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## Pharmacist perceptions of the New Mexico pharmacist-performed tuberculosis testing program

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### Abstract

**Objective**—This study evaluated pharmacists' perceptions of the New Mexico pharmacist-performed tuberculosis skin testing (PPTST) program.

**Methods**—This cross-sectional study was conducted using a telephone survey. New Mexico pharmacists who completed the tuberculin skin test (TST) training from March 2011 to June 2016 were eligible for inclusion. Data collected included demographics, years since licensure, pharmacy setting and location, reasons for obtaining certification, training time, training quality, self-perceived competency after training, whether the participant was performing TSTs, number of tests performed, time required to administer or interpret the test, and reasons for not testing.

**Results**—We attempted to contact all 209 pharmacists who completed the TST training during the evaluation period. Ninety-four of the 99 pharmacists contacted consented to participate (overall study response rate of 45%). The chain community pharmacy was the most common practice setting of respondents. After training completion, greater than 95% agreed or strongly

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Supplementary data

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agreed they felt confident in administering the TST. The percent of respondents working in New Mexico who were actively testing was 50.6%, with 42% of those pharmacists providing TSTs in small cities. Eleven pharmacists reported that they were performing TSTs in locations where testing would not otherwise have been available. An initial TST visit was approximately 6–15 minutes, and follow-up visits were typically 5 minutes or less. The most common reason reported for not testing was lack of employer support (61%). The strongest association with testing was training requirement by employer (odds ratio [OR], 20.4; 95% CI 4.2–99.2), followed by strong confidence in their ability to perform the TST (OR, 14.2; 95% CI 2.8–71.2).

**Conclusion**—PPTST is positively perceived by New Mexico pharmacists and provides testing in non-urban areas where access may be low. Survey respondents were confident in their ability to perform the TST and report that testing typically takes less than 15 minutes. The main hindrance to implementing PPTST was lack of employer support.

Early identification of tuberculosis (TB) has been a prevention strategy in the United States, but it is estimated that approximately 13 million people in the United States still have latent TB infection.<sup>1</sup> Additional strategies to improve testing access are needed to reduce TB incidence, including expansion of trained health care professionals.

Community pharmacies provide a potential setting to deliver tuberculin skin tests (TSTs), with easy access, extended hours, fast service without appointments, and established pharmacist-patient relationships. To date, there are limited data regarding pharmacist-performed TB skin testing (PPTST). Currently, only New Mexico and Idaho have laws allowing PPTST without a pharmacist-physician collaborative practice agreement.<sup>2–4</sup> Nearly 35% of residents in New Mexico live in rural areas of the state, compared with 20% nationally,<sup>5</sup> resulting in barriers to health care access. In March 2011, New Mexico passed a regulation that allows New Mexico pharmacists to prescribe, administer, and interpret TSTs.<sup>4</sup> The goal of the New Mexico PPTST initiative is to improve access to TB testing, especially in rural areas of the state, and to improve overall public health. The New Mexico PPTST was initially driven by patient need in rural areas of the state where pharmacists were the most accessible and sometimes the only available health care professional. Early data published by our group on the New Mexico PPTST program were encouraging.<sup>2</sup> As previously reported from March 2011 through August 2013, 626 patients requested TSTs in New Mexico community pharmacies. TSTs were performed by 25 New Mexico pharmacists, and approximately 70% of them were performed in rural New Mexico. The follow-up TST reading rate was high at 92.8%. Of the 43 pharmacists trained during the evaluation period, 18 did not perform TSTs. It was unclear why more than 40% of trained pharmacists were not performing TSTs. Prior studies have reported that pharmacists are oftentimes willing to provide additional services (e.g., immunizations, smoking cessation, oral contraceptives, HIV testing, naloxone) in their communities if they receive proper education and training, especially if there is a need or a perceived public health benefit.<sup>6–9</sup>

## Objectives

The objective of this study was to determine the number of New Mexico pharmacists who have completed the TST certification and are actively performing TSTs in New Mexico since program implementation, to evaluate pharmacists' perceptions of the training and

implementation of the PPTST initiative in New Mexico, and to evaluate reasons why pharmacists are not performing TSTs after training.

