

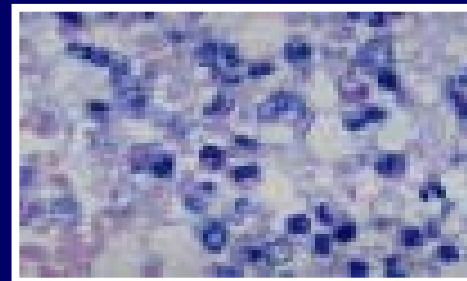
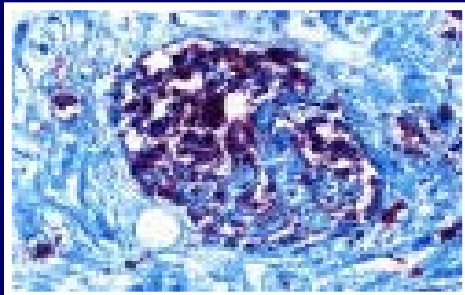
# Preventing Transmission of *M. tuberculosis* in Healthcare Settings

## People Can Stop TB!

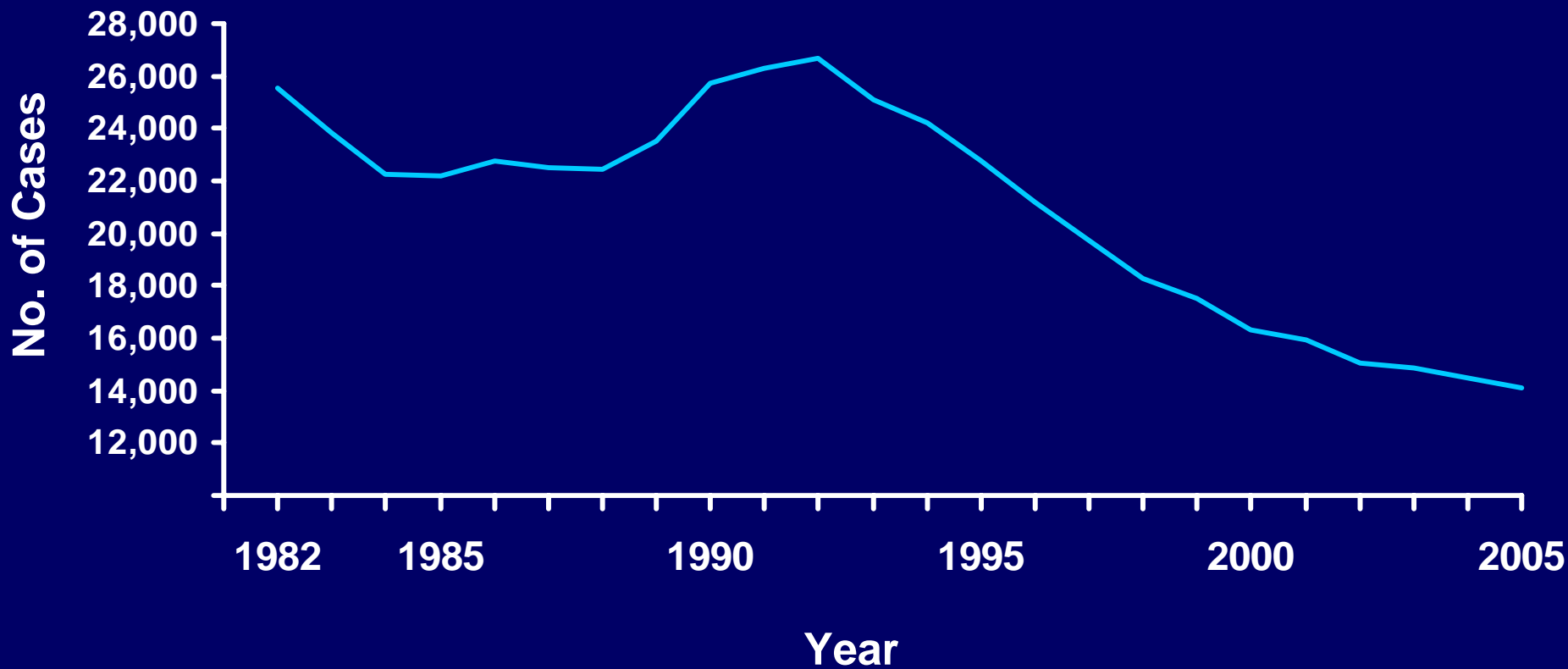
Lauren Lambert, MPH

Division of Tuberculosis Elimination (DTBE)

