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The Financial Cost of a Large Tuberculosis Outbreak in an Alaska Village

Background

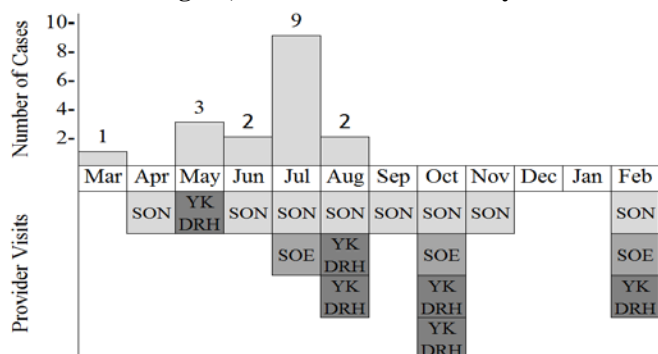
In the mid-20th century, rural Alaska was experiencing an extensive tuberculosis (TB) epidemic that was the principal health problem of the territory.¹ While great progress has been made in controlling tuberculosis, Alaska continues to have one of the highest TB rates in the United States.² Few attempts have been made to document the economic impact associated with TB control nationally. This *Bulletin* estimates the total direct financial cost associated with a single large TB outbreak in a Yukon-Kuskokwim Delta (YKD) village in 2013.

Outbreak Overview

In March 2013, the Section of Epidemiology (SOE) received a report of one active case of TB in a resident of a YKD village (Village A; population <1,000 persons). The investigative work that followed involved eight public health nurse (PHN) visits and three SOE nurse visits to the village to place tuberculin skin tests and screen individuals for TB (Figure 1). Nurses collected sputum samples from patients at-risk for TB disease and sent those samples to the Alaska State Public Health Laboratory (ASPHL) to test for TB bacteria and drug susceptibility patterns. PHNs, in consultation with SOE, performed case management for active TB and latent TB infection (LTBI), including patient assessments, education, and contact investigations. Directly observed therapy (DOT) aides were hired locally to assure that patients took their medications on-time. SOE collaborated with local health care providers and PHNs, provided consultations and on-site support, managed the DOT program, shipped medications, and coordinated testing with ASPHL.

Over the course of 5 months, 17 cases of active TB infection were identified in Village A; all infected persons tested positive for the same TB genotype, which was unique to this village. Patient ages ranged from 11 months to 68 years; seven patients were aged <18 years. In addition to the 17 active TB cases identified, 60 new cases of latent tuberculosis infection (LTBI) were identified during this outbreak. Patients received care at the subregional village clinic and the Yukon-Kuskokwim Delta Regional Hospital (YKDRH) in Bethel, both operated by the Yukon-Kuskokwim Health Corporation (YKHC). Staff from YKDRH, the Section of Nursing (SON), and SOE made numerous trips to Village A throughout the outbreak (Figure 1). The remoteness of the village and its limited public health and health care infrastructure added to the challenges of the outbreak response.

Figure 1. TB Cases by Month of Onset and Provider Visits* — Village A, March 2013 – February 2014

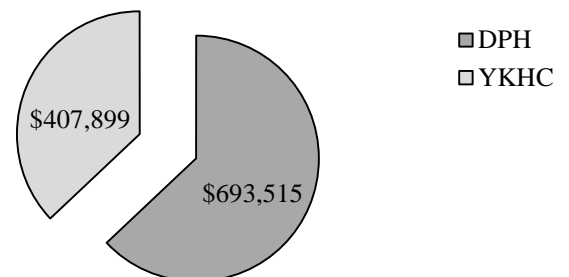


*Provider visits by the Yukon-Kuskokwim Delta Regional Hospital (YKDRH) represent physicians traveling from Bethel to Village A for patient care, and provider visits by the Alaska Sections of Public Health Nursing (PHN) and Epidemiology (SOE) represent visits by nurses and epidemiologists. Each box represents a flight in and out of Village A by at least one staff member.

Cost Estimate Results

The direct cost estimate associated with this outbreak totaled \$1,101,414 (Figure 2). YKHC costs included direct health care costs for clinical services and associated travel. Clinical services included office visits, tests, and procedures for patients with either active TB or LTBI. Travel-associated costs included six physician visits to Village A to evaluate patients and patient visits to Bethel for clinical services. Division of Public Health (DPH) costs included TB medications, DOT payments, incentives, shipping, travel, laboratory testing, and staff time. The estimated DPH staff time involved in this investigation was 10,900 hours (Table).

Figure 2. TB Outbreak Response Costs, by Payer — Village A, March 2013–February 2014*



*DPH resources represent a combination of State and Federal monies; a precise breakdown of the amount of spending from each source is infeasible.

Table. Estimated Work Hours for a TB Outbreak, by DPH Section — Village A, March 2013–February 2014

Employer	Work Type	Work Hours
ASPHL	All-inclusive	350
SOE	All-inclusive	1600
SON	All-inclusive	8950
Total Work Hours of All Agencies Combined		10,900

Limitations

This evaluation has several limitations. First, estimates used to calculate health care and travel costs for LTBI patients were drawn from a small sample of data. Second, surveys were sent out months after the outbreak peaked, which made accurate reporting a challenge. Additionally, estimates of staff hours were subject to recall bias and most YKHC staff hours were not available and are not included in the total. Finally, it is assumed that all of the 60 newly identified LTBI cases were infected during this outbreak, as most were either linked to an active case or tested negative for LTBI within the two years prior to this outbreak (and the last active case of TB in village A was in 2006); however, it is possible that some became infected before this outbreak occurred.

Summary

TB remains a serious public health threat in Alaska and requires substantial resources to control. While this was the largest village-based outbreak seen in Alaska in many years, numerous smaller village-based outbreaks occur during most years. Historically, high rates of TB and ongoing challenges due to health care infrastructure, geography, and health disparities contribute to the high rate of TB in Alaska. Close collaboration between federal, state, and tribal partners is critical to reduce the number and size of Alaska TB outbreaks.

References

1. Robert Fortuine, "Must We All Die? Alaska's Enduring Struggle with Tuberculosis" (University of Alaska Press), p. 49.
2. Alaska SOE. Tuberculosis in Alaska 2013 Annual Report. Available at: http://www.epi.alaska.gov/pubs/webtb/TB_Report_2013.pdf