Best Practices in TB Control

Practical Uses of Epidemiology for TB Control

December 6, 2012

NEW JERSEY MEDICAL SCHOOL GLOBAL TUBERCULOSIS INSTITUTE

Sponsored by the
Global Tuberculosis Institute

Objectives

Upon completion of this seminar, participants will be able to:

- **Describe the application of epidemiologic concepts in TB control**
- **Identify sources of program- and state-level epidemiologic data that can be used in TB program evaluation and monitoring**
- **Discuss the role of epidemiology in monitoring and evaluating TB control program performance**
- **Outline effective strategies for using epidemiologic principles to improve a TB control program at clinic, county, or state level**

Faculty (1)

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Assistant Clinical Professor, Heilbrunn Department of Population & Family Health, Mailman School of Public Health, Columbia University, NY

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Agenda

- Welcome and Introductions – ***Bill Bower***
- Overview: What is epidemiology and what's in it for me? – ***Marian Passannante***
- The clinic is where it all starts – ***Mark Wolman***
- Unveiling the TB among us – ***Patricia High***
- Epi makes a difference at state level – ***Lynn Sosa***
- Making use of epi resources – ***Marian Passannante***
- Questions and Discussion
- Conclusion and Evaluation

Overview: What is Epidemiology and What's in it for me?

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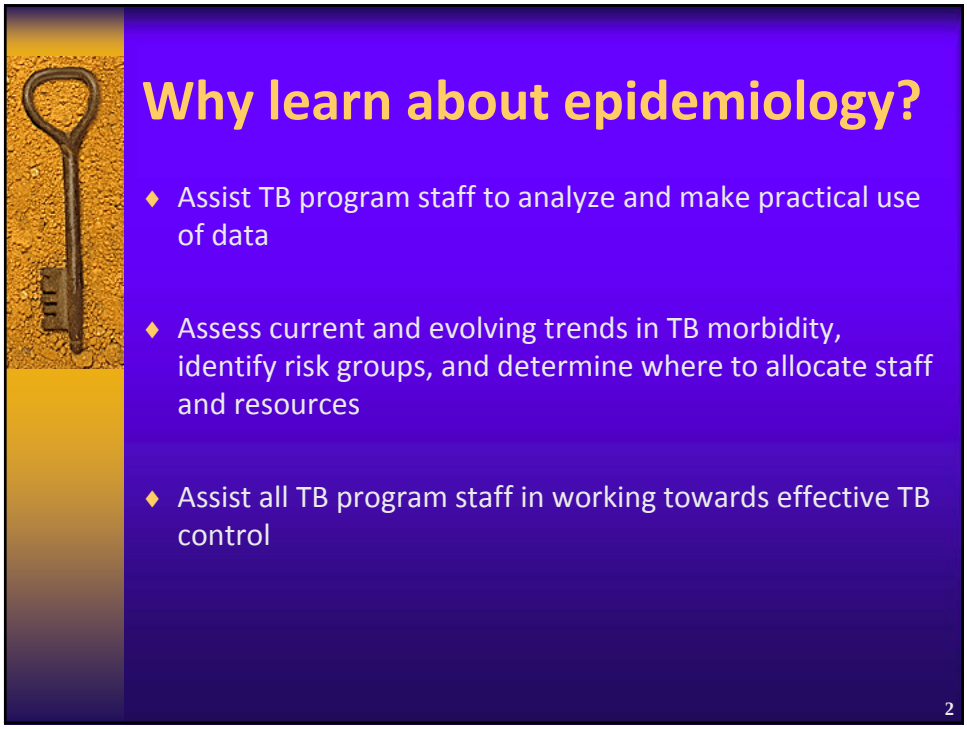
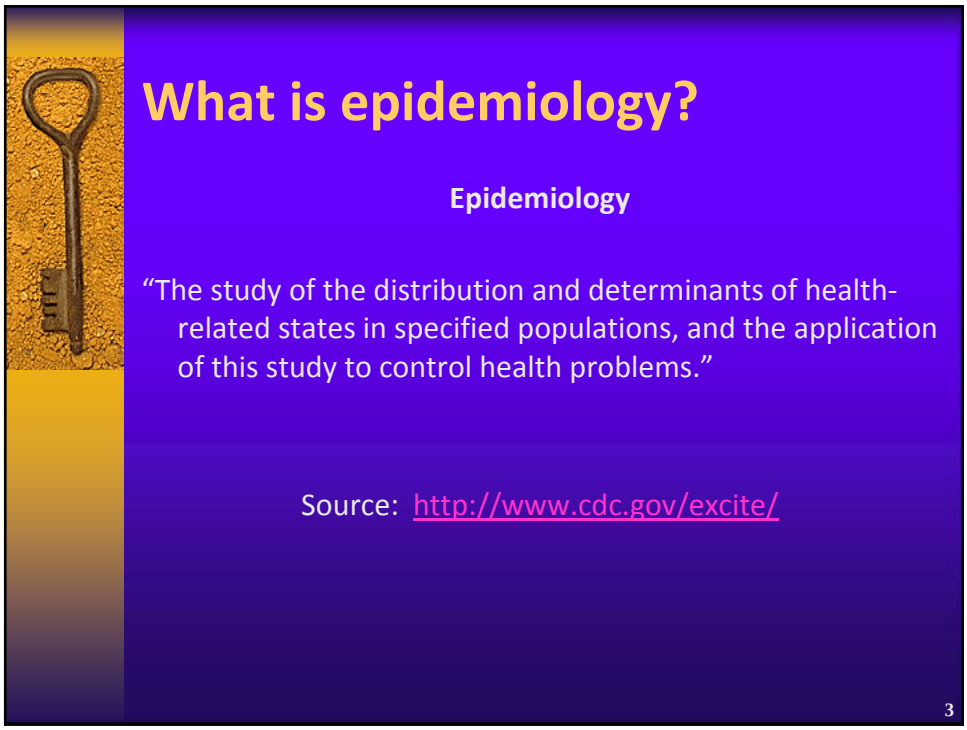
1


Why learn about epidemiology?
Assist TB program staff to analyze and make practical use of data
Assess current and evolving trends in TB morbidity, identify risk groups, and determine where to allocate staff and resources
Assist all TB program staff in working towards effective TB control
2


What is epidemiology?
Epidemiology
"The study of the distribution and determinants of health-related states in specified populations, and the application of this study to control health problems."
Source: http://www.cdc.gov/excite/
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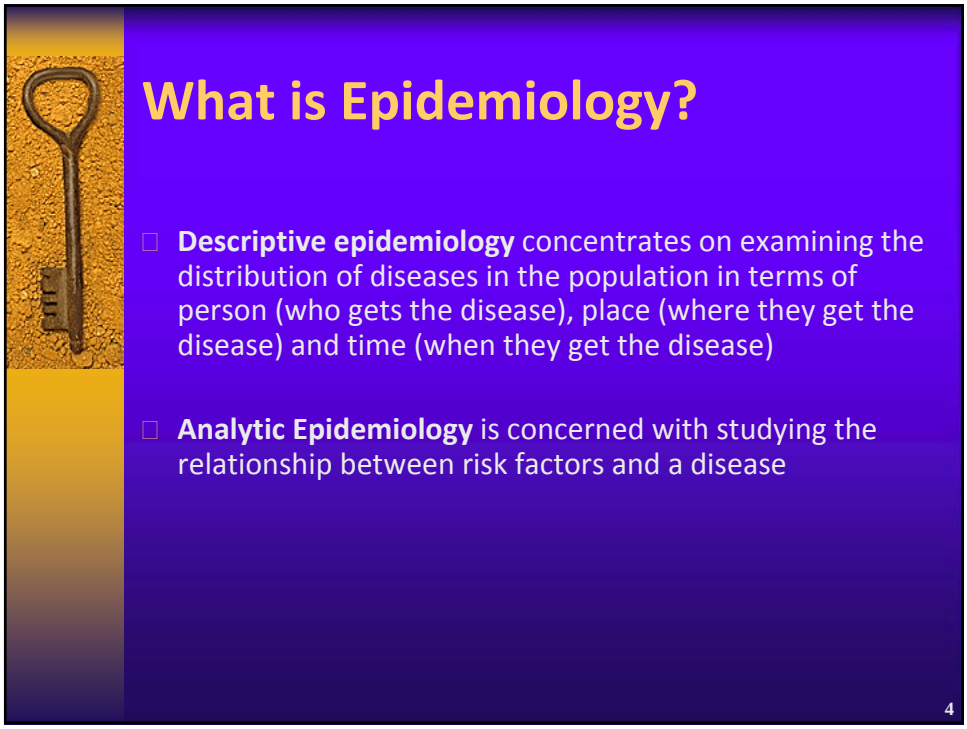
What is Epidemiology?
Descriptive epidemiology concentrates on examining the distribution of diseases in the population in terms of person (who gets the disease), place (where they get the disease) and time (when they get the disease)
Analytic Epidemiology is concerned with studying the relationship between risk factors and a disease
4