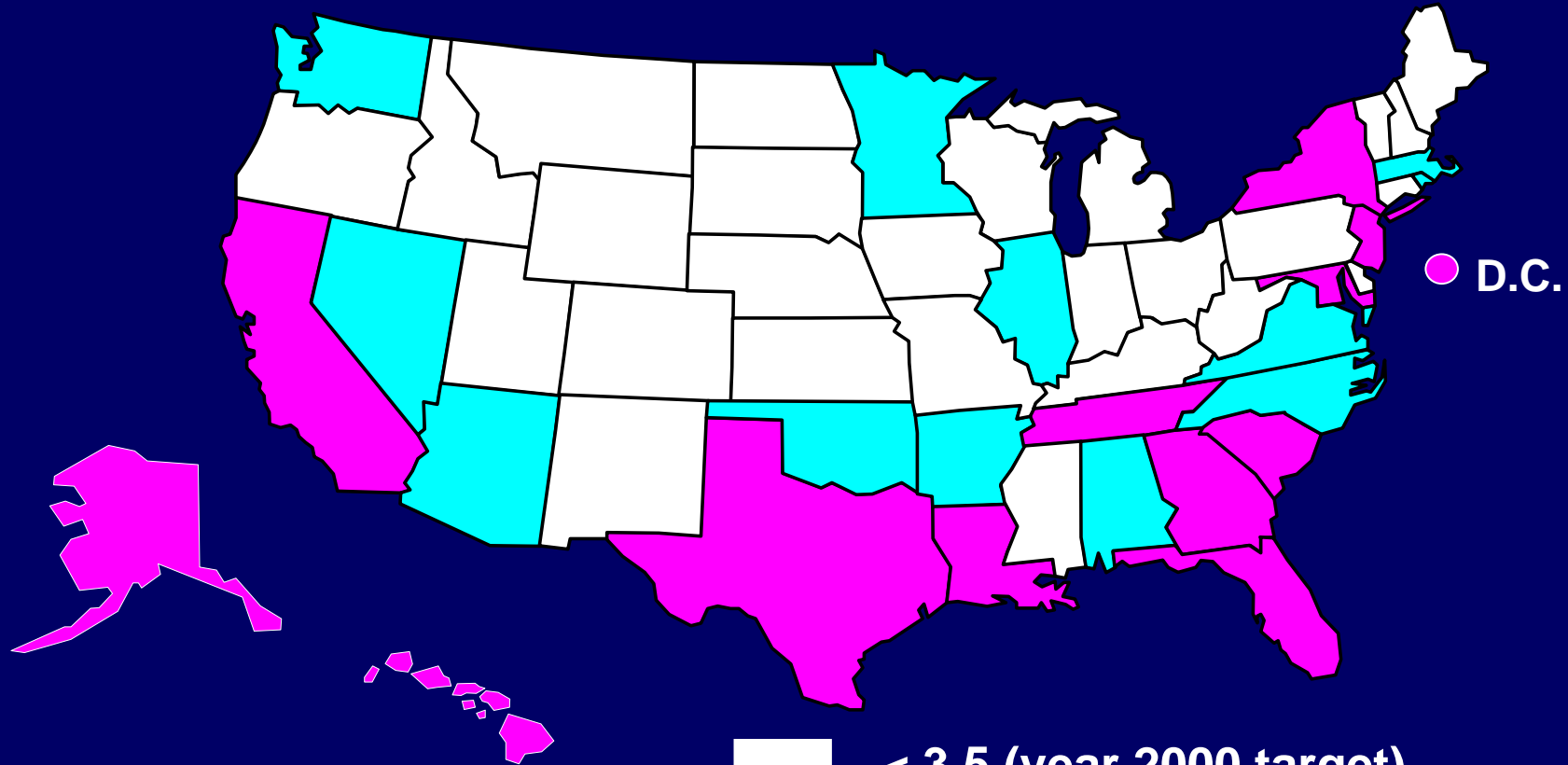
Centers for Disease Control and Prevention (CDC)



# Reported TB Cases United States, 1982–2005



# TB Case Rates,\* United States, 2005



\*Cases per 100,000.



