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# A Case Study of Cross-Jurisdiction Resource Sharing: The Merger of Two Tuberculosis Clinics in East Tennessee.

## **ABSTRACT**

Cross-jurisdiction resource sharing is considered a possible means to improve efficiency and effectiveness of public health service delivery. A merger of the Tuberculosis (TB) clinics of a rural and a metropolitan jurisdiction in East Tennessee provided an opportunity to study service provision changes in real time. A mixed methods approach was used, including quantitative data on latent TB treatment outcomes and qualitative data from staff interviews, as well as documentation of changes in staffing time in TB services. Results showed a mix of efficiency changes, indicating probable increased pressure on key service providers after the merger, in addition to expected improvements of economies of scale such as a reduction in overall staff time. Mechanisms found beneficial in coping with the merger, such as face-to-face meetings between coworkers and management of the different jurisdictions were identified at interview. The clinic merger was associated with a balance of efficiency changes, problems and advantages, and this balance is likely to change as new working arrangements become more routine.

### **Keywords**

cross-jurisdiction resource sharing, clinic merger, efficiency, effectiveness, mixed methods

### **Cover Page Footnote**

I would like to acknowledge the help of all of the dedicated staff at Knox County Health Department, East Tennessee Region of the Tennessee Department of Health, TB Elimination Program, Tennessee Dept of Health and University of Tennessee, Knoxville who helped with data collection and advice for this project.

Since the economic recession of 2008, when about half of the local health departments in the country were affected by funding cuts, improvements in efficiency and effectiveness have been a priority. Cross-jurisdictional sharing is being examined as a means to improve efficiency and effectiveness of delivery of public health services.<sup>1,2,3</sup> In October 2011 the Tennessee Department of Health (TDH) agreed to a merger of the tuberculosis (TB) clinics of East Tennessee Region (ETR) of TDH, a rural jurisdiction covering 15 counties, with Knox County Health Department (KCHD), a single-county metropolitan jurisdiction<sup>1</sup>. The merger occurred in the context of a decline in the number of active TB cases in the region, mirroring a national trend of decreasing TB cases over the previous 10-15 years.<sup>4</sup> The incentive for this cross-jurisdiction merger of two clinics was a need to cover medical services while reducing costs through staff reductions and work pattern reorganizations. Prior to the merger, TB services were provided to patients by staff of KCHD or ETR depending on county of residence. Physician services were provided by a single specialist to both health departments. A nurse practitioner provided diagnosis and treatment plans for some latent tuberculosis (LTB) cases at KCHD. After the merger, all patients were managed at KCHD for diagnosis and treatment plan, and LTB patient management was taken over by the nurse practitioner. Such a merger can stress the systems of care coordination, and the near-term balance of benefit versus disadvantage is unclear and might change over time. This study aimed to investigate this balance of efficiencies over the period of the merger by assessing the efficiency and effectiveness of service provision as a result of the merger.

Efficiency was measured in terms of changes in staffing (i.e., number and type of staff) as well as time taken for provision of services. Process changes such as redesigned staff functions for existing and new staff are documented. Effectiveness was measured in terms of outcomes; LTB rather than active TB case outcomes were measured due to low numbers of active cases and because LTB management is less regulated than that of active TB. Direct interviews with staff provided a qualitative component which revealed information about both efficiency and effectiveness, including service provision problems and staff approaches to problem resolution.

## METHODS

KCHD and ETR staff provided a list of patients who received an LTB diagnosis or who had a new positive TB skin test from January 1, 2010 to December 31, 2012 via database queries. The KCHD list included both Knox County residents over the whole period and ETR patients seen after the merger. A 30% random sample of the KCHD list was taken, due to the large number of patients on the KCHD list. The ETR list (patients seen at the ETR clinic before the merger) was shorter and sampling was not required. LTB test details, clinic encounter, and continuation of care data were extracted through medical record reviews. Staffing data, including full-time, half-time or part-time staff estimates were collected from the local health departments.