How do we find descriptive data?
Public Health Surveillance
The systematic, ongoing collection, analysis, interpretation, and dissemination of health data. The purpose of public health surveillance is to gain knowledge of the patterns of disease, injury, and other health problems in a community so that we can work toward controlling and preventing them.
Source: http://www.cdc.gov/excite/
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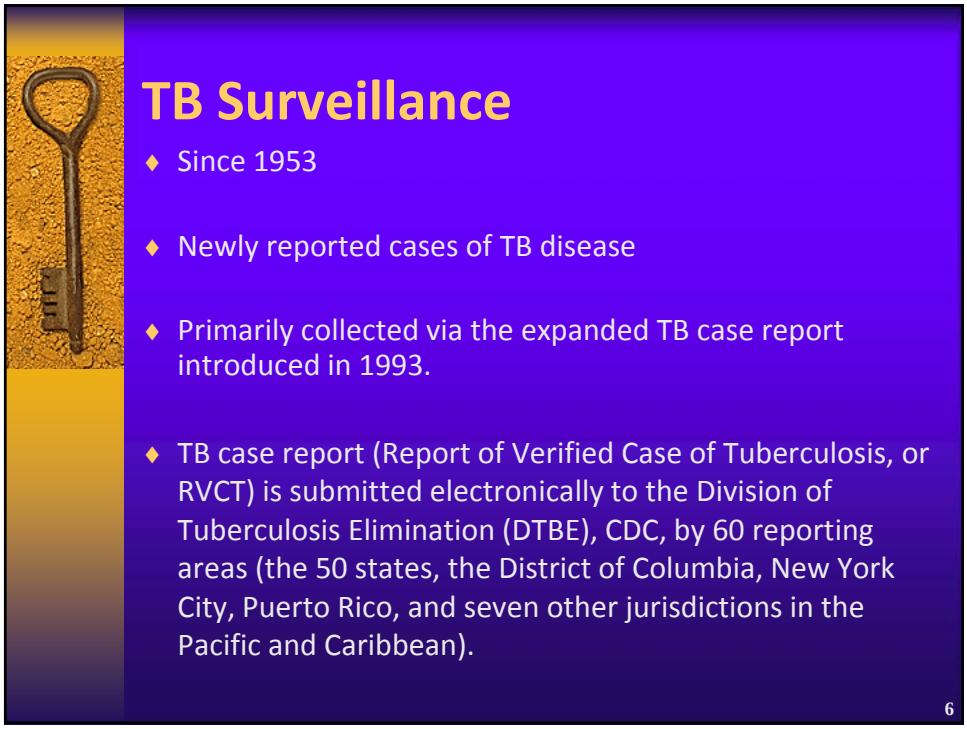
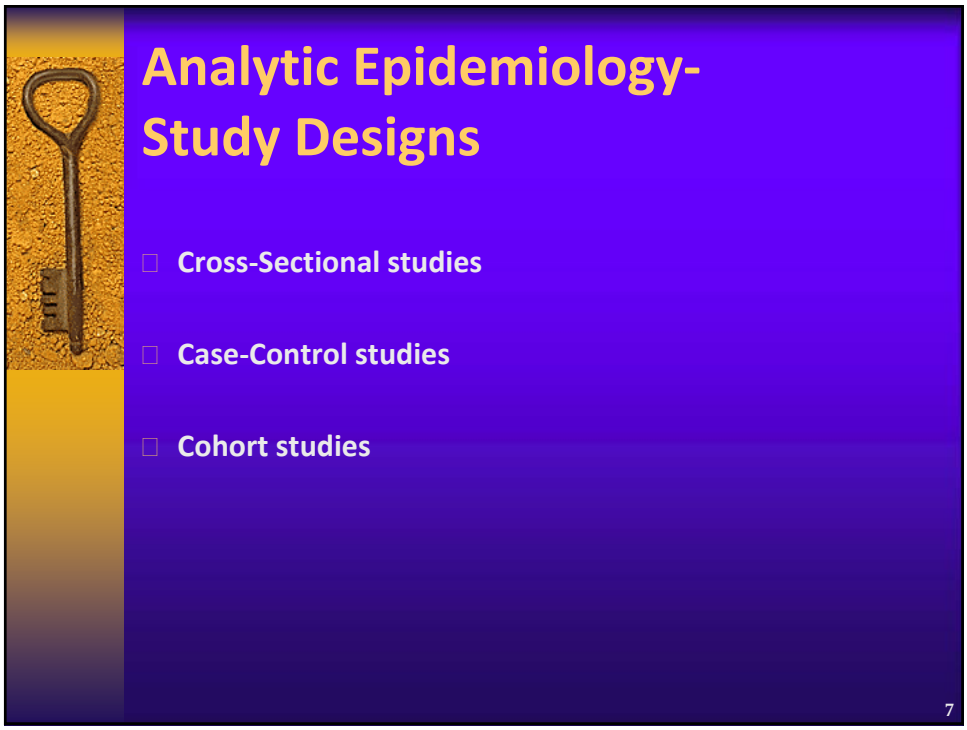
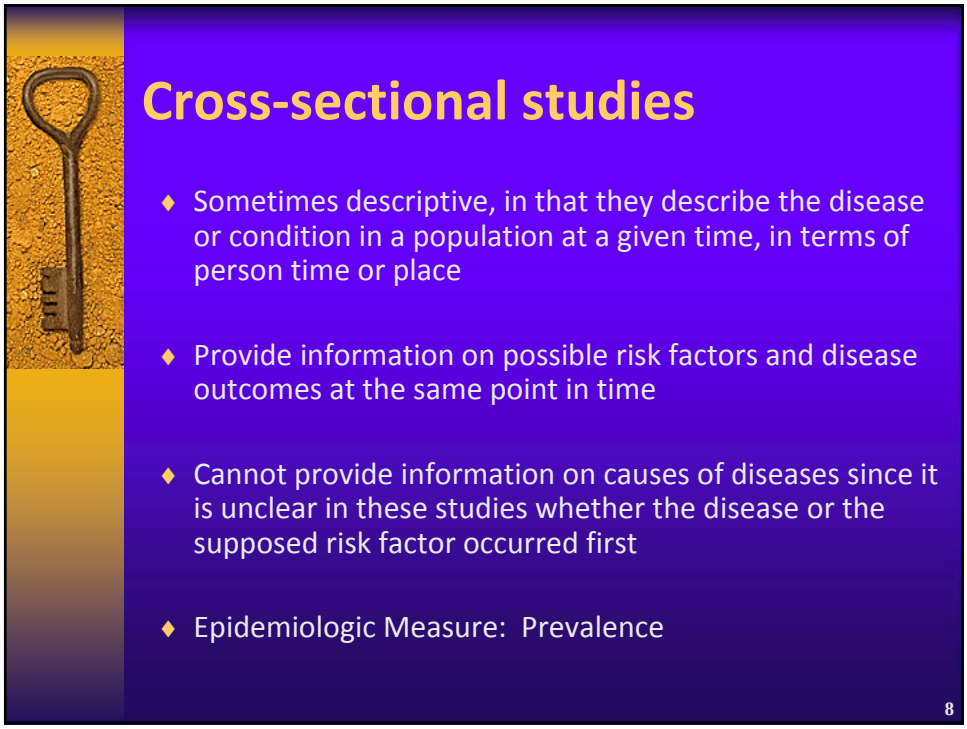
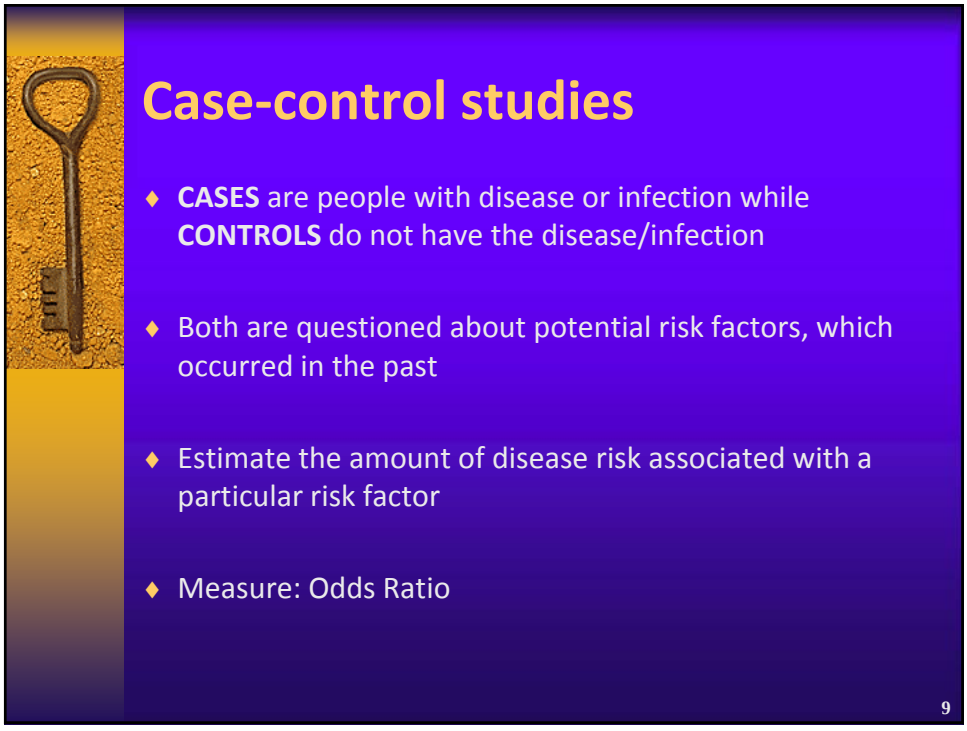
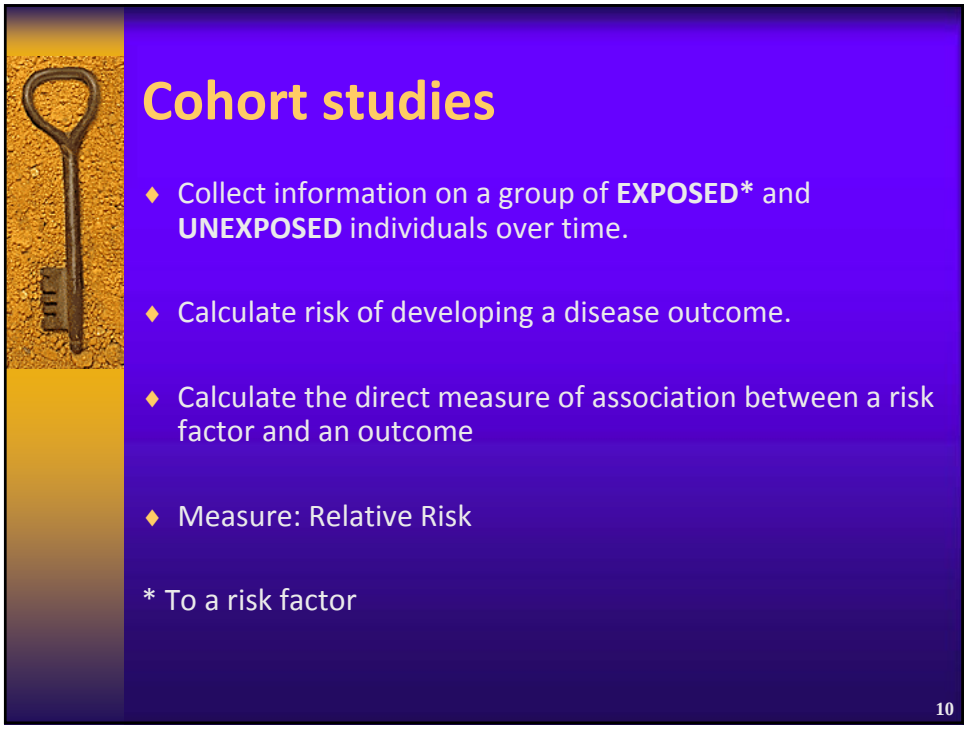