## Methods

A cross-sectional survey was conducted via telephone. The survey was developed by 2 pharmacists with expertise in the area of TB treatment and testing and 1 pharmacy student. It was then reviewed by 2 additional pharmacists with expertise in TB and survey development for accuracy, clarity, and appropriate language level. After modifications were incorporated the survey and study protocol were approved by the University of New Mexico Institutional Review Board as an exempt study submission. New Mexico pharmacists who completed PPTST certification training between March 2011 and June 2016 were eligible for inclusion in the study. Attempts were made to contact all pharmacists who completed the training. Each contacted individual was asked to participate in the study by completing a survey that evaluated the training program and implementation of the New Mexico PPTST program. Individuals agreeing to participate gave verbal consent before the survey was administered. The survey was conducted using a script and administered by the same investigator throughout the study. The final survey consisted of 24 questions. Data collected included pharmacist demographics, years licensed, pharmacy setting and location, reasons for obtaining optional TST certification, whether training time was appropriate, quality of the training program, self-perceived competency at the end of training, whether the respondent was currently performing TB testing, number of tests performed per week, time required to administer and interpret the test, and reasons for not using TST certification if the respondent was not currently performing TB testing (e.g., employer support, time, confidence, inadequate training, staffing, uneasiness delivering test results, lack of information to link patients to follow-up care, reimbursement concerns). See Appendix A for the full survey.

Descriptive statistics used were means and standard deviation (SD), frequencies, and percentages. Bivariate analyses of pharmacists currently performing TSTs compared to those not performing TSTs were two-tailed with a *P* value less than 0.05 to determine statistical significance. Chi-squared tests were used to compare frequencies, and *t* test of means was used for continuous variables. Using the U.S. Census definition of an urban area,<sup>10</sup> cities of practice with a population of 50,000 or more were considered a large city, and cities with populations less than 50,000 were considered a small city. A multiple logistic regression analysis was performed to identify factors contributing to pharmacists actively performing TB testing. Forward stepwise regression was used to construct the regression model. Initial variables considered in the model were those with a *P* value less than 0.10 in the bivariate analyses, and a significance level of 0.05 was required for entrance into and staying in the model. The Hosmer–Lemeshow goodness-of-fit test was used to assess the final model.<sup>11</sup> Accuracy of the model was assessed using the c-statistic,<sup>12</sup> and SAS (Version 9.4; Cary, NC) statistical software was used for analyses.

## Results

Two hundred nine pharmacists completed the TST training during the evaluation period, all of whom we attempted to contact. Ninety-nine pharmacists were reached by the study investigator, and 94 pharmacists consented to participate in the study (overall study response rate of 45%). The respondents included 57 female (60.6%) and 37 male (39.4%) subjects with a mean age of 37.7 years ( $SD \pm 11.8$  years). The most common practice setting was chain community pharmacy (60.7%). Table 1 presents the demographic information of study participants.

### Perceptions of pharmacist-performed TB testing

Respondents agreed or strongly agreed that the following were advantages of offering TSTs in pharmacies: accessibility (100 %), pharmacist's knowledge (98.9 %), positive pharmacist-patient relationship (97.9%), ability to obtain TST with other multiple services (95.7%), extended hours (93.6%), fast service (89.4%), and privacy (80.9%). The majority of respondents agreed or strongly agreed that implementation of PPTST has been successful in New Mexico (78.7%) and that PPTST benefits the community (97.8%) and has a positive impact on public health (98.9%).

### Training

Reasons for obtaining TB testing certification were to gain skills (97.9%), to affect public health (95.7%), requirement by employer (37.2%), revenue source (34%), or other (4.3%). All the respondents reported that the quality of the training met or exceeded their expectations. Most pharmacists believed that the training time required was adequate (90.4%), with only 2 pharmacists (2.1%) reporting that training time was insufficient. Upon completion of the training, 89 (95%) of pharmacists agreed or strongly agreed that they felt confident in both administering and interpreting the TST.

### Implementation of pharmacist-performed TB testing into practice

Eighty-nine of 94 survey respondents were employed and working in New Mexico at the time of the survey; 3 respondents were out of state, 1 was unemployed, and 1 was retired. The number of survey respondents who reported that they were performing TSTs in New Mexico was 45 of 89 (50.6%), with 19 of the pharmacists performing TSTs in small cities around the state. Eleven pharmacists reported that they were performing TSTs in areas where access to testing would not otherwise have been available.

The majority of survey respondents reported performing an average of 1–2 tests per week (0 tests/week = 2.2%; 1–2 tests/week = 60.0%; 3–4 tests/week = 22.2%; 5–6 tests/week = 8.9%; 7–8 tests/week 6.7%; and >8 tests/week = 0.0%). For the initial visit, 82.2% of pharmacists reported spending at most 15 minutes for TST placement, education, and counseling (0–5 minutes = 4.4%; 6–10 minutes = 42.2%; 11–15 minutes = 35.6%; 16–20 minutes = 11.1%; >20 minutes = 6.7%). Follow-up visits are typically done as walk-ins during the reading window (48–72 hours), but scheduling can be done at the discretion of the pharmacist. For the follow-up visit 71.1% of pharmacists reported spending 5 minutes or

less for TST interpretation, education, and counseling (0–5 minutes = 71.1%; 6–10 minutes = 15.6%; 11–15 minutes = 11.1%; 16–20 minutes = 2.2%; > 20 minutes = 0%).