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<sup>1</sup> The East Tennessee Region includes the following counties: Anderson, Blount, Campbell, Claiborne, Cocke, Grainger, Hamblen, Jefferson, Loudon, Monroe, Morgan, Roane, Scott, Sevier, and Union Counties. Knox County Health Department serves the city of Knoxville and Knox County as a Metro Health Department.

For the quantitative component of this study, the time interval between TB skin test (or other test for LTB) and clinical assessment, treatment completion rates, and staffing reductions provide measures of changes in efficiency and effectiveness. Median time from positive TB test to clinical assessment before versus after the merger was compared using the Mann-Whitney test. Treatment completion rates were compared before versus after the merger using the Chi-square test. Level of significance for statistical tests was set at  $p < 0.05$ . Statistical analysis was performed in SPSS version 20.

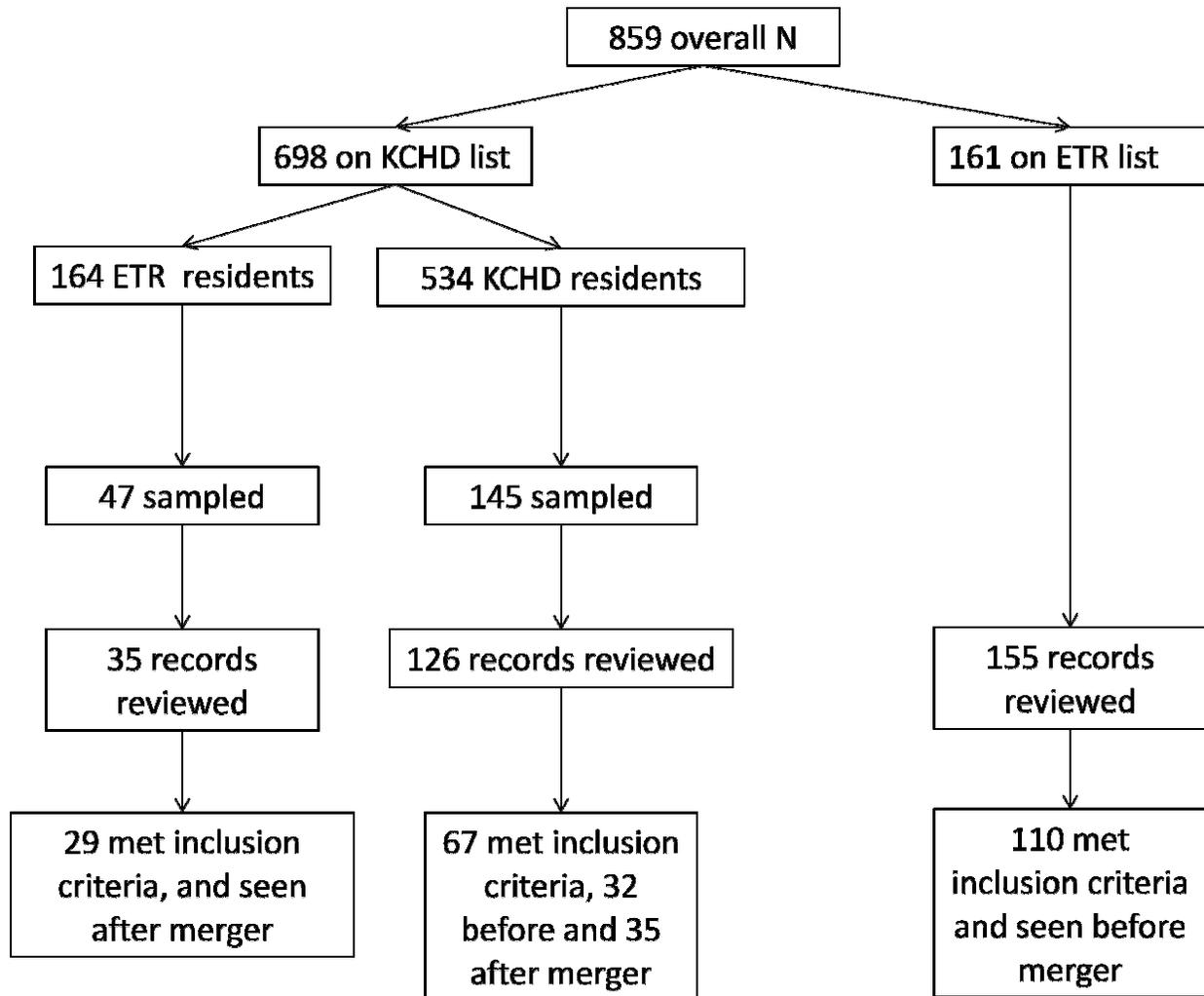
For the qualitative component of this study, staff of ETR and KCHD working in TB services before and after the merger, covering medical (both clinical and management), nursing and administrative roles, were interviewed. Individual face-to-face semi-structured interviews were audio-recorded, transcribed and imported into ATLAS/ti software for coding and identification of themes. Core consistencies and meanings were extracted and summarized. This study was approved by the Tennessee Department of Health Institutional Review Board.