TB Surveillance
Since 1953
Newly reported cases of TB disease
Primarily collected via the expanded TB case report introduced in 1993.
TB case report (Report of Verified Case of Tuberculosis, or RVCT) is submitted electronically to the Division of Tuberculosis Elimination (DTBE), CDC, by 60 reporting areas (the 50 states, the District of Columbia, New York City, Puerto Rico, and seven other jurisdictions in the Pacific and Caribbean).
6


Analytic Epidemiology-Study Designs
Cross-Sectional studies
Case-Control studies
Cohort studies
7


Cross-sectional studies
Sometimes descriptive, in that they describe the disease or condition in a population at a given time, in terms of person time or place
Provide information on possible risk factors and disease outcomes at the same point in time
Cannot provide information on causes of diseases since it is unclear in these studies whether the disease or the supposed risk factor occurred first
Epidemiologic Measure: Prevalence
8


Case-control studies
CASES are people with disease or infection while CONTROLS do not have the disease/infection
Both are questioned about potential risk factors, which occurred in the past
Estimate the amount of disease risk associated with a particular risk factor
Measure: Odds Ratio
9


Cohort studies
Collect information on a group of EXPOSED* and UNEXPOSED individuals over time.
Calculate risk of developing a disease outcome.
Calculate the direct measure of association between a risk factor and an outcome
Measure: Relative Risk
* To a risk factor
10

Clinical trial
Used to assess the effectiveness of clinical therapies (e.g., a new TB drug regiment)
Individuals are assigned to different therapies and then followed over time to measure the outcome of the therapy.
11

Interpreting Epidemiologic Measures

- Cross-Sectional Study: Prevalence
- Case-Control Study: Odds Ratio
- Cohort Study: Relative Risk

- Calculate Confidence Intervals to estimate how much variation there is around these measures

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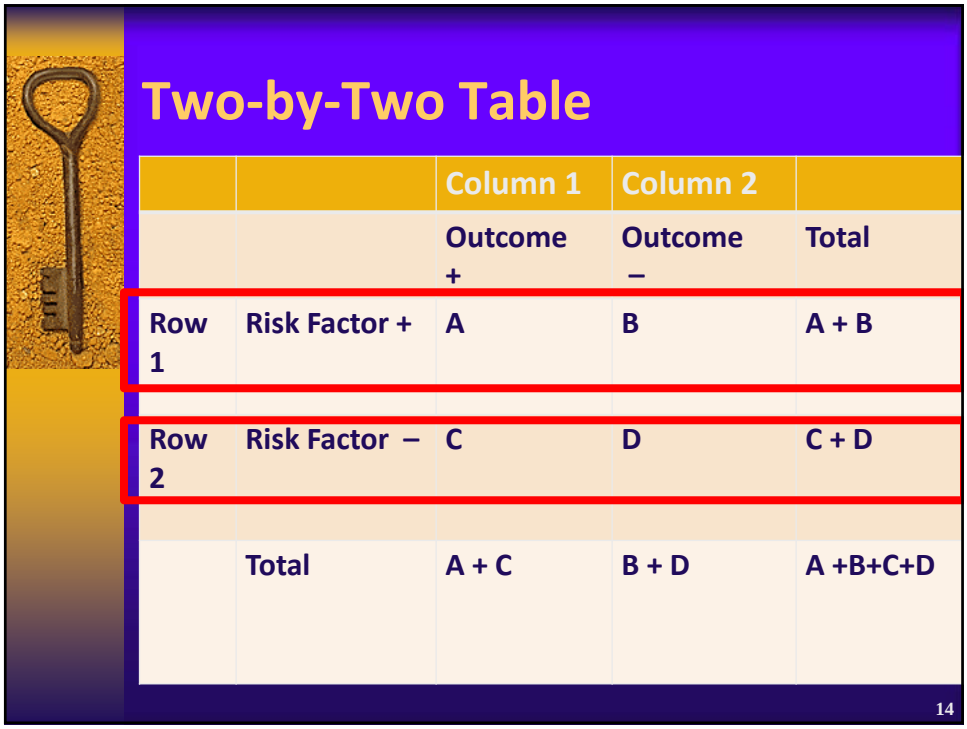
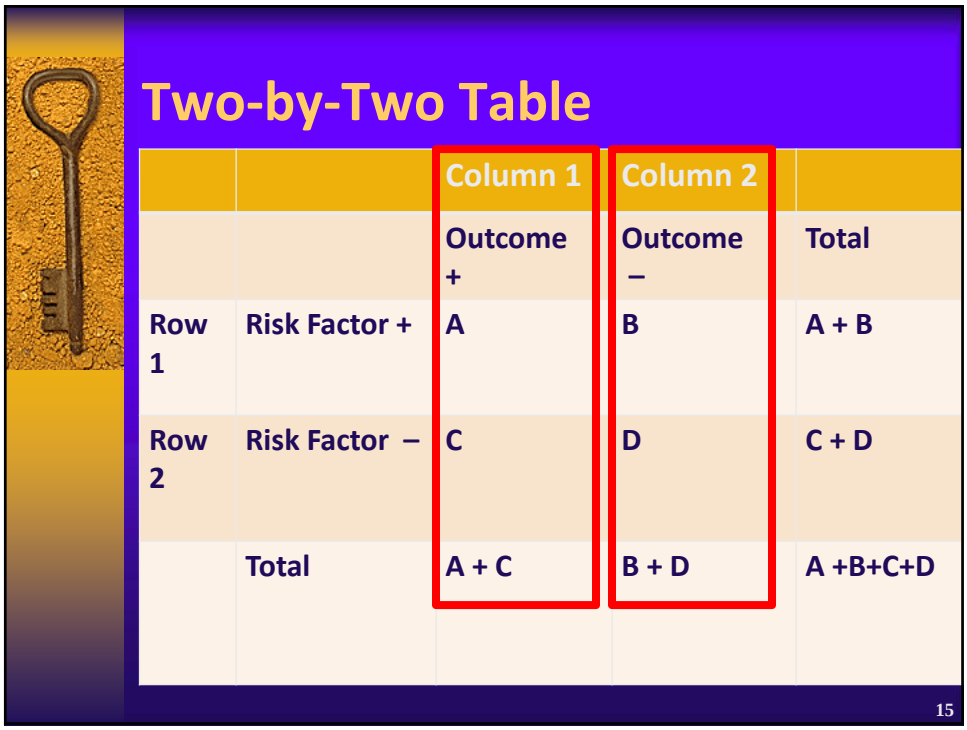
Two-by-Two Table

	Outcome +	Outcome –	Total
Risk Factor +	A	B	A + B
Risk Factor –	C	D	C + D
Total	A + C	B + D	A +B+C+D

13


Two-by-Two Table
Column 1
Column 2
Outcome +
Outcome –
Total
Row 1
Risk Factor +
A
B
A + B
Row 2
Risk Factor –
C
D
C + D
Total
A + C
B + D
A +B+C+D
14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A + B
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C
D
C + D
Total
A + C
B + D
A +B+C+D
15

Two-by-Two Table

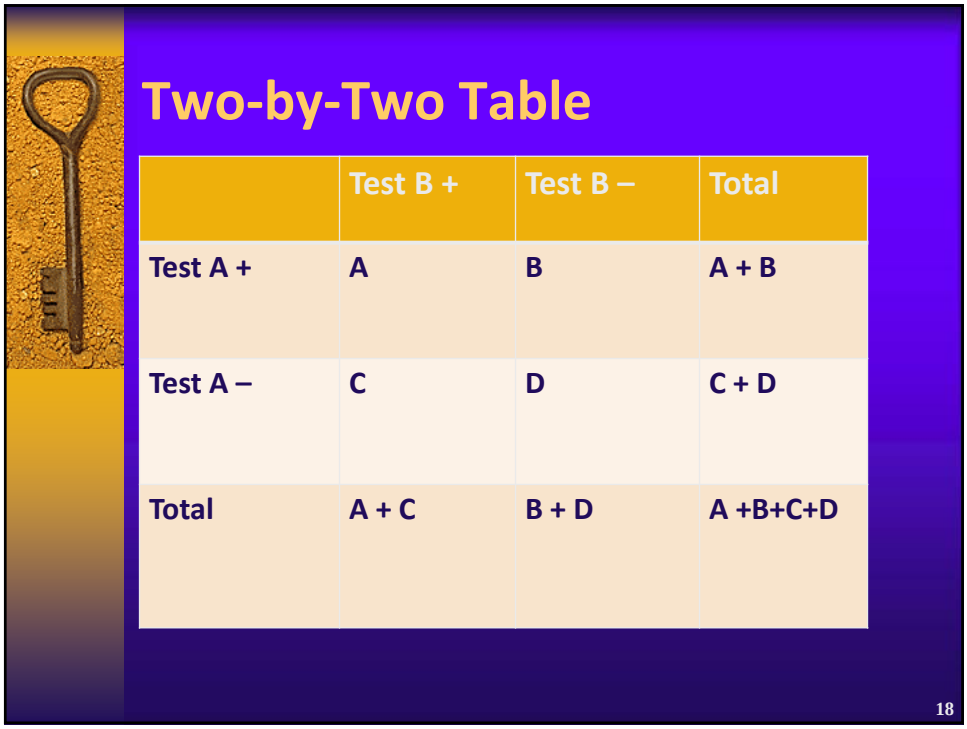
	Outcome +	Outcome –	Total
Risk Factor +	A	B	A + B
Risk Factor –	C	D	C + D
Total	A + C	B + D	A +B+C+D