---

# MMWR<sup>™</sup>

**Morbidity and Mortality Weekly Report**

---

Recommendations and Reports

December 30, 2005 / Vol. 54 / No. RR-17

---

**Guidelines for Preventing the Transmission  
of *Mycobacterium tuberculosis*  
in Health-Care Settings, 2005**

**INSIDE: Continuing Education Examination**

---

**DEPARTMENT OF HEALTH AND HUMAN SERVICES  
CENTERS FOR DISEASE CONTROL AND PREVENTION**

# Purpose of 2005 Guidelines

- Update 1994 *Mycobacterium tuberculosis* infection control (IC) guidelines
- Further reduce threat to health-care workers (HCWs)
- Expand guidelines to nontraditional settings
- Simplify procedures for assessing risk

# Hierarchy of Infection Control



Administrative Controls



Environmental Controls



Respiratory Protection

# Fundamentals of Infection Control

- **Administrative controls:** reduce risk of exposure via effective IC program
- **Environmental controls:** prevent spread and reduce concentration of droplet nuclei
- **Respiratory protection controls:** further reduce risk of exposure

# Administrative Controls

- Assign responsibility for TB IC
- Conduct TB risk assessment
- Develop written TB IC plan
  - Recognize and transfer TB suspects
  - Separate TB suspects from others
- Provide TB screening for HCWs
- Train HCWs about TB IC
- Ensure timely lab processing
- Use appropriate signage advising cough etiquette

# Environmental Controls

- **Control source of infection**
- **Dilute and remove contaminated air**
- **Control airflow**
- **Local and general exhaust ventilation**
- **Room air cleaners**
  - **High efficiency particulate air (HEPA) filtration**
  - **Ultraviolet germicidal irradiation (UVGI)**

# Respiratory Protection (RP)

- **Implement RP program**
- **Train HCWs in RP**
- **Train patients in respiratory hygiene**

# What's New

- Expanded scope of health-care settings
- Change of risk classification and tuberculin skin test (TST) frequency
- “Airborne infection isolation” (All)
- Criteria for initiating and discontinuing All precautions
- QuantiFERON-TB Gold test (QFT-G)
- Respirator fit testing and training (including voluntary use of respirators by visitors)
- Frequently asked questions (FAQs)
- Expanded Glossary

# Expanded Scope

## Inpatient settings

- Emergency departments
- Intensive care units
- Laboratories
- Bronchoscopy suites
- Autopsy suites

## Outpatient settings

- Dental care settings
- Dialysis centers
- Medical offices/  
ambulatory care units

## Nontraditional facility- based settings

- Correctional facility  
medical services
- Home-based healthcare/  
outreach
- Long-term care facilities/  
hospices
- Homeless shelters

# **TB Risk Assessment**

## ***Settings Expecting to Encounter TB Patients***

- **Review number of TB patients encountered**
- **Determine**
  - **HCWs to be included in TB screening**
  - **Number of All rooms needed**
  - **Types of environmental controls needed**
- **Identify and address areas with increased transmission risk**
- **Conduct periodic reassessments**

# TB Risk Assessment

## *Settings Not Expecting to Encounter TB Patients*

- Assign responsibility for TB IC program
- Perform a risk assessment
  - Written TB IC plan
  - Problem evaluation and contact investigation
- Document steps for prompt recognition and evaluation of suspected *M. tuberculosis* transmission
- Conduct periodic reassessments

