



# The cost-effectiveness of testing and treatment for latent tuberculosis infection among foreign-born persons in the U.S.



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## RESEARCH QUESTIONS

- Is it cost-effective to test and treat for latent tuberculosis infection (LTBI) among foreign-born U.S. residents with medical comorbidities?
- Which testing modality maximizes population health outcomes while likely being cost effective?

## BACKGROUND

- 67% of active TB cases occur in persons born outside the U.S.<sup>1</sup>
- Only 7.5% of cases in the foreign-born are due to recent transmission<sup>2</sup>
- Preventing reactivation in the foreign-born is essential to TB elimination in the U.S.
- Evidence shows that testing and treatment in the foreign-born is cost-effective<sup>3</sup>
- Medical comorbidities increase reactivation risk but reduce lifespan, complicating the decision to test and treat

## METHODS

- Simulated one-time testing and treatment for LTBI
- Considered foreign-born U.S. residents with no additional identified risk (NIR), HIV, diabetes mellitus (DM) and end stage renal disease (ESRD)
- Evaluated four strategies: 1) No testing 2) Tuberculin skin test (TST) alone 3) Interferon gamma release assay (IGRA) alone 4) TST-then-IGRA – Diagnosed with LTBI only if both positive
- Applied test characteristics for TST and IGRA ascertained from systematic review and Bayesian meta-regression
- 12 weeks of self-administered isoniazid and rifapentine (3HP)
- Continuous exposure to population-specific background mortality and healthcare costs
- Exponential decline of reactivation rate over time

## TESTING AND TREATMENT COSTS

Item	Cost (2015 \$USD)
TST (plant and read)	\$7.87 <sup>4</sup>
IGRA	\$84.35 <sup>5</sup>
Course 3HP	\$581.80 <sup>4,5,6</sup>