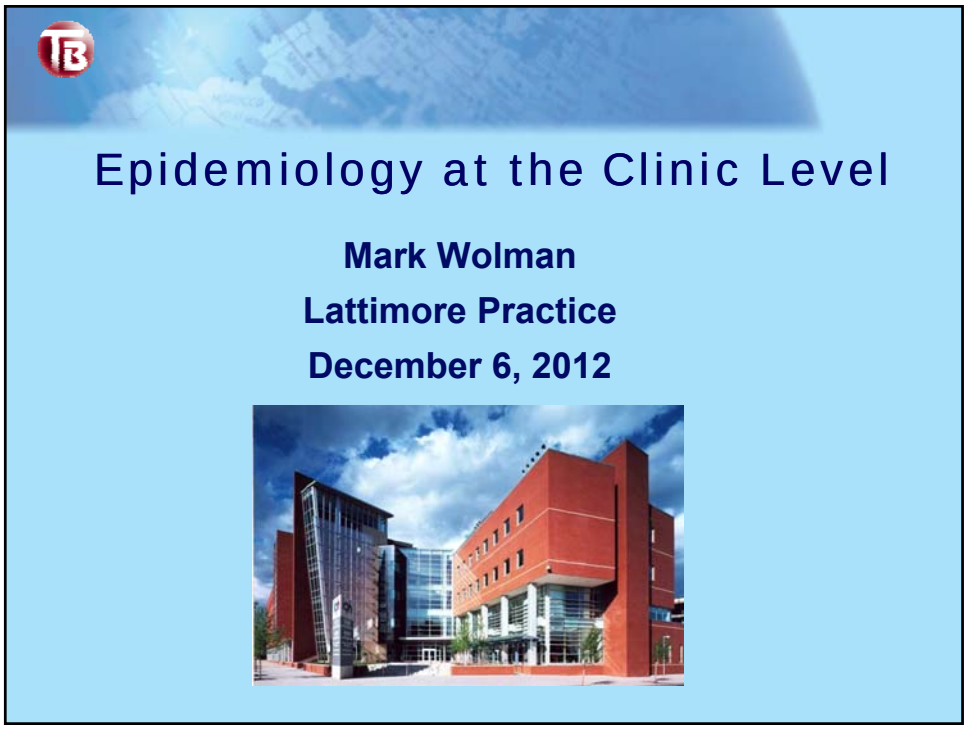
16

Two-by-Two Table

	Outcome +	Outcome –	Total
Risk Factor +	A	B	A + B
Risk Factor –	C	D	C + D
Total	A + C	B +D	A +B+C+D

17


Two-by-Two Table
Test B +
Test B –
Total
Test A +
A
B
A + B
Test A –
C
D
C + D
Total
A + C
B + D
A +B+C+D
18


Epidemiology at the Clinic Level
Mark Wolman
Lattimore Practice
December 6, 2012

TB Classifications and Descriptions - 1

Class A - TB

- Applicants with infectious or potentially infectious tuberculosis disease
- Waiver may be granted to immigrate prior to initiation of treatment or completion of treatment

Class B1 - TB, Pulmonary

- ***No treatment***
- Applicants who have medical history, physical examination or chest x-ray findings suggestive of pulmonary tuberculosis
- AFB smear and culture negative
- Treatment postponed until after immigration

TB Classifications and Descriptions - 2

Class B1 - TB, Pulmonary

- ***Completed treatment***
- Applicants diagnosed with pulmonary tuberculosis
- Successfully completed treatment through directly observed therapy prior to immigration

Class B1 - TB Extrapulmonary

- Applicants with evidence of extrapulmonary tuberculosis
- Treatment postponed until after immigration

TB Classifications and Descriptions - 3

Class B2 - TB, LTBI Evaluation

- applicants with TST ≥10mm or (+) IGRA
- tuberculosis disease typically ruled out through immigration chest x-ray
- treatment postponed until after immigration

Class B3 - TB, Contact Evaluation

- applicants with recent overseas exposure to a known tuberculosis case
- overseas testing for LTBI may or may not be completed
- index case information should be documented

Background - 1

1991 – CDC initially published Technical Instructions (TI) for overseas screening for tuberculosis

2007 – TI revised requiring panel physicians to administer TSTs or IGRAs for individuals between the ages of 2-14 applying for US immigration status

- Children living in countries with TB incidence of ≥20 cases per 100,000 population
- Asymptomatic children with a (+) TST or IGRA and negative chest x-ray categorized as **Class B2**

Background - 2

NJDH & Senior Services TB Program policy indicates the following recommendations for the medical evaluation of Class B2 immigrants:

- Review of current medical history as provided by a parent or adult
- Assessment of both current and overseas medical information
- Current symptom assessment
- TST administered or IGRA collected regardless of documented positive or negative overseas results

Background - 3

2010

- Despite IGRAs being phased into both our clinic practice as well as overseas screening of Class B2 immigrants, the TST remained the predominant method to identify LTBI

- Completing the TB Follow-Up Worksheet with the final domestic medical disposition required
  - ➢ cross-checking the foreign TST results as reported and documented on immigration forms, and
  - ➢ comparing domestic TST results

Background - 4

- Notable discordance in the results captured our attention in further exploring this event of interest
- In an effort to systematically collect, analyze and interpret this health-related data we initiated and conducted a retrospective record review of Class B2 immigrants arriving in three NJ counties between September1, 2009-March 25, 2010
  - Review consisted of comparing foreign and domestic TST results
  - Proportion of discordant TST results were calculated both overall and by country of origin

Findings - 1

- **69 Class B2 immigrants reported for domestic medical evaluations during the review period**
- **23 immigrants were excluded from final review**
  - moved out of jurisdiction
  - unable to locate
  - no documented record of initial TST results
  - retested with QFT

Findings - 2

TST records were reviewed for 46 immigrants comparing foreign and domestic TST results

- 70% (32/46) Dominican Republic
- 23% (11/46) Philippines
- 7% (3/46) other countries

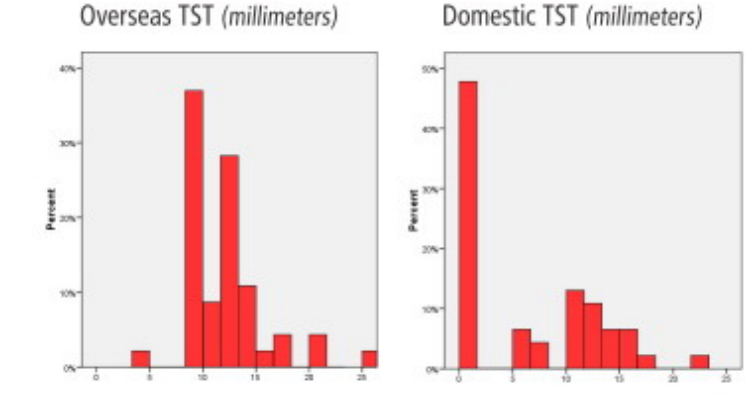
- 67% (31/46) females
- 33% (15/46) males

- Median age 11 years

Findings - 3

- **According to immigration records the majority of foreign (+) TST results clustered between 10-12mm**

Figure 1



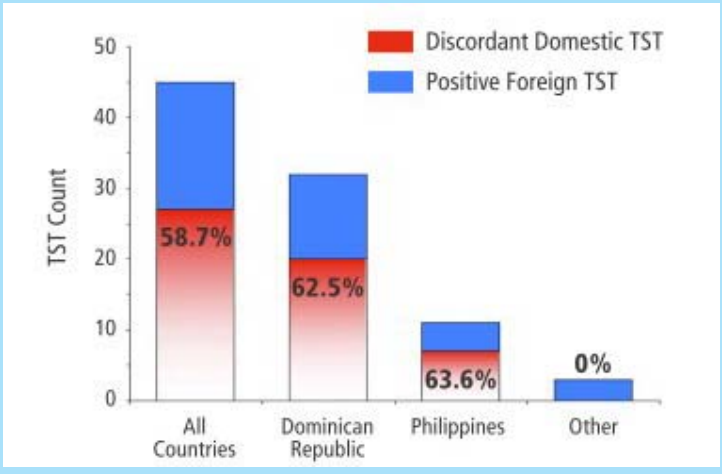
Findings - 4

- **Overall 58.7% (27/46) of Class B2 immigrants with a foreign TST result of ≥10mm had a repeat domestic TST result of 0mm**

Table 1

Foreign TST	Domestic TST		
	≥10mm	<10mm	**Total**
≥10mm	18	27	**45**
<10mm	1	0	**1**
Total	**19**	**27**	**46**

Figure 2



Conclusion - 1

- **Proportion of repeat TSTs recorded as 0mm included**
  - 63% Dominican Republic
  - 64% Philippines
  - 93% of immigrants reviewed originated from these two specific countries
  - This limitation did not allow for an analysis of data from a wider variety of countries
- **The striking discordance between foreign and domestic TST results among Class B2 immigrants from the Dominican Republic and Philippines raised questions about the validity of TST results in those countries**

Conclusion - 2

- **Causes of reported discordance may be attributed to**
  - Improper administration of TSTs and/or
  - Misinterpretation of TST results (erythema vs induration)
- **Inaccuracy of TST results has various and far-reaching implications, including unnecessary**
  - Increased work load at local health departments or clinics
  - Chest x-rays
  - Physician visits
  - Medical treatment
  - Use of limited resources

Conclusion - 3

- As a result of this review a comprehensive study was recommended to address the root cause of this *potentially* widespread phenomenon
- Representatives from CDC recognized this TST discordance and initiated appropriate discussions with their global partners in the Dominican Republic and Philippines in order to implement steps of quality assurance regarding the administering and reading of the TST

Acknowledgments

- Alfred Lardizabal, MD
- Amy Davidow, PHD
- Anna Sevilla, MPH, MBS
- Middlesex County Health Department

Unveiling the TB Among US

USING EPIDEMIOLOGY AT THE COUNTY LEVEL

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INTRODUCTION

- Rates of TB in New Jersey (3.8 cases/100,000 pop. in 2011) continue to exceed the national average (3.4)
- Rate of TB in Ocean County (2.6) falls below the national average
- While cases of TB among US-born are decreasing nationally, US-born cases are increasing in Ocean County
- Underscores the importance of maintaining high levels of suspicion for TB in Ocean County, even among US-born populations