# Change in Risk Classifications

## Previous

- Minimal
- Very low
- Low
- Intermediate
- High

## New

- Low
- Medium
- Potential ongoing transmission

# TB Testing Frequency

**Risk classification**

**Frequency**

---

**Low**

**Baseline on hire; further testing not needed unless exposure occurs**

---

**Medium**

**Baseline, then annually**

---

**Potential ongoing transmission**

**Baseline, then every 8–10 wks until evidence of transmission has ceased**

# FAQs (1)

- **Is placing a TST on a pregnant woman safe?**
- **Should two-step testing be performed in a contact investigation for HCWs who have not had a TST within the preceding 12 months?**
- **If a person does not return for a TST reading within 48–72 hours, when can a TST be placed on them again?**

## FAQs (2)

- **Should a TST reading of  $\geq 10$  mm be accepted 7 days after the TST was placed?**
- **Does BCG affect TST results and interpretations?**
- **Are periodic chest radiographs recommended for HCWs (or staff or residents of LTCFs) who have positive TST or BAMT results?**

# Conclusions

- 2005 guidelines
  - Greater flexibility for assessing risk
  - Broader scope of health-care settings
- Since publication
  - Errata posted on the DTBE website
  - Additional FAQs posted

<http://www.cdc.gov/nchstp/tb/>

# TB Infection-Control Guidelines Work Group

## DTBE

Diane I. Bennett, MD  
Michael F. Iademarco, MD  
Paul A. Jensen, PhD  
Lauren A. Lambert, MPH  
Beverly Metchock, DrPH  
Renee Ridzon, MD\*

## Division of Global Migration and Quarantine (DGMQ)

Paul M. Arguin, MD

## Division of Healthcare Quality Promotion, (DHQP)

Denise M. Cardo, MD  
Amy B. Curtis, PhD  
Adelisa L. Panlilio, MD  
Patricia M. Simone, MD

## Division of Oral Health (DOH)

Jennifer L. Cleveland, DMD  
Amy S. Collins, MPH

## Division of Applied Research and Technology (DART)

G. Scott Earnest, PhD

## Division of Respiratory Disease Studies, (DRDS)

Teri Palermo, RN

## Division of Surveillance, Hazard Evaluations, and Field Studies (DSHEFS)

Teresa A. Seitz, MPH

## Occupational Health and Safety (OHS)

Yona Hackl, RN, MS  
Jonathan Y. Richmond, PhD\*\*

## Division of Laboratory Systems

John C. Ridderhof, DrPH

## CDC Writer/Editor

Allison Greenspan, NCID, OD

\*\*Retired from CDC.

\* Currently with the Bill and Melinda Gates Foundation.