Table 2 provides comparative statistics for pharmacists performing and not performing TSTs. Eight factors were found to be associated with performing TB testing ( $P < 0.10$ ) and were included in the full regression model: current age ( $P = 0.02$ ), years of practice ( $P = 0.02$ ), practice setting ( $P < 0.0001$ ), large city location ( $P = 0.01$ ), consulting room at practice ( $P < 0.0001$ ), TB test training required by employer ( $P < 0.0001$ ), TB testing as a revenue source for the employer ( $P < 0.0001$ ), and pharmacists feeling strongly confident in their ability to administer the TB test ( $P = 0.01$ ). Of these factors, 4 remained in the final reduced model (data not shown): practice setting, consulting room at practice, TST training required by employer, and pharmacists feeling strongly confident in their ability to administer the TST. The Hosmer–Lemeshow test did not indicate a lack of fit for the model ( $P = 0.97$ ). The reduced model had a c-statistic of 0.94, indicating a high correlation between those predicted to be TB testing and those actually TB testing. The strongest association was TST training required by employer (odds ratio [OR], 20.4; 95% CI 4.2–99.2), followed by pharmacists feeling strongly confident in their ability to administer the TST (OR, 14.2; 95% CI 2.8–71.2), having a consulting room available at the pharmacy practice (OR, 11.7; 95% CI 2.1–64.4), and compared to a chain practice setting, the setting being a clinic, hospital, or other setting (OR, 0.03; 95% CI 0.001–0.55) or an independent pharmacy setting (OR, 4.3; 95% CI 0.6–30.1).

Most of the independent pharmacies (13/15) were located in small cities, whereas all the clinic, hospital, or other pharmacy settings were in large cities. Similarly, most of the independent pharmacies currently testing had a consulting room available (13/15), and of those with a consulting room, 85% were administering TSTs. The majority of the clinic, hospital, or other settings did not have a consulting room available (13/19), and of those with a consulting room available, only 1 of 6 was performing TSTs. Among chain pharmacies, approximately two-thirds had a consulting room available, and of those, approximately 75% were performing TSTs.

Forty-four pharmacists certified to perform TSTs in New Mexico were not currently providing this service. The most common reason reported for not performing TB testing was lack of employer support (29/44; 65.9%). Only 9.1% and 6.8% of pharmacists responded time required to perform TST or inadequate training, respectively, as reasons for not performing TSTs.

## Discussion

Results from this study show that the PPTST program in New Mexico has seen significant utilization. More than 200 pharmacists have completed the TST training, and, based on our survey results, nearly half of our study respondents were actively testing. Pharmacists are performing TSTs in urban and small cities that serve large rural areas in the state where access to TST might not be otherwise available. Most New Mexico pharmacists who have obtained the TST training are in a community pharmacy setting and report that TB testing is

an opportunity to expand their skillset and provide more public health services to their communities.

TST training and program implementation for pharmacists are limited around the country. However, based on current programs,<sup>2,3,13</sup> TST training and implementation does not require a large time or resource commitment. The current New Mexico Pharmacist TST training entails a 1-hour pre-recorded webinar, followed by 3 hours of in-class education that involves administration and reading of TSTs. The training is cosponsored by the New Mexico Department of Health (DOH) TB Program and the New Mexico Pharmacists' Association (NMPhA) and is offered quarterly. The training is conducted by a registered nurse who is the TB Program Manager at the New Mexico Department of Health. New Mexico pharmacy students are also able to take the NM DOH/NMPhA TST training for free, as it has not yet been integrated into the current curriculum. In Idaho, pharmacists complete a Centers for Disease Control and Prevention Web-based TB testing course.<sup>3</sup> Washington State allows TB skin testing under collaborative practice agreements, and the Washington State Pharmacy Association offers a self-study training followed by a 1-on-1 training–practicum with preceptors rather than structured classes.<sup>13</sup> Washington State University and University of Washington have also integrated TST training into the pharmacy school curriculums.<sup>14,15</sup>

New Mexico pharmacists who completed the TST training course and responded to the survey believe that the training time was adequate and were confident in their ability to administer and interpret the TST. Confidence in their ability to administer and interpret the TST was positively associated with pharmacist implementation of the TST into pharmacy practice.