COUNTY DEMOGRAPHY

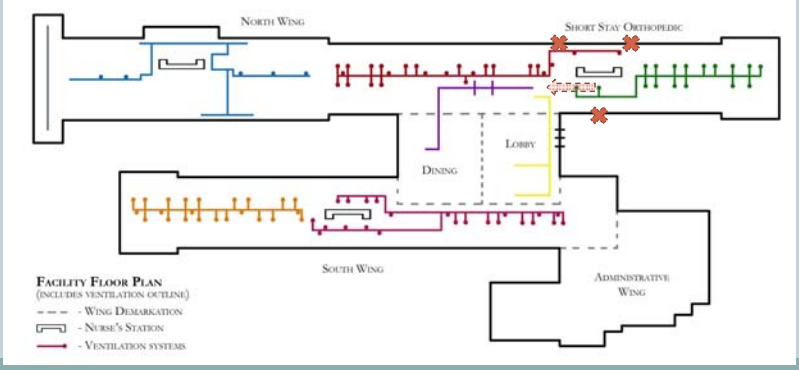
- 21.1% of Ocean County residents are aged 65 years or older compared to 13.7% in NJ and 12.9% in US
- Older residents may be more likely to:
  - be on immunosuppressive medications that may initiate the replication of tuberculin bacilli (TNF-alpha inhibitors),
  - have underlying respiratory or chronic conditions that mask tuberculosis (TB) disease, and/or
  - be overlooked as an at-risk population for TB disease
- Lakewood, Toms River, and Brick have large, urban populations

TB INVESTIGATION OVERVIEW

- In January 2011, annual employee tuberculin skin testing (TST) at a short-term rehabilitation facility identified 4 recent TST converters working on or near the same skilled nursing unit
- No patient or employee had been diagnosed with active TB disease
- All facility staff were tested for TB infection and disease
- Clinical presentation and medical records for patients with pulmonary disease were studied

TB INVESTIGATION OVERVIEW

- Statistical analyses performed – significant increased risk for infection were housekeepers (OR: 4.6, p=<0.01) and nursing administrators on Unit C (OR: 8.7, p=0.01)



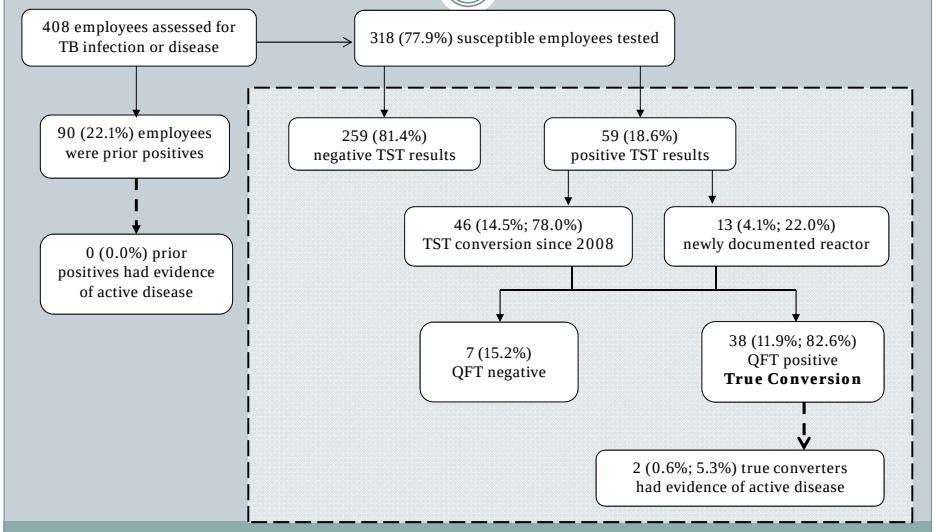
TB INVESTIGATION OVERVIEW

- One patient had medical history including:
  - worsening CXRs with cavitation and bilateral infiltrates,
  - rapid 25lbs weight loss,
  - hemoptysis, increased cough and sputum production x4 mos
  - hoarseness, loss of voice, and vocal cord paralysis
- Patient was US-born 77 year old Caucasian male
- Despite numerous tracheal and pulmonary procedures, AFB smears and cultures were never ordered and TB was never considered in differential
- Cause of death listed as tracheal bronchitis

TB INVESTIGATION OVERVIEW

- The patient's sole household contact tested TST and QFT positive, had recent history of bronchitis, and an abnormal CXR suggestive of TB although sputum has remained smear and culture negative
- All facility staff were tested for TB infection and disease; a total of 59/318 employees tested were found to have TST conversions
  - 90 (22.1%) previously positive TST employees were asymptomatic for TB disease.
  - 59 (18.6%) recent TST converters were identified and 38 (64.4%) of these were positive on subsequent QFT-Gold testing.

TB INVESTIGATION OVERVIEW



TB INVESTIGATION RESULTS

- All 38 QFT positive employees initiated treatment (100% completed treatment course – predominantly 6 mo course of rifampin)
- Facility administration used strong language to encourage treatment for LTBI – critical to the level of treatment completion among health care workers

GAPS IN TB RESPONSE IDENTIFIED

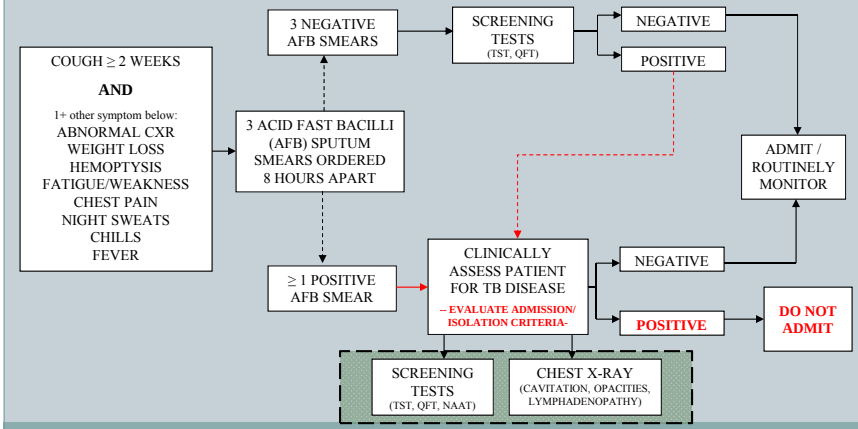
- No one suspected TB!
- Outbreak unveiled gaps in Ocean County's response to TB by:
  - identifying missed opportunities for TB screening in acute care facilities both at the initiation of a TNF-alpha inhibitor and upon presentation of symptoms compatible with active TB disease
  - highlighting the importance of specific sub-acute care admissions policies that include symptom assessments and medical history to rule out active TB disease
  - reinforcing the importance of annual TST for healthcare workers

COUNTY-LEVEL IMPLICATIONS

- In low TB incidence counties, the suspicion for TB is decreased and knowledge about the differential diagnosis of TB is limited
- TB screening and diagnosis remains a critical part of an effective hospital infection prevention program, even in low risk counties
- Administrative controls, including symptom screening and sputum testing, help maintain a high index of suspicion for TB and are critical for the early identification of active TB disease
- As a result of this outbreak, and additional TB cases identified late in the course of illness, 2 of Ocean County's 4 acute care facilities have begun to implement more stringent policies on TB screening for individuals presenting with symptoms compatible with active disease

COUNTY-LEVEL IMPLICATIONS

- All prospective admissions should be screened for TB disease as follows:



CONCLUSION

- Epidemiology was used to highlight gaps in Ocean County's TB response
  - Identify and quantify TB exposure and risk at the facility level
  - Identify possibility of missed diagnoses and its impact on community at large
- Epidemiology supports new recommendations for improvement in county-level TB response across the spectrum of the health care system
  - Acute care administrative controls
  - Sub-acute and long term care admissions policies
  - HCW TB screening
  - Education of non-HCWs in healthcare facilities

Thank you!

A special thanks to all of the individuals that took part in this investigation:

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Tara Grimley-Makowski
Louise Archetti
Daniel Regenye

New Jersey Department of Health:
Karen Galanowsky
Al Cortes

Community Medical Center:
Dr. Isabel Guerrero
Christine Filippone

Analysis of Tuberculosis Deaths Connecticut—2007–2009

Lynn Sosa, MD
Deputy State Epidemiologist
Connecticut Department of Public Health

DPH Keeping Connecticut Healthy

TB Morbidity United States, 2006–2011

Year	No.	Rate*
2006	13,727	4.6
2007	13,278	4.4
2008	12,895	4.2
2009	11,528	3.8
2010	11,171	3.6
2011	10,528	3.4

*Cases per 100,000. Updated as of June 25, 2012.

Connecticut 2011 Incidence

- 83 Cases
  - Lowest number ever reported in CT
- 65 (78%) Foreign-Born
  - 27 (42%) in country ≤5 years
  - 23 different nations (India, Haiti, Philippines)
- 40 (48%) males
- Cases reported in 39 different towns
- Seven cases (7%) co-infected with HIV
- One case was multi-drug resistant (MDR)

TB Mortality

- United States ~550 deaths annually
- Connecticut 2001–2010
  - 80 deaths
  - Median 7 per year
- CDC recommends review of each TB death
  - No standardized method
  - Few TB programs perform reviews

Study Questions

- Were deaths TB-related?
- Did missed opportunities occur?
- Which factors were associated with death of TB patients in Connecticut?

