Executive Commentary

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INTRODUCTION

Since 1953, the National Tuberculosis (TB) Surveillance System (NTSS) has collected information on each newly reported case of TB disease in the United States. In addition to the 50 United States and the District of Columbia (DC), CDC accepts TB case reports from five U.S. territories (American Samoa, Commonwealth of the Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands) and three sovereign nations that have signed compacts of free association with the United States (Federated States of Micronesia, Republic of the Marshall Islands, and Republic of Palau); however, the information presented in this commentary is based on the case reports from the 50 states and DC, except where otherwise specified. CDC maintains TB surveillance data in an electronic database for all cases reported since 1993; reporting areas may update this information at any time. Small variations in historical data included in this report compared with previous reports are attributed to these updates. This annual summary contains information on TB cases reported to CDC during 1993–2016 by year that the reporting jurisdiction counted the case.

KEY FINDINGS

In 2016, the 50 states and the District of Columbia (herein referred to as the "United States") reported 9,272 TB cases to CDC, representing the lowest number of annual cases on record and a 2.9% decrease from 2015. The national TB incidence rate was 2.9 per 100,000 persons, a 3.6% decrease from 2015. While the reversal of the increase in cases observed in 2015 is a positive sign, the pace of TB's decline in the United States remains too slow to achieve TB elimination in this century.[1] As reported in earlier years, TB case counts are highest in four states: California, Texas, New York, and Florida. Together, they accounted for just over half of the cases reported by the 50 states and DC. Twelve states and DC reported incidence rates above the national average.

New Data: County-level estimates of recent transmission of TB disease, mapped as case counts, are included in this 2016 report. Nationally, CDC attributes about 14% of genotyped cases reported during 2015–2016 to recent transmission and approximately 86% to reactivated latent TB infection. CDC attributes an estimated 5% of genotyped cases to extensive recent transmission, defined as a plausible chain of transmission of ≥6 cases, including the plausible source case and 4 or more other cases within 3 years before a given case in the chain.

TB TREATMENT AND OUTCOME

Effective treatment of TB disease requires the use of multiple antimicrobial drugs at appropriate doses for sufficient periods to ensure both cure as well as to prevent the occurrence of drug resistance. CDC defines primary drug resistance as the presence of drug resistance in a patient who has no prior history of TB disease. The most common form of primary anti-TB drug resistance is isoniazid monoresistance, which occurred in 577 (8.7%) cases reported during 2016. Primary multidrug-resistant (MDR) TB (defined as resistance to both isoniazid and rifampin) occurred in 78 (1.2%) cases reported during 2016. The United States reported one extensively drug-resistant TB (defined as MDR TB that is additionally resistant to any fluoroquinolone and at least one of three injectable second-line anti-TB drugs) case in 2016. The percentage of TB cases that are drug resistant has remained stable for the last 20 years.

Among cases reported in 2014, the most recent year for which case completion data are available, 63.9% of TB patients received exclusively directly observed therapy (DOT) and an additional 29.0% of patients received a combination of DOT and self-administered therapy. These percentages have been stable since 2011. Many TB programs are exploring alternatives to traditional DOT, such as the use of videoconferencing or other electronic means of monitoring medication adherence; however, NTSS does not

currently distinguish these alternative strategies from traditional DOT.

Among patients expected to complete TB treatment within 1 year of diagnosis, 90.1% completed therapy within 1 year. An additional 6.5% (total of 96.6%) of these individuals eventually completed treatment. Among persons with TB reported in 2014, a total of 8,119 (88.6%) completed treatment, 568 (6.2%) died before completing treatment, and the remainder discontinued treatment for other reasons.

Among TB cases reported in 2014, a total of 774 (8.2%) died either before treatment could be started, or after starting treatment but before completing treatment. Among those who died, 287 (37.1%) were reported as having died because of TB disease or the adverse effects of TB treatment.