## **RESULTS**

The annual count of active TB cases for investigation over the period 2010-12 in the separate regions as reported on the Aggregate Reports for Tuberculosis Program Evaluation, was less than or equal to ten. Outcome analysis proceeded on the LTB cases.

The database query identified a total of 698 patients from the KCHD list (assessed at KCHD) and 161 patients from the ETR list. A total of 316 patient records were reviewed. Patients who came for assessment of a positive test in 2010-2012 (where the positive test was not more than 1 year before the clinic assessment) and with a diagnosis of LTB were included for analysis of outcomes, providing a total of 206 patients for analysis of LTB outcomes. Of the 206, 110 were seen at ETR before the merger and 96 were seen at KCHD; of these 96, 32 were seen before the merger and 64 after (**Figure 1**).

Figure 1. Flow diagram showing case numbers after sampling, record review and final inclusion for LTB outcome analysis.



Overall there was no significant change in median time from positive TB skin test to clinical assessment comparing before merger to after (15 days before merger versus 17 after,  $p=0.847$ ) (**Table 1**). However a comparison of those cases seen at KCHD before versus after the merger showed an increase in median time from positive test to clinical assessment (7.5 days before versus 17 after,  $p=0.024$ ). No significant difference was found in treatment completion rates (where the denominator is those who started treatment) comparing before to after merger. However treatment starting rates were significantly higher after the merger when considering all patients.

**Table 1. Latent TB case outcomes**

	<b>N (number of LTB cases evaluated)</b>	<b>Median time from positive test to clinic assessment (days)</b>	<b>Number started treatment/N</b>	<b>Number completed treatment/Number started**</b>
Before merger, all	142	15□	30/142 (21.1%)	17/29 (58.6%)
After merger, all	64***	17	34/64 (53.1%)	18/33 (54.5%)
P		0.847	0.000	0.747
Before merger, seen at KCHD	32	7.5	17/32 (53.1%)	10/17 (58.8%)
After merger, seen at KCHD	64	17	34/64 (53.1%)	18/33 (54.5%)
P		0.024	1.000	0.773
Before merger, seen at KCHD, Knox residents only	32	7.5	17/32 (53.1%)	10/17 (58.8%)
After merger, seen at KCHD, Knox residents only	35	19	19/35 (54.3%)	12/19 (63.2%)
p		0.081	0.924	0.790
Before merger, seen at ETR,	110****	18□	13/110 (11.8%)	7/12 (58.3%)
After merger, seen at KCHD, ETR residents only	29***	15	15/29 (51.7%)	6/14 (42.9%)
P		0.403	0.000	0.431

\* 2 cases were missing data

\*\* Where treatment completion unknown, case excluded

\*\*\* Number represents an approximately 30% sample of KCHD list

\*\*\*\* Number represents 100% sampling of ETR list, cases seen at ETR before merger

Overall, there was a reduction in staff FTEs employed in the TB programs (**Table 2**). A nursing position was reassigned at ETR; duties of the nursing position before the merger involved TB program management and after the merger were reassigned to liaison and field nursing duties. Changes in processes of care provision and roles of staff were implemented at the time of the clinic merger.