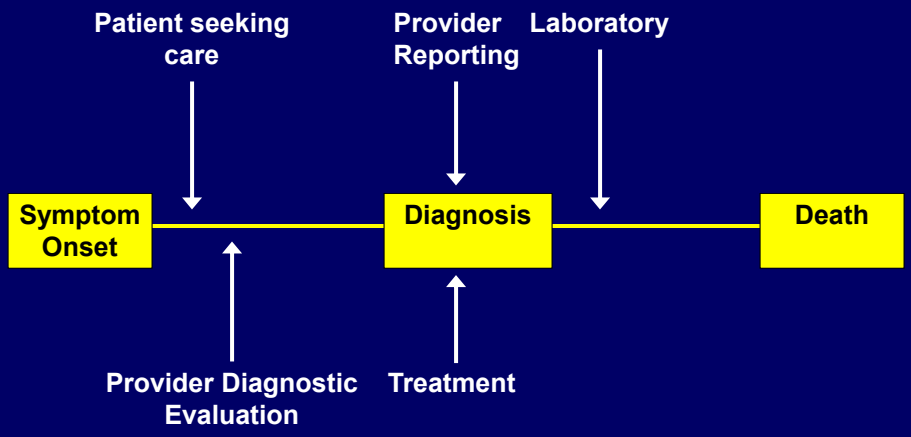
Methods

- 2007–2009 data
- TB Control Program records and medical charts
- Modified California Department of Public Health TB data tool
  - TB-relatedness of deaths
  - Missed opportunities

Algorithm for Determination of TB-related Deaths

- Severity of TB disease
  - Based on: imaging, clinical history, pathology, sputum smear
- TB-related complications
  - Clinical
  - Medications
  - Procedures
- Anatomical site of TB disease
- Cause of death documentation

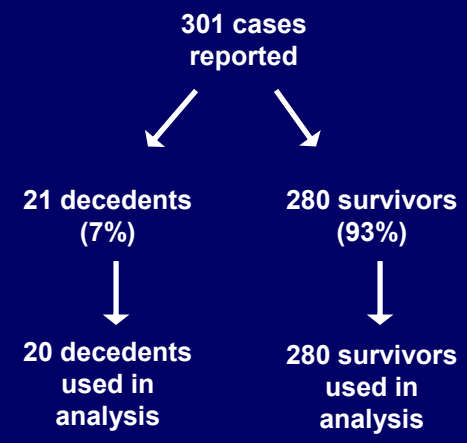
Categories of Missed Opportunities



Analysis

- Descriptive statistics
- Assessment of factors associated with death (cohort study)
  - TB surveillance data
  - Limited subset of variables
  - Chi-square and Fisher's exact tests

Cases Reported and Used in Analysis



Timing of Deaths with Respect to Tuberculosis Diagnosis and Treatment (N=20)

- 14 (70%) died during treatment
- 1 (5%) died before starting treatment
- 5 (25%) diagnosed with TB after death

Demographic Features and Social Risk Factors of Decedents (N=20)

	No. (%)
Age ≥65 years	11 (55)
Male	11 (55)
Foreign born	11 (55)
Excessive alcohol	5 (25)
Injecting drug use	1 (5)
Homeless	2 (10)
Corrections	0 (0)

Clinical Features of Decedents (N=20)

	No. (%)
≥1 Medical comorbidity	14 (70)
Chronic lung disease	4 (29)
Immunosuppressive condition	9 (64)
Disease Site	
Pulmonary only	15 (75)
Extrapulmonary (EP) only	2 (10)
Combined Pulmonary + EP	3 (15)
MDR TB	0 (0)
Respiratory specimen smear positive	10 (53)
HIV positive	1 (11)

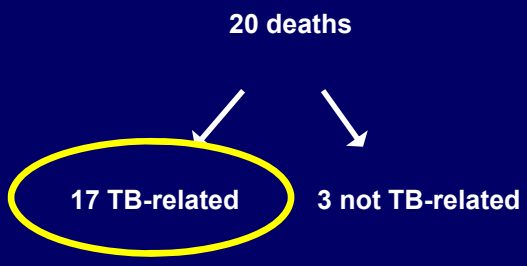
TB-relatedness of Deaths

20 deaths

17 TB-related

3 not TB-related

TB-relatedness of Deaths



Missed Opportunities

94% (16/17) cases with TB-related deaths had ≥ 1 missed opportunity

Missed Opportunities: Case Detection (N=17)

Missed opportunity	No. (%)
Reporting delay	10 (67)
Provider delay starting diagnostic evaluation	5 (31)
Provider delay completing diagnostic evaluation	5 (33)
Laboratory delay initial culture	3 (27)
Patient delay in care	2 (13)

Missed Opportunities: Medical Treatment (N=17)

Missed Opportunity	No. (%)
Laboratory delay initial susceptibility	6 (60)
Inappropriate TB regimen	5 (33)
Delay treatment initiation	3 (19)

Demographic and Clinical Factors and Risk of Death

	With Factor		Without Factor			
	% Died	Total	% Died	Total	RR	CI
Age ≥65 years	21	53	4	247	5.7	2.5–13.1
Male	7	163	7	137	1.0	0.4–2.4
Foreign born	5	224	12	76	0.4	0.2–1.0
Smear positive	9	112	8	119	1.2	0.5–2.8
Combined Pulmonary and EP TB	15	20	6	280	2.5	0.8–7.7
MDR TB	0	5	8	250	0.0	n/a
HIV positive	7	14	4	204	1.8	0.2–13.6
Excessive alcohol use	24	21	5	279	4.4	1.8–11.0
Injecting drug use	25	4	6	296	3.9	0.7–22.5
Homeless	20	10	6	290	3.2	0.9–12.0
Corrections	0	3	7	297	0.00	n/a

Limitations

- Missed opportunities among survivors not assessed
- Missed opportunity ≠ preventable death
- Small cohort size

Conclusions

- Majority of deaths TB-related
- Missed opportunities common
- Factors associated with death included older age and excessive alcohol use
- TB death review valuable, even in low-incidence areas

Public Health Action

- Connecticut TB Control Program instituted regular review of TB patient deaths
- Factors associated with death reviewed for living TB patients during Control Program case management meetings
- Disseminate findings to health care providers and public health partners
  - Educational seminars
  - Publications: local, peer-reviewed journal*
  - Professional meetings: local, national

*Kattan J, Sosa LE, Lobato MN. Tuberculosis mortality: death from a curable disease, Connecticut, 2007-2009. *Int J Tuberc Lung Dis* 2012; 16: 1657–62.

Acknowledgments

- Jessica Kattan, CDC EIS Officer
- Connecticut DPH
  - Matt Cartter
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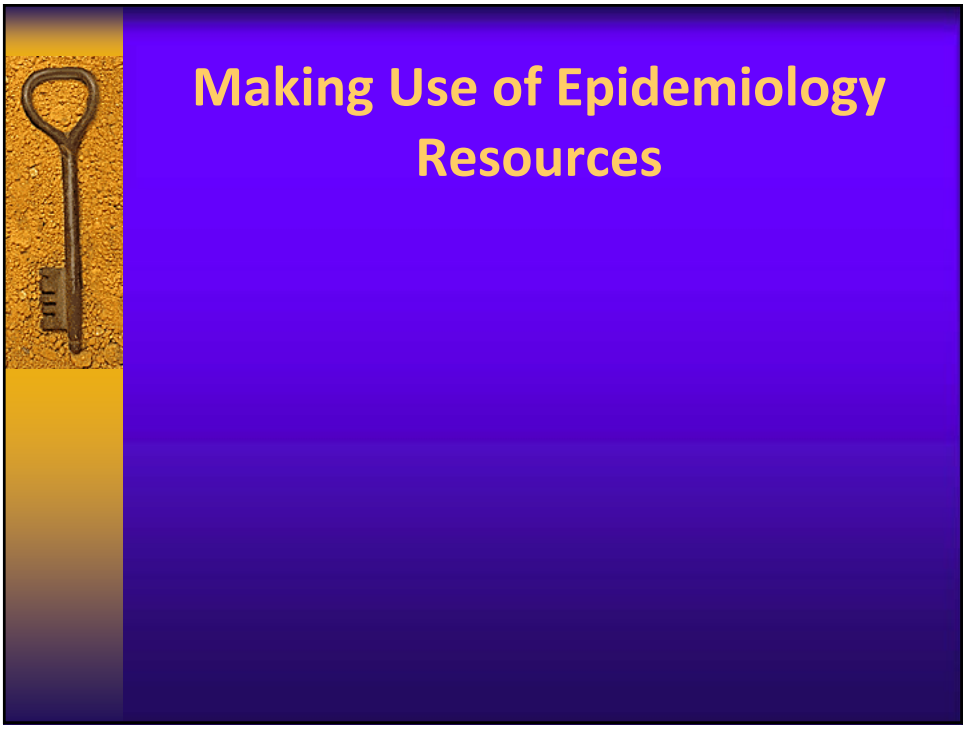
- California DPH
  - Jennifer Flood
- CDC
  - Mark Lobato
  - Sundari Mase
  - Maryam Haddad
  - Julie Magri
- U Conn Health Center
  - Trini Mathew



Making Use of Epidemiology Resources

CDC EXCITE website
http://www.cdc.gov/EXCITE

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http://www.cdc.gov/tb/statistics/reports/2011/default.htm

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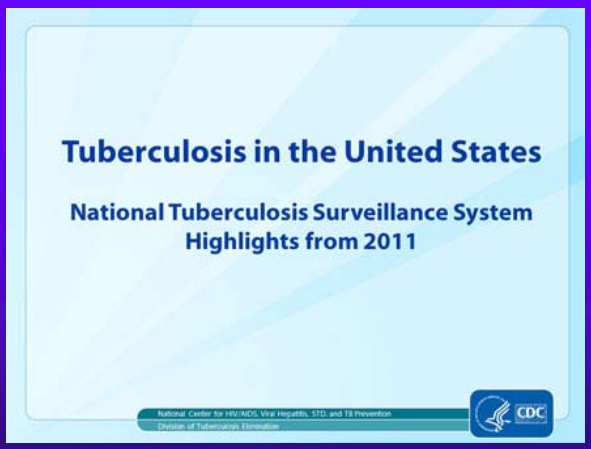
TB Surveillance



http://www.cdc.gov/tb/statistics/reports/2011/default.htm

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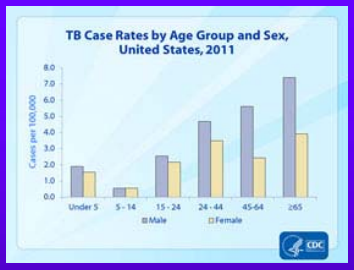
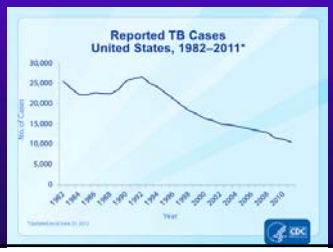
Descriptive Data

person



place

time



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Sources of TB Surveillance Information