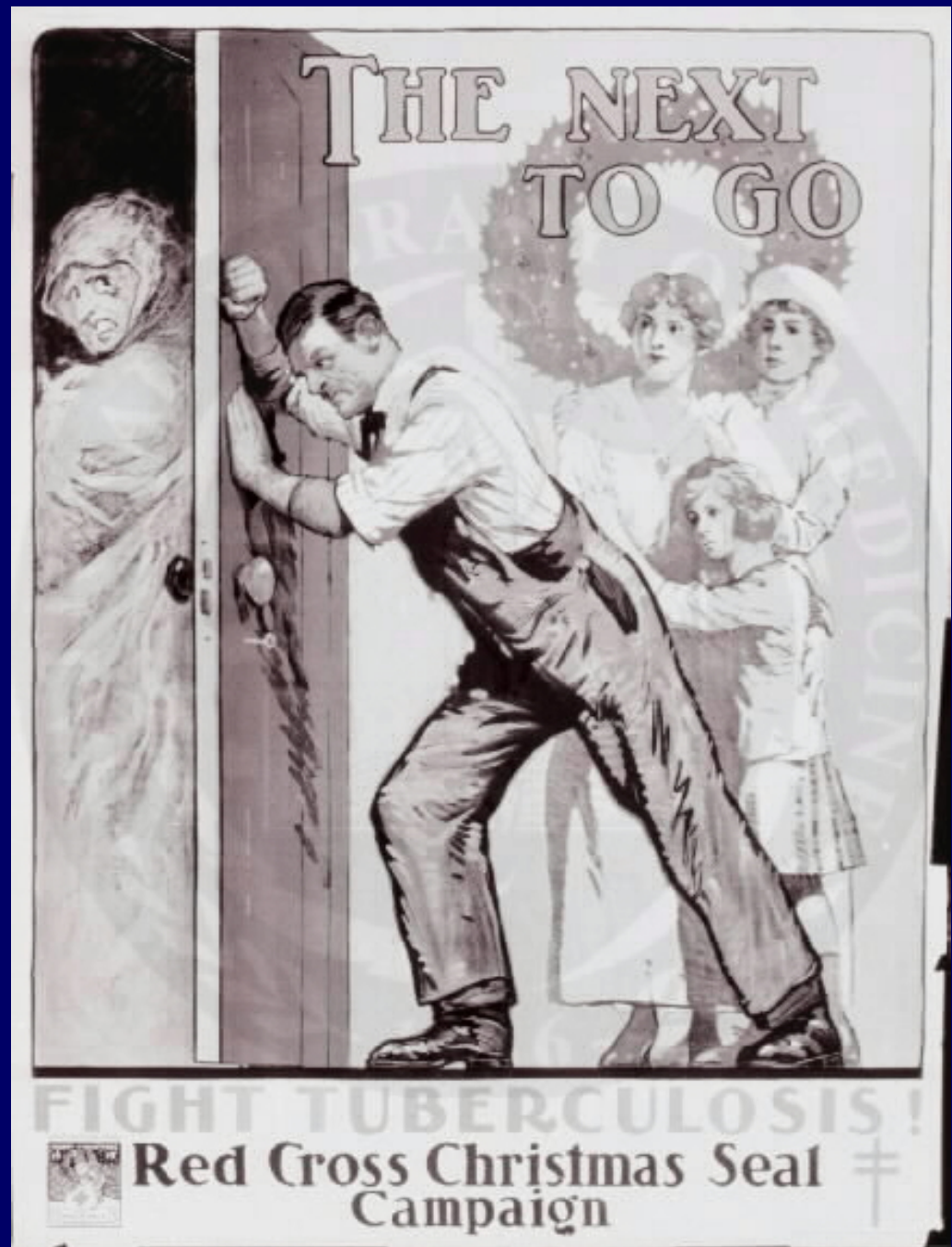
# External Contributors

James August, MPH, American Federation of State, County and Municipal Employees, Washington, DC; Scott Barnhart, MD, Harborview Medical Center, Seattle, Washington; Joe Bick, MD, University of California, Davis, California; Henry Blumberg, MD, Emory University, Atlanta, Georgia; Dorothy Dougherty, OSHA, Washington, DC; Charles E. Dunn, Sr, Commercial Lighting Design, Inc. (Lumalier), Memphis, Tennessee; Amanda L. Edens, MPH, OSHA, Washington, DC; New Jersey Medical School, Newark, New Jersey; Kevin Fennelly, MD, New Jersey Medical School, Newark, New Jersey; Victoria Fraser, MD, Washington University School of Medicine, St. Louis, Missouri; Mary Gilchrist, PhD, University Hygienic Laboratory, Iowa City, Iowa; Robert J. Harrison, MD, California Department of Health Services, Oakland, California; Denise Ingman, Department of Health and Human Services, Helena, Montana; Pam Kellner, RN, MPH, New York City Department of Health, New York, New York; James McAuley, MD, Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois; Roy McKay, PhD, University of Cincinnati, Cincinnati, Ohio; Dick Menzies, MD, McGill University, Montreal, Canada; Shelly L. Miller, PhD, University of Colorado (Mechanical Engineering), Boulder, Colorado; Jose Montero, MD, New Hampshire, Department of Health and Human Services; Edward Nardell, MD, Harvard Medical School, Harvard School of Public Health, Boston, Massachusetts; Mark Nicas, PhD, University of California, School of Public Health, Berkeley, California; Paul S. Ninomura, BS, Health Resources and Services Administration (HRSA), Seattle, Washington; Tholief O'Flaherty, PhD, New York City Department of Health, New York, New York; Nicholas Pavelchak, BS, New York State Department of Health, Troy, New York; Jean Pottinger, MA, University of Iowa, Iowa City, Iowa; Gina Pugliese, MS, Premier Safety Institute, Chicago, Illinois; Randall Reves, MD, Denver Public Health Department, Denver, Colorado; Jane Siegel, MD, University of Texas, Dallas, Texas; Kent Sepkowitz, MD, Memorial Sloan-Kettering Cancer Center, New York, New York; Andrew J. Streifel, MS, University of Minnesota, Minneapolis, Minnesota; Rachel L. Stricof, MPH, New York State Department of Health, Albany, New York; Michael L. Tapper, MD, Lenox Hill Hospital, New York, New York; Robert Weinstein, MD, Healthcare Infection Control Practices Advisory Committee (HICPAC); Sharon Welbel, MD, Cook County Hospital, Chicago, Illinois; and Karen Worthington, MS, OSHA, Lambertville, New Jersey.