**Table 2. Staff numbers in the TB programs**

		<b>KCHD</b>			<b>ETR</b>		
		<b>FTEs before merger</b>	<b>FTEs after merger</b>	<b>Change in FTEs</b>	<b>FTEs before merger</b>	<b>FTEs after merger</b>	<b>Change in FTEs</b>
clinical	Nurse manager	0.5	0.6	+0.1	0.13	0.03	-0.1
	TB nurse(s)	1.5	2.0	+0.5	2.0	1.0	-1.0
	Physician	0.1	0.1	0	0.1	0	-0.1
	Nurse practitioner	1.0	1.0	0	0	0	0
	Public health investigator	0.5	1.0	+0.5	0	0	0
support	Radiology technician	1.0	1.0	0	0.1	0	-0.1
	Interpreter	0	0	0	0.1	0	-0.1
administrative	Clerks/secretary	1.5	1.5	0	1.0	0.3	-0.7
	Patient services manager	0.5	0	-0.5	0	0	0
<b>Total FTE Changes</b>		<b>6.6</b>	<b>7.2</b>	<b>+0.6</b>	<b>3.43</b>	<b>1.33</b>	<b>-2.1</b>

Main themes extracted from the staff interviews included advantages, change in practices, learning mechanisms, solutions adopted, and problems encountered. The direct advantage of having a team dedicated to TB services (at KCHD) was mentioned. Many of the staff did not view the change to have affected their work practices significantly. However the period immediately after the merger was particularly associated with practical problems and adoption of new procedures. Some problems, such as agreement on funding allocation arrangements, were not fully resolved at the time of the interviews, but others such as computer system incompatibility, were resolved. Among the solutions adopted, face-to-face meetings were mentioned as useful by a number of workers to enable adoption of new working practices and to enable communication between staff unfamiliar with each other. In addition, an attitude of willingness to help was referred to as beneficial.

Limitations of this study included lack of a comprehensive cost analysis due to difficulties in comparing cost systems across different organizations. Instead, FTEs were used as an indicator of overall cost changes. Also, although large-scale changes in patient volume before versus after the merger were not evident, a detailed analysis of patient volume change was not performed.

## IMPLICATIONS

The immediate and near-term period of change after a cross-jurisdictional merger can lead to a stress on service provision and may not provide the desired improvements in efficiency. Given that patients may be seen on a regular basis at KCHD while they were seen only on specific clinic days at ETR, it was anticipated that time to medical assessment from a positive TB skin test would decrease for patients coming from ETR to KCHD. However the decrease found in this group was non-significant while in the case of Knox residents, time to assessment showed a borderline significant increase. The likely reason for this is an increase in the overall number of patients being seen in the merged TB clinic.

The balance of efficiencies related to resource sharing may change over time; continued follow-up could record the changing balance of efficiencies as the new arrangements become more routine. In the time covered by this study, the initial few months after the merger were described as a period of confusion which eased as new working practices were adopted and became more familiar.

### SUMMARY BOX:

**What is Already Known about This Topic?** Cross-jurisdictional resource sharing is considered a way to improve efficiency and effectiveness of public health service provision. There is a current effort to build evidence about cross-jurisdictional resource sharing arrangements and multiple projects are ongoing.

**What is Added by this Report?** This report is a case study of cross-jurisdictional resource sharing involving a merger of the TB clinics of rural and metro health departments. The balance of changes in efficiency and effectiveness are assessed using both qualitative and quantitative approaches.

**What are the Implications for Public Health Practice, Policy, and Research?** Cross-jurisdictional mergers may be required to enable continuation of service provision, particularly when case numbers are decreasing. However the period of change can lead to a stress on service provision and methods to ease the transition period may be required.

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