Reported Tuberculosis in the United States, 2011
http://www.cdc.gov/tb/statistics/reports/2011/default.htm

Tuberculosis in the United States, 2011 (Slide Set)
http://www.cdc.gov/tb/statistics/surv/surv2011/default.htm

Online Tuberculosis Information System (OTIS)
OTIS is a query-based system containing information on TB cases reported to CDC. http://wonder.cdc.gov/tb.html

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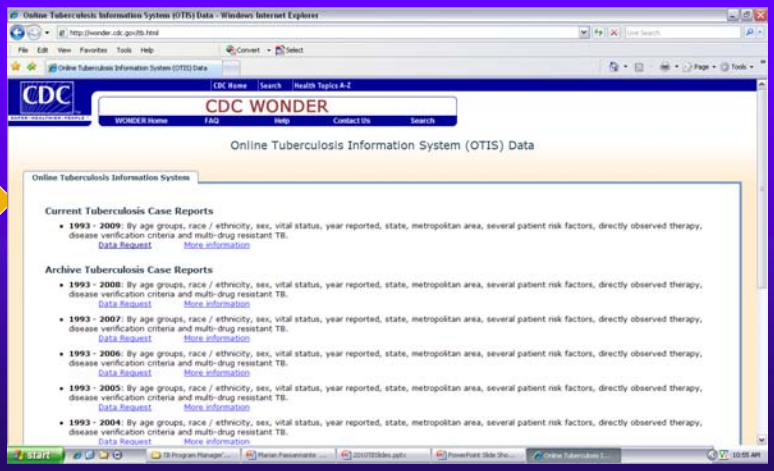
Online Tuberculosis Information System (OTIS)



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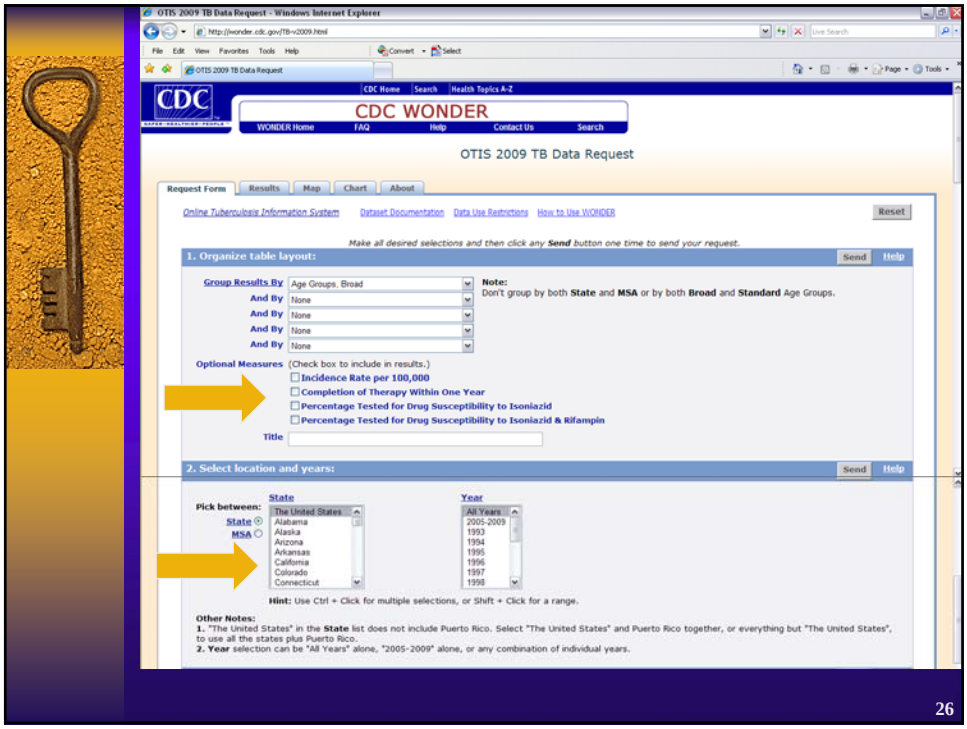
OTIS 2009 TB Data Request - Windows Internet Explorer
CDC WONDER
OTIS 2009 TB Data Request
Request Form
Results
Map
Chart
About
Reset
Make all desired selections and then click any Send button one time to send your request.
1. Organize table layout:
Send
Help
Group Results By
Age Groups, Broad
And By
None
Note:
Don't group by both State and MSA or by both Broad and Standard Age Groups.
Optional Measures
(Check box to include in results.)
Incidence Rate per 100,000
Completion of Therapy Within One Year
Percentage Tested for Drug Susceptibility to Isoniazid
Percentage Tested for Drug Susceptibility to Isoniazid & Rifampin
Title
2. Select location and years:
Pick between:
State
MSA
The United States
Alabama
Alaska
Arizona
Arkansas
California
Colorado
Connecticut
Year
All Years
2005-2009
1993
1994
1995
1996
1997
1998
Hint: Use Ctrl + Click for multiple selections, or Shift + Click for a range.
Other Notes:
1. "The United States" in the State list does not include Puerto Rico. Select "The United States" and Puerto Rico together, or everything but "The United States", to use all the states plus Puerto Rico.
2. Year selection can be "All Years" alone, "2005-2009" alone, or any combination of individual years.

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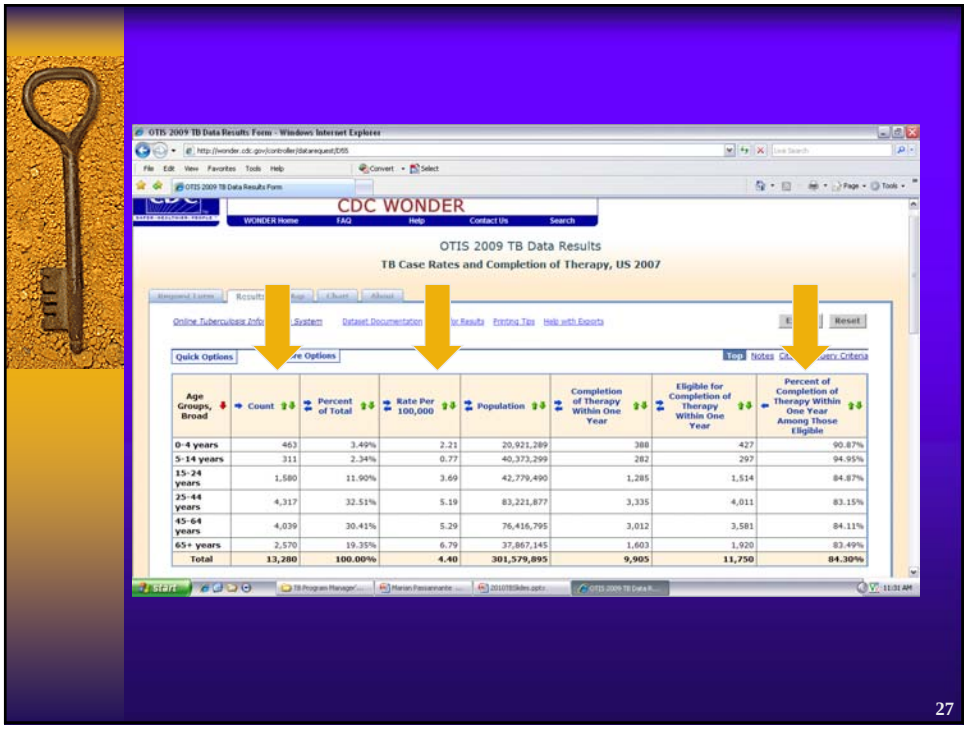
OTIS 2009 TB Data Results Form - Windows Internet Explorer
CDC WONDER
OTIS 2009 TB Data Results
TB Case Rates and Completion of Therapy, US 2007
Reset
Quick Options
Age Groups, Broad
Count
Percent of Total
Rate Per 100,000
Population
Completion of Therapy Within One Year
Eligible for Completion of Therapy Within One Year
Percent of Completion of Therapy Within One Year Among Those Eligible
0-4 years 463 3.49% 2.21 20,921,289 388 427 90.87%
5-14 years 311 2.34% 0.77 40,373,299 282 297 94.95%
15-24 years 1,580 11.90% 3.69 42,779,490 1,285 1,514 84.87%
25-44 years 4,317 32.51% 5.19 83,221,877 3,335 4,011 83.15%
45-64 years 4,039 30.41% 5.29 76,416,795 3,012 3,581 84.11%
65+ years 2,570 19.35% 6.79 37,867,145 1,603 1,920 83.49%
Total 13,280 100.00% 4.40 301,579,895 9,905 11,750 84.30%

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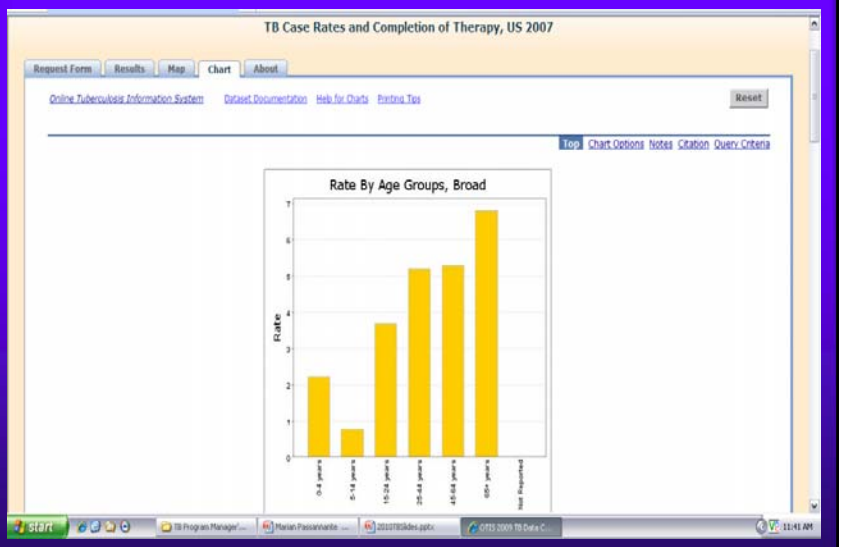