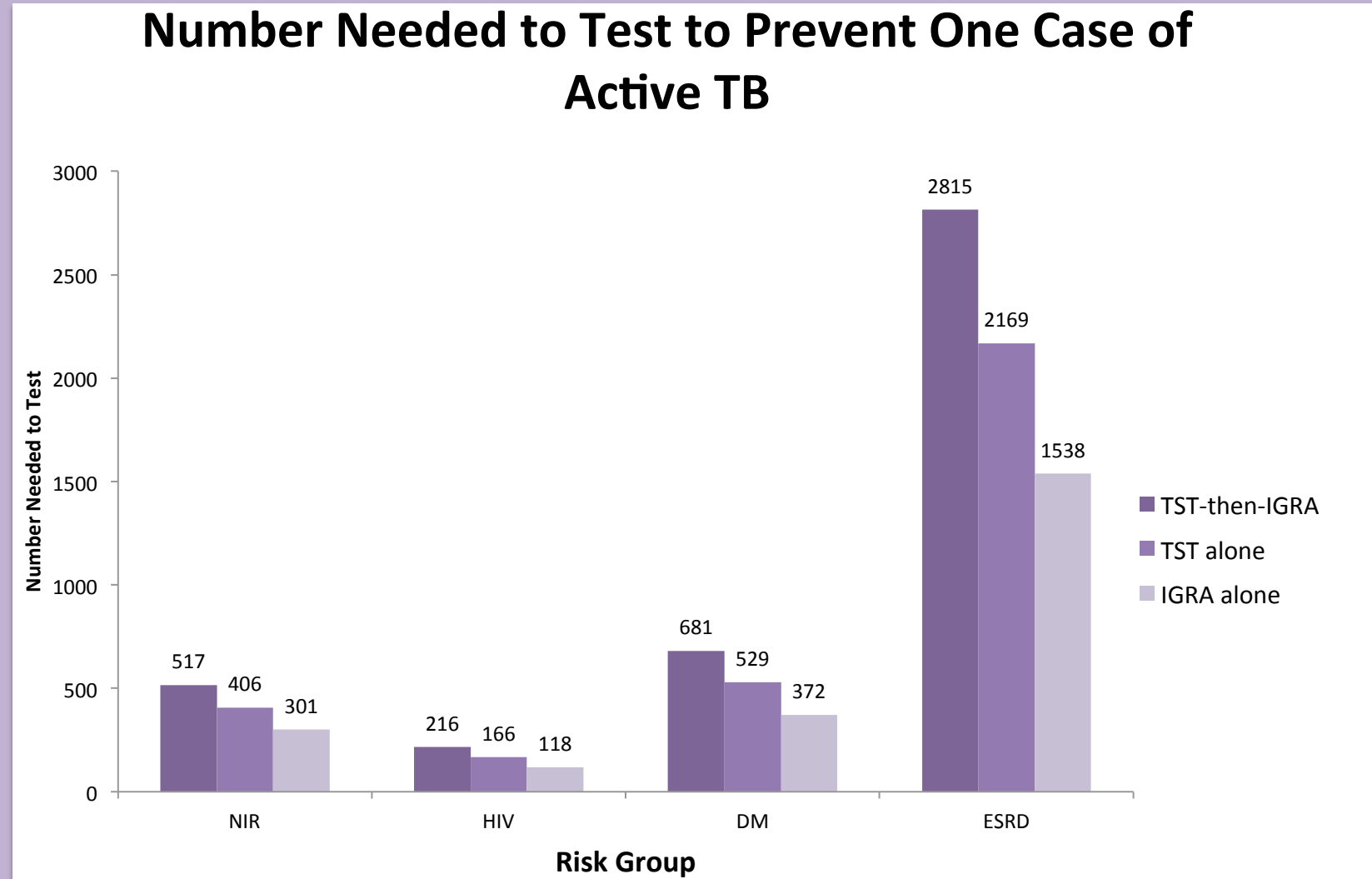
## SELECTED PARAMETERS

Risk Group	NIR	HIV	DM	ESRD
Age (years)	35	35	57	58
Life Expectancy, no LTBI (years)	80 <sup>7</sup>	68.5 <sup>7,8</sup>	75 <sup>9</sup>	62 <sup>9</sup>
LTBI Prevalence	17.5% <sup>10</sup>	17.5% <sup>10</sup>	17.5% <sup>10</sup>	17.5% <sup>10</sup>
Return for TST read	82% <sup>11</sup>	82% <sup>11</sup>	82% <sup>11</sup>	82% <sup>11</sup>
Therapy Completion	78.3% <sup>12</sup>	78.3% <sup>12</sup>	78.3% <sup>12</sup>	78.3% <sup>12</sup>
TST sensitivity (mean)	71.1%	66.7%	66.5%	66.5%
IGRA sensitivity (mean)	78.8%	76.7%	77.5%	77.5%
TST specificity (mean)	88.6%	87.0%	86.6%	86.6%
IGRA specificity (mean)	99.9%	99.2%	97.7%	97.7%

