Birth Cohort Screening for Latent Tuberculosis Infection in Arkansas; A Proposal

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BACKGROUND

- Drugs for tuberculosis (TB) treatments were developed after 1950 (**Fig. 1**)
- People born prior to 1951 are at higher risk of *Mycobacterium tuberculosis* (*M. tb*) exposure and latent TB infection (LTBI)
- LTBI affects 4.7% of the US population (approximately 13 million people)
- 189 TB cases (39.0% of all US-born cases) between 2009 and 2014 in Arkansas were born prior to 1951 (**Table 1**)
- 19 of 25 (76.0%) TB cases reported after death were born prior to 1951; also, 28 of 52 (53.8%) cases that died during treatment in Arkansas.

Figure 1. Timeline for Discovery of TB Drugs

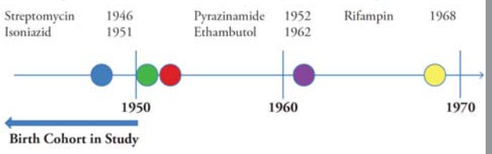
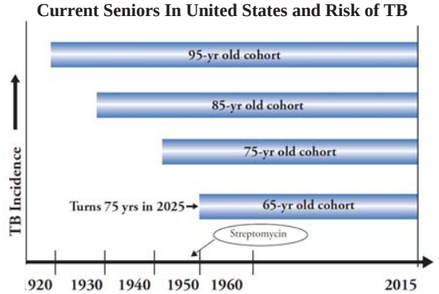


Table 1. TB Cases Among US-Born Residents in Arkansas (2009-2017)

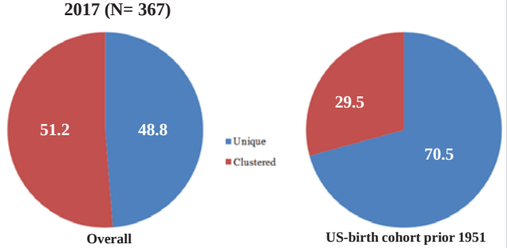
Year	US-born TB Cases	
	Total	Prior 1951 Birth Cohort Cases (%)
2009	59	28 (47.4)
2010	53	19 (35.8)
2011	61	24 (39.4)
2012	47	22 (46.8)
2013	48	25 (52.1)
2014	58	24 (41.4)
2015	59	19 (32.2)
2016	46	16 (34.8)
2017	53	12 (22.6)
Total	484	189 (39.0)

Figure 2. Birth Cohort Effect Model, 1920-1950: Current Seniors In United States and Risk of TB



- Genotyping: birth cohort cases: higher proportion of unique genotype (**Fig. 3**)
- Screening for LTBI allows early detection of active disease
- Early detection of active disease reduces risk of TB transmission, complications, and death

Figure 3. TB Genotyping Clusters; Evidence of Remote TB Transmission Arkansas, 2009-2017 (N= 367)



- People in the target birth cohort are vulnerable to delays in TB diagnosis
  - High LTBI prevalence
  - Waning immunity with increasing age
  - TB symptoms resembling other chronic conditions
  - Reduced TB awareness in the US
- US Preventive Task Force (2016) recommends LTBI screening among the following high-risk groups:
  - HIV infected, homeless, foreign born.
  - The target birth cohort was not recognized as "at high risk" in the latest recommendation
- Reliable estimate of the true LTBI prevalence among the birth cohort is not available, due to lack of population-based screening

OBJECTIVES

1. Determine prevalence of LTBI among Arkansans born prior to 1951
2. Prevent TB-related complications and deaths in this birth cohort
3. Raise TB awareness among providers and community

METHODS

OVERALL
A population-based LTBI screening program, of 10,000 Arkansans born prior to 1951

Develop Materials
- Educational pamphlet
- Letter to physician
- LTBI clinical from

Enroll Clinics
- Multi-approach:
  - County health officers
  - UAMS Institute on Aging
  - Arkansas Academy of Family Physicians

Train Staff
- TB awareness
- T.SPOT protocol

PREPARATION

Educate Patient
- Distribute educational materials
- Q&A
- Encourage patient participation

Implement Screening
- Baseline T.SPOT test
- Offered to people born prior to 1951 during routine clinic visits
- Samples analyzed at Oxford Immunotec lab (Memphis, TN)

Collect Data
- Reports from Oxford Immunotec
- Stratified by reason for screening
  - Contact investigation
  - Targeted testing

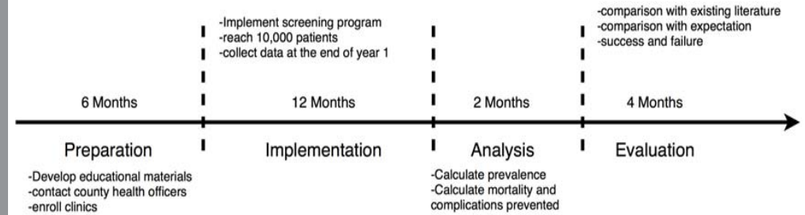
IMPLEMENTATION

Analyze data
- Prevalence of LTBI in the target birth cohort
- Comparison of LTBI prevalence in birth cohort with:
  - LTBI prevalence in general population
  - Previous hypothesis (10%)
- Prevented complications and death

Interpret findings
- Effectiveness
- Current recommendations
- Program sustainability

EVALUATION

Figure 4. Project timeline



DISCUSSION

- **Potential impacts**
  - Add to current knowledge of LTBI
  - Inform decisions for screening LTBI
  - Shorten delays in diagnosing TB
  - Allow replication of screening programs in other states
- **Seeking a Grant**
  - Project coordinator
  - Education materials
- **Medicare coverage of TB screening (T-SPOT.TB) in this birth cohort**
- **Limitations**
  - Ambitious sample size (10,000)
  - *We believe it's possible given that it's only 2% of the entire birth cohort*
  - Sample not representative because participation is voluntary
    - *We might conduct sensitivity analysis at the end of the project*
  - Some missed TB diagnosis might not be assessable (e.g. those who die before TB diagnoses are made)