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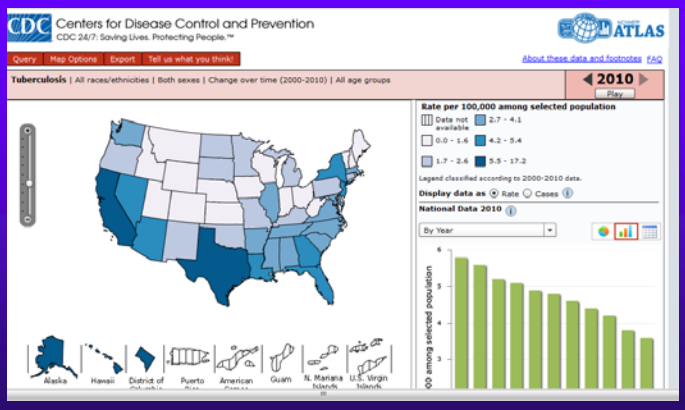
Atlas

- Recently CDC added TB data to another data query system, called Atlas



http://www.cdc.gov/nchhstp/atlas/

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The Basics

1. Introduction – Uses of Epidemiology in Tuberculosis Prevention and Control
2. What Is Epidemiology?
3. Types of Epidemiology
   - Descriptive
   - Analytic
4. Key Concepts in Epidemiology
   - Morbidity
   - Mortality
5. Presenting Program Data

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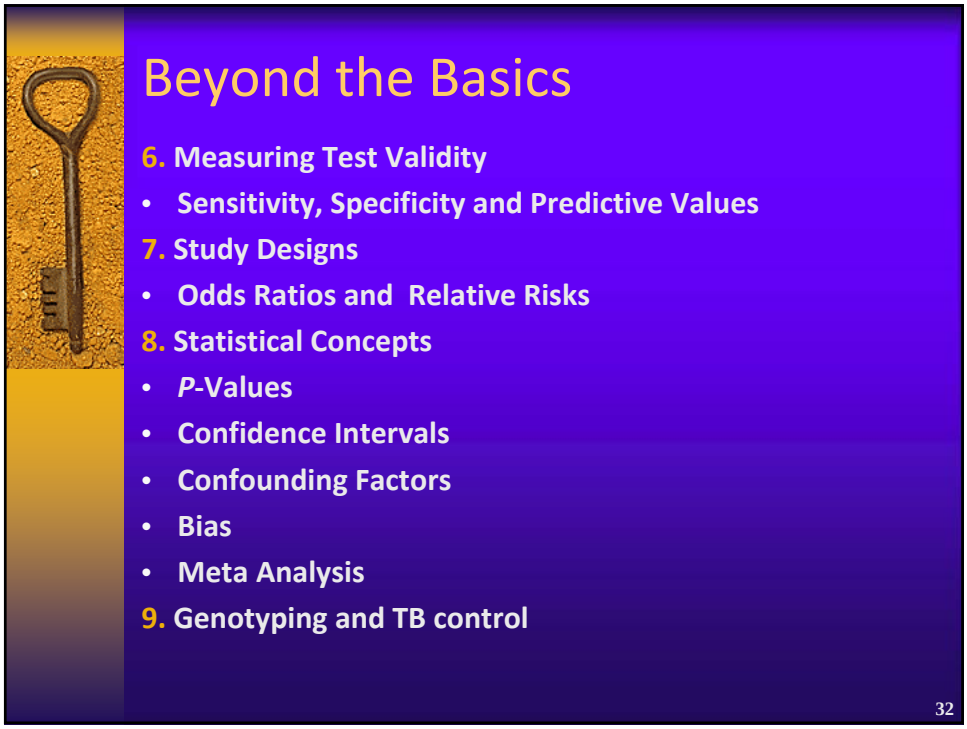
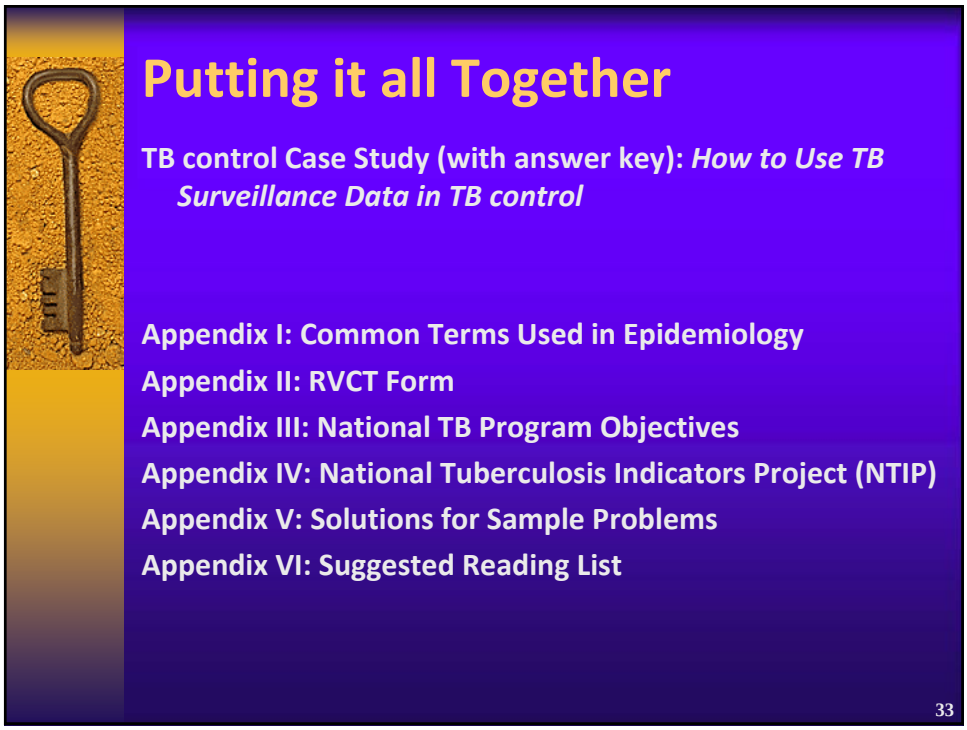

Beyond the Basics
6. Measuring Test Validity
• Sensitivity, Specificity and Predictive Values
7. Study Designs
• Odds Ratios and Relative Risks
8. Statistical Concepts
• *P*-Values
• Confidence Intervals
• Confounding Factors
• Bias
• Meta Analysis
9. Genotyping and TB control
32


Putting it all Together
TB control Case Study (with answer key): *How to Use TB Surveillance Data in TB control*
Appendix I: Common Terms Used in Epidemiology
Appendix II: RVCT Form
Appendix III: National TB Program Objectives
Appendix IV: National Tuberculosis Indicators Project (NTIP)
Appendix V: Solutions for Sample Problems
Appendix VI: Suggested Reading List
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Educational Resources

Incorporating Tuberculosis into Public Health Core Curricula

The New Jersey Medical School Global Tuberculosis Institute, one of four Regional Training and Medical Consultation Centers funded by the Centers for Disease Control and Prevention, has developed TB-related teaching materials for use in core courses of MPH programs, using the Association of Schools of Public Health (ASPH) core competencies for public health disciplines and interdisciplinary domains.

This document includes a series of TB-related case studies, fact sheets and PowerPoint presentations. They were developed for use in core courses in the disciplines of Biostatistics, Epidemiology, Environmental Health Sciences, Health Policy and Management, and Social and Behavioral Sciences and to illustrate the cross-cutting domains of Communications and Informatics, Diversity and Culture, Program Planning and Public Health Biology. These materials do not require that instructors have prior knowledge of TB.

- How To Use This Material
- Learning Objectives
- Contributors and Reviewers

VIEW CURRICULUM

DISCLAIMER: *The materials on this website are in the public domain and may be used and reprinted without permission for educational purposes. Further reproduction of*

http://www.umdnj.edu/ntbc/products/incorporating.html

Epidemiology

Document Name	Word	PDF
EPI Case Study 1: Incidence, Prevalence, and Disease Surveillance; Historical Trends in the Epidemiology of M. tuberculosis - *Student Version 1.0*		
EPI Case Study 2: Reliability, Validity, and Tests of Agreement in M. Tuberculosis Screening - *Student Version 1.0*		
EPI Case Study 3: Cross-Sectional, Case-Control, and Cohort Studies; Identification of TB Risk Groups and TB Risk Factors in Epidemiologic Studies - *Student Version 1.0*		
EPI Case Study 4: Using Molecular Epidemiology in a TB Contact Investigation - *Student Version 1.0*		
EPI Fact Sheet 1: Primary, Secondary, and Tertiary Prevention Fact Sheet – TB Examples - *Student Version 1.0*		
Primer on TB - *Student Version 1.0*		

INSTRUCTOR'S GUIDES

Closing

- Epidemiologic methods can help us to identify local, state, and national patterns of disease and their impact on local control of tuberculosis
- Can use epidemiological methods to find ways to improve both patient care outcomes and effectiveness of individual TB Programs
- Variety of TB educational and data resources

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Speaker

Marian R. Passannante, PhD

Epidemiologist, NJMS Global TB Institute

Associate Professor, Department of Preventive Medicine & Community Health and

Associate Professor, Department of Quantitative Methods: Epidemiology and Biostatistics, New Jersey Medical School, Newark, NJ

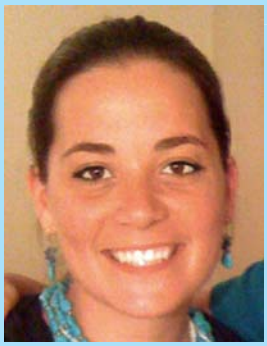
Speaker

Mark Wolman, MPH

Program Manager, Tuberculosis Control

New Jersey Medical School Global Tuberculosis Institute, Newark, NJ

Speaker



Patricia High, MHS, MCHES

Supervising Program Analyst

Ocean County Health Department, Toms River, NJ

Speaker

Lynn Sosa, MD

Deputy State Epidemiologist

Connecticut Department of Public Health, Tuberculosis Control Program, Hartford, CT

Thank you for your participation!

"And it was so typically brilliant of you to have invited an epidemiologist."