacle to tuberculosis treatment in impoverished nations (11, 21, 22).

The high cost of medications, $145 per course, is also an obstacle to the widespread duplication of our program. But the high cost of a course of medication is considerably offset when considered from the perspective of cost per cure, taking into account the savings that derive from the shortened period of medical supervision and the decreased loss of medication in the ineffective treatment of the larger numbers of patients prematurely defaulting from longer therapies (23). The disciplined use of clinical algorithms and the adoption of newer therapies using intermittent rifampin (24) would help reduce medication costs further. Finally, close attention to medication inventory control is needed to prevent diversion of these costly medications into black markets where they are readily sold for the kind of self-medication that so many of our patients had participated in.

Ultimately, control of tuberculosis in developing nations will require an integrated program of case finding, chemotherapy selection, treatment program design, and cost control (21). The program at Nong Samet demonstrates the feasibility of successfully integrating a short-course therapy with a program design to allow high compliance under difficult field conditions.

**Acknowledgment**

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**References**

5. Singapore Tuberculosis Service/British Medical Research Council. Clinical trial of six month and four month regimens of chemotherapy in the
6. Hong Kong Chest Service/British Medical Research Council. Controlled trial of 6 month and 8 month regimens in the treatment of pulmonary tuberculosis; the results up to 24 months. Tubercle 1979; 60:201-10.
24. Hong Kong Chest Service. Controlled trial of 4 3-times-weekly regimens and a daily regimen all given for six months for pulmonary tuberculosis, Second report: the results up to 24 months. Tubercle 1982; 63:89-98.