# CDC Contributors

Heinz William Ahlers, MS, CDC/NIOSH, Pittsburgh, Pennsylvania; Gabrielle Benenson, MPH, CDC/NCHSTP, Atlanta, GA; Roland BerryAnn, BS, CDC/NIOSH, Morgantown, West Virginia; Regina Bess, BS, CDC/NCHSTP, Atlanta, Georgia; Yvonne Boudreau, MD, CDC/NIOSH, Denver, Colorado; Kenneth G. Castro, MD, CDC/NCHSTP, Atlanta, Georgia; L. Casey Chosewood, MD, CDC/OHS, Atlanta, Georgia; Christopher C. Coffey, PhD, CDC/NIOSH, Atlanta, Georgia; Maria Fraire, MPH, CDC/NCHSTP, Atlanta, Georgia; Judy Gibson, MSN, CDC/NCHSTP, Atlanta, Georgia; Robert C. Good, PhD, Retired from CDC/NCID, Atlanta, Georgia; Maryam Haddad, MSN, CDC/NCHSTP, Atlanta, Georgia; Connie Henderson, BS, CDC/NCHSTP, Atlanta, Georgia; Kashef Ijaz, MD, CDC/NCHSTP, Atlanta, Georgia; William R. Jarvis, MD, retired from CDC/NCID, Atlanta, Georgia; John A. Jereb, MD, CDC/NCHSTP, Atlanta, Georgia; Margaret Kitt, MD, CDC/NIOSH, Morgantown, West Virginia; Mark Lobato, MD, CDC/NCHSTP, Atlanta, Georgia; Suzanne Marks, MPH, CDC/NCHSTP, Atlanta, Georgia; Stephen B. Martin, Jr., CDC/NIOSH, Morgantown, West Virginia; Kenneth F. Martinez, MSEE, CDC/NIOSH, Cincinnati, Ohio; Jerry Mazurek, MD, CDC/NCHSTP, Atlanta, Georgia; R. Leroy Mickelsen, MS, CDC/NIOSH, Cincinnati, Ohio; Vincent Mortimer, MS, retired from CDC/NIOSH, Cincinnati, Ohio; Glenda Newell, CDC/NCHSTP, Atlanta, Georgia; Tanja Popovic, MD, CDC/OD, Atlanta, Georgia; Laurence D. Reed, MS, CDC/NIOSH, Cincinnati, Ohio; Apavoo Rengasamy, PhD, CDC/NIOSH, Pittsburgh, Pennsylvania; Millie P. Schafer, PhD, CDC/NIOSH, Cincinnati, Ohio; Philip Spradling, MD, CDC/NCHSTP, Atlanta, Georgia; Carol M. Stephenson, PhD, CDC/NIOSH, Cincinnati, Ohio; Zachary Taylor, MD, CDC/NCHSTP, Atlanta, Georgia; Tonya Thrash, CDC/NCHSTP, Atlanta, Georgia; Douglas B. Trout, MD, CDC/NIOSH, Cincinnati, Ohio; Andrew Vernon, MD, CDC/NCHSTP, Atlanta, Georgia; Gregory R. Wagner, MD, CDC/NIOSH, Washington, DC; Wanda Walton, PhD, CDC/NCHSTP, Atlanta, Georgia; Angela M. Weber, MS, CDC/ATSDR, Atlanta, Georgia; Robbin S. Weyant, PhD, CDC/OHS, Atlanta, Georgia; and John J. Whalen, MS, retired from CDC/NIOSH, Cincinnati, Ohio.