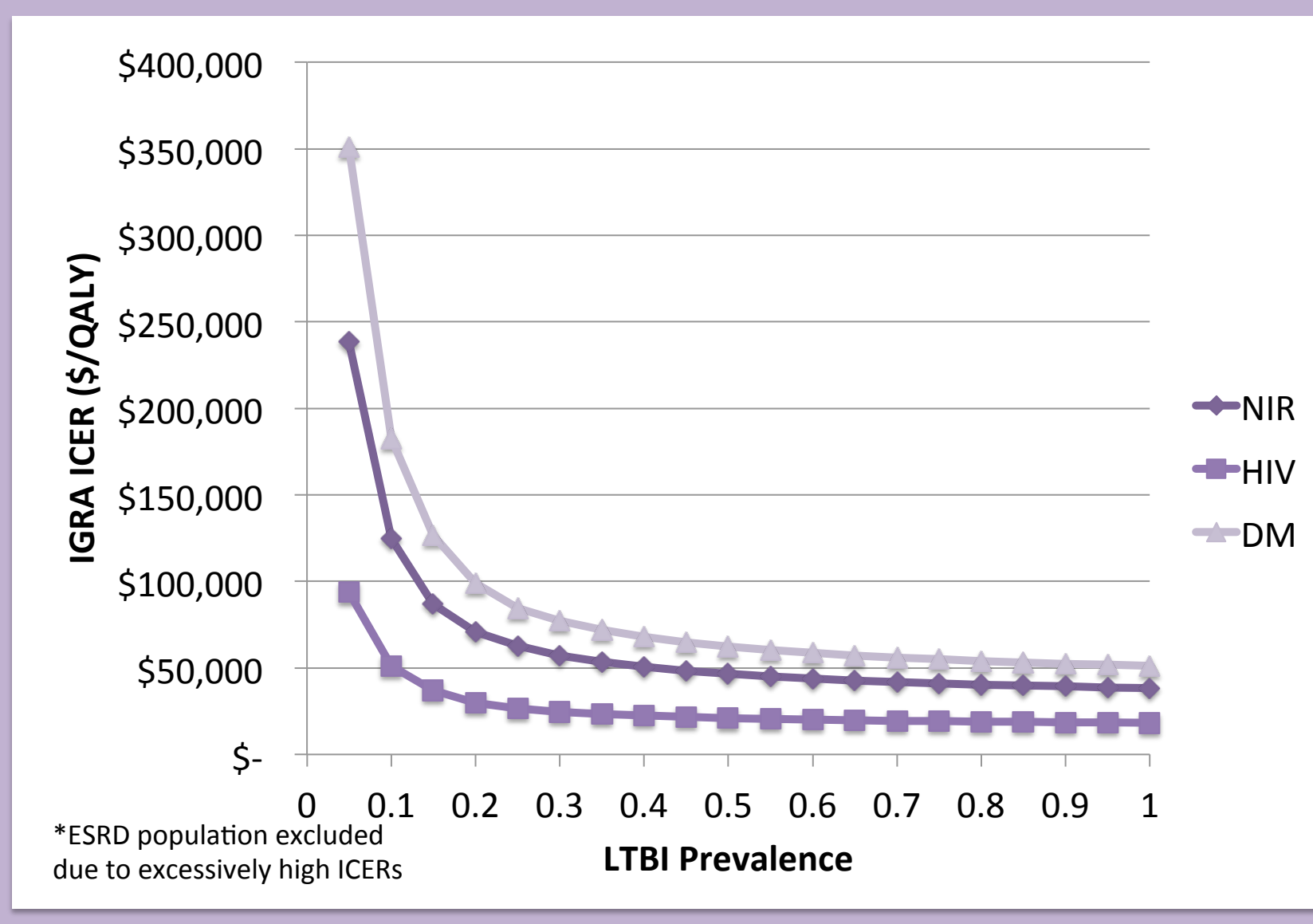
## RESULTS BY RISK GROUP

Strategy	Incr Cost	Incr QALY	ICER (\$/QALY)	Cases of TB per 100,000
<b>No Identified Risk</b>				
No Testing	\$ —	—	—	664
Test TST-then-IGRA	\$ 50	0.00145	\$ 33,700	471
Test TST alone	\$ 30	0.000390	—	418
Test IGRA alone	\$ 81	0.00107	\$ 75,900	332
<b>HIV</b>				
No Testing	\$ —	—	—	1752
Test TST-then-IGRA	\$ 62	0.00351	\$ 17,800	1289
Test TST alone	\$ 37	0.00105	—	1149
Test IGRA alone	\$ 97	0.00293	\$ 33,000	902
<b>Diabetes Mellitus</b>				
No Testing	\$ —	—	—	554
Test TST-then-IGRA	\$ 50	0.000982	\$ 51,200	397
Test TST alone	\$ 34	0.000270	—	355
Test IGRA alone	\$ 90	0.000813	\$ 111,000	275
<b>End Stage Renal Disease</b>				
No Testing	\$ —	—	—	131
Test TST-then-IGRA	\$ 445	0.000180	\$ 2,474,600	95
Test TST alone	\$ 151	0.0000453	—	85
Test IGRA alone	\$ 419	0.000148	\$ 2,831,900	66