There were approximately 49% of study respondents who completed the TST training but reported that they were not testing. This is similar to the results published in 2015.<sup>2</sup> The current study suggests that failure to implement PPTST into practice settings was not due to insufficient training or lack of confidence. Lack of employer support was the primary reason for not providing TSTs, likely because of concerns regarding reimbursement and time.

Data from this study illustrate that TB skin testing should not impede workflow because the testing is accomplished quickly, and pharmacists are typically only administering 1–2 tests per week. The TST is also inexpensive, and the low cost can be passed on to the patient. In New Mexico, insurance does not cover the TST. Most pharmacies in New Mexico charge approximately \$40 per TST, which is typically less than other physician and nursing clinic locations. The pharmacy cost for the test is typically less than \$5 per test, making this a viable and potentially profitable service for community pharmacies to provide.

There is also a need for this service as previously demonstrated in 2015, with more than 600 tests performed by 25 pharmacists within 2 years of launching the initiative.<sup>2</sup> Despite some inherent drawbacks to the TST (e.g., requirement of follow-up reading, decreased specificity in some populations), it is unlikely to be replaced by the currently available blood tests (e.g., interferon-gamma release assays), which also have a number of limitations.<sup>16–19</sup> The community pharmacy setting provides an additional setting for TB skin testing. High TST

follow-up reading rates have previously been demonstrated in this setting.<sup>2,20</sup> The data from this study show that the current incentives are insufficient for all employers and management to allow pharmacists to perform TSTs, despite pharmacists being willing to provide this public health service. Consideration should be given to what additional incentives might encourage broader adoption of this service.

Although this study provides important information on PPTST, there are limitations to the study. We were unable to contact all TST-trained pharmacists for our study because of missing or old contact information. As a result, our small convenience sample size produced wide confidence intervals for some of our OR estimates, potentially overstating the OR estimates for some factors.<sup>21</sup> However, 95% (94/99) of pharmacists who were reached agreed to participate in the study. The results are representative of pharmacists who decided to complete the optional TST training and may not be able to be generalizable to all pharmacists. When conducting a telephone survey, there is potential for recall and reporting bias. Some study participants were contacted a number of years after their initial TST training. Most pharmacists were reached at work, which might have also affected responses if they felt rushed.

## Conclusion

The study results demonstrate that pharmacist-performed TB skin testing is feasible and easy to implement and that there is a demand for this public health service. However, employer support is vital to implementation of this service.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1**

Demographic data of survey participants (N = 94)

<b>Demographic</b>	<b>Data</b>
Sex, n (%)	
Female	57 (60.6)
Male	37 (39.4)
Mean age, years (SD)	
	37.7 (11.8)
Licensure status during training, n (%)	
Pharmacist	71 (75.5)
Student	23 (24.5)
Mean years of practice (SD)	
	11.4(12.2)
Current practice setting, n (%)	
Chain	57 (60.6)
Independent	16(17)
Hospital	15 (16)
Clinic	2 (2.1)
Other	4 (4.3)

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**Table 2**  
Survey responses among participants currently employed and living in New Mexico

Variable	Not testing		Currently testing		P value <sup>a</sup>
	N	%	N	%	
Respondents (N = 89)	44	49.4	45	50.6	
Female sex	29	65.9	25	55.6	0.32
Current age <sup>b</sup> (mean, SD)	34.6	8.9	40.4	12.9	0.02
TB testing certification completed as a					0.42
Pharmacist	32	72.7	36	80.0	
Student	12	27.3	9	20.0	
> 10 years of practice as a pharmacist	12	27.3	22	48.9	0.04
Practice setting					< 0.0001
Chain	24	54.5	31	68.9	
Clinic, hospital, other	18	40.9	1	2.2	
Independent	2	4.5	13	28.9	
Large city ( > 50,000 population)	36	81.8	26	57.8	0.01
Pharmacy practice has a consulting room	17	38.6	38	84.4	< 0.0001
City or town of current practice site has TB testing available at a location other than pharmacy	40	90.9	37	82.2	0.49
Other location requires an appointment (% of other location sites)	5	12.5	8	21.6	0.24
Other location testing free (% of other location sites)	0	0.0	1	2.7	0.42
Reason for obtaining TB testing certification (could choose more than one)					
Required by employer	5	11.4	28	62.2	< 0.0001
Gain skills or certification	42	95.5	45	100.0	0.15
To affect public health	41	93.2	43	95.6	0.63
Revenue source	6	13.6	24	53.3	< 0.0001
Other	2	4.5	2	4.4	0.98
Strongly confident in administering TB test	13	29.5	26	57.8	0.01

Abbreviation used: TB, tuberculosis.

<sup>a</sup>Statistical significance determined using a chi-squared test for frequencies and *t* test for mean values.

There were 2 missing current age observations: 1 in each group.  
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