Thank you!





# Answers to FAQs

**Q: Is placing a TST on a pregnant woman safe?**

**A: Yes, placing a TST on a pregnant woman is safe.**

**Q: Should two-step testing be performed in a contact investigation for HCWs who have not had a TST within the preceding 12 months?**

**A: No, two-step testing should only be used for baseline TST screening and has no role in a contact investigation.**

**Q: If a person does not return for a TST reading within 48–72 hours, when can a TST be placed on them again?**

**A: A TST can be administered again as soon as possible. If the second step of a two-step TST is not read within 48–72 hours, administer a third test as soon as possible (even if multiple months have elapsed), and ensure that the result is read within 48–72 hours.**

**Q: Should a TST reading of  $\geq 10$  mm be accepted 7 days after the TST was placed?**

**A: If the TST was not read between 48–72 hours, another TST should be placed as soon as possible and read within 48–72 hours. However, certain studies indicate that positive TST reactions might still be measurable 4–7 days after the TST was placed. If the TST reaction is read as  $>15$  mm 7 days after placement, the millimeter result can be recorded and considered to be a positive result.**

**Q: Does BCG affect TST results and interpretations?**

**A: BCG is the most commonly used vaccine in the world. BCG might cause a positive TST (i.e., false-positive) result initially; however, tuberculin reactivity caused by BCG vaccination typically wanes after 5 years but can be boosted by subsequent TST. No reliable skin test method has been developed to distinguish tuberculin reactions caused by vaccination with BCG from reactions caused by natural mycobacterial infections, although TST reactions of >20 mm of induration are not usually caused by BCG.**

**Q: Are periodic chest radiographs recommended for HCWs (or staff or residents of LTCFs) who have positive TST or BAMT results?**

**A: No, persons with positive TST or BAMT results should receive one baseline chest radiograph to exclude a diagnosis of TB disease. Further chest radiographs are not needed unless the patient has symptoms or signs of TB disease or unless ordered by a physician for a specific diagnostic examination. Instead of participating in serial skin testing, HCWs with positive TST results should receive a medical evaluation and a symptom screen.**

# TB Risk Classifications (1/3)

<b>Inpatient Settings</b>	<b>Low</b>	<b>Medium</b>	<b>Potential Ongoing Transmission</b>
<200 beds	<3 TB patients/yr	$\geq 3$ TB patients/yr	Evidence of ongoing transmission, regardless of setting
$\geq 200$ beds	<6 TB patients/yr	$\geq 6$ TB patients/yr	

# TB Risk Classifications (2/3)

<b>Outpatient Settings</b>	<b>Low</b>	<b>Medium</b>	<b>Potential Ongoing Transmission</b>
<b>TB treatment facilities, medical offices, ambulatory care settings</b>	<b>&lt;3 TB patients/yr</b>	<b>≥3 TB patients/yr</b>	<b>Evidence of ongoing transmission, regardless of setting</b>

# TB Risk Classifications (3/3)

<b>Nontraditional Facility-based Settings</b>	<b>Low</b>	<b>Medium</b>	<b>Potential Ongoing Transmission</b>
<b>Emergency medical service (EMS), medical settings in correctional facilities, outreach care, LTCFs</b>	<b>Only patients with LTBI treated; No cough-inducing procedures are performed; System to detect/ triage persons with TB symptoms</b>	<b>Settings where TB patients are expected to be encountered</b>	<b>Evidence of ongoing transmission regardless of setting</b>