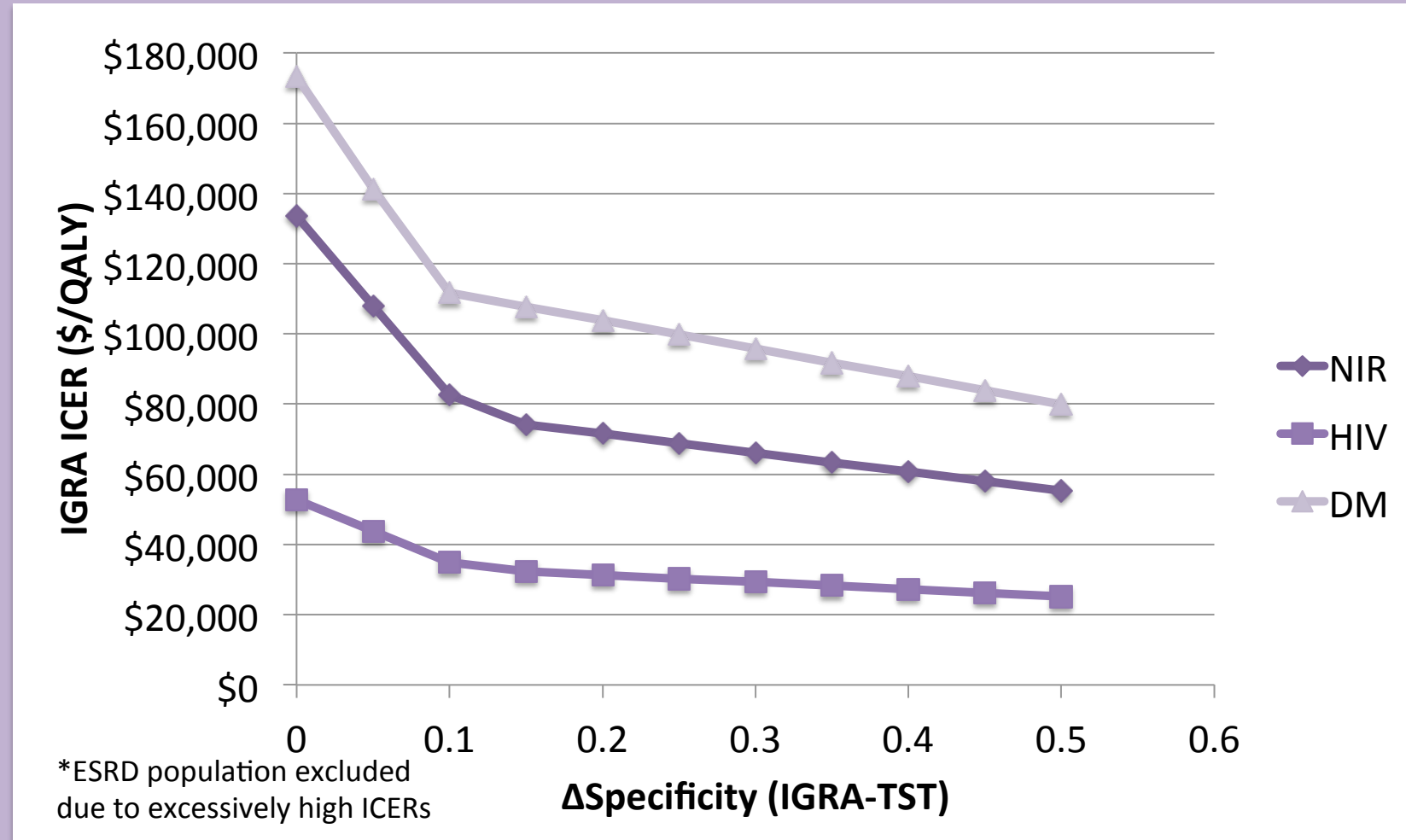
## NUMBER NEEDED TO TEST



## SENSITIVITY ANALYSIS ON LTBI PREVALENCE



## SENSITIVITY ANALYSIS ON TST SPECIFICITY



## CONCLUSIONS

- Testing and treatment for LTBI is likely cost-effective among foreign-born persons with no additional identified medical risk, with HIV or with diabetes
- IGRA alone provides best health outcomes and good value for money, due to higher specificity and sensitivity and no loss to follow-up
- Decreased lifespan reduces the potential impact of testing for LTBI in end-stage renal disease patients, resulting in an unattractive ICER for any examined strategy in this population

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