RISK FACTORS

Country of birth continues to be a risk factor for TB diagnosed in the United States because the risk of TB exposure varies by country. In 2016, 2,901 TB cases were reported in U.S.-born persons (defined as persons born in the United States or its territories, or born elsewhere to a U.S. citizen parent), compared with 6,351 cases in non-U.S.–born persons (31.3% vs 68.5%). In terms of incidence rates per 100,000 persons, U.S.-born persons had a TB rate of 1.1 compared with 14.7 among non-U.S.–born persons. Among non-U.S.–born persons reported with TB in 2016, the top five countries of birth were Mexico, the Philippines, India, Vietnam, and China.

Among the cases reported in non-U.S.–born persons in 2016, a total of 1,120 (17.6%) were diagnosed <1 year after first arrival in the United States, which is consistent with previous observations that the risk of developing TB disease among non-U.S.–born persons is greatest in the first 1–2 years after arrival in the United States. However, approximately equal percentages of TB cases among non-U.S.–born persons occur <10 years and ≥10 years after first arrival, demonstrating that the risk of developing TB disease remains substantial after >10 years residence in the United States. Additionally, case counts and rates among non-U.S.–born persons might have changed slightly from 2015 to 2016 because of a correction in this report of CDC's definition of non-U.S.–born to include persons born in the freely associated states of Federated States of Micronesia, Republic of the Marshall Islands, and Republic of Palau, who did not have a U.S. citizen parent. CDC made this correction to conform to U.S. Census Bureau definitions.[2]

TB continues to affect racial and ethnic minorities disproportionately compared with non-Hispanic whites. The TB incidence rate per 100,000 persons for non-Hispanic whites has remained stable at 0.6 for the past 3 years, while the incidence rate for other racial/ethnic groups ranges from 4.5 for Hispanics to 18.0 among non-Hispanic Asians (7.5–30 times the rate for non-Hispanic whites). However, the incidence rate for all racial/ethnic minority groups did decline from 2015.

Among U.S.-born persons reported with TB disease in 2016, non-Hispanic blacks were most commonly represented (1,068 cases, 36.8%), followed by non-Hispanic whites (915 cases, 31.5%) and Hispanics (603 cases, 20.8%). Among non-U.S.–born persons reported with TB disease in 2016, non-Hispanic Asians (3,045 cases, 47.9%) were the largest group, followed by Hispanics (1,987 cases, 31.3%) and non-Hispanic blacks (906 cases, 14.3%).

Among persons reported with TB in 2016, a total of 454 (5.6% of TB cases with test result information) were co-infected with human immunodeficiency virus (HIV). Of these patients with HIV/TB coinfection, 229 were 25–44 years of age (8.6% of TB cases in this age group with test result information). The percentage of HIV/TB co-infection has remained stable over the last 3 years. Additionally, diabetes mellitus continues to be an important clinical risk factor for TB dis

ease. In 2016, a total of 1,524 (16.4%) persons reported with TB also had diabetes.

Residence in congregate settings remains a risk factor for TB infection, which can subsequently progress to TB disease. Additionally, TB cases in congregate settings increase the risk of secondary cases and the difficulty of subsequent contact investigations. Among TB cases reported in 2016, healthcare providers diagnosed 328 (4.0%) cases among residents of correctional facilities, 430 (4.9%) cases in persons who experienced homelessness in the year preceding diagnosis, and 168 (1.9%) cases in persons who had resided in long-term care facilities in the year preceding diagnosis.

Substance use is also a risk factor for TB infection and for progression to TB disease. Among TB cases reported in 2016 with information on history of substance use in the year preceding TB diagnosis, 111 (1.3%) cases were among persons who reported injecting drugs, 599 (6.8%) reported using noninjectable drugs, and among TB cases diagnosed in persons ≥15 years of age, 875 (10.0%) reported excessive alcohol use.

GENOTYPING OF TB ISOLATES

TB genotyping is a laboratory-based analysis of the genetic material of the bacteria that cause TB. TB genotype clusters are defined in this report as two or more cases with matching genotypes in the same county during a 3-year time period. CDC identified clusters among 20.8% of genotyped cases during 2014–2016. During this period, the percentage of clustered cases among U.S.-born persons with TB was 34.8%, compared with 14.4% among non-U.S.–born persons.

However, not all clustered cases result from recent transmission. A new section of the annual report describes county-level estimates of recent transmission based on a plausible-source case method.[3] A map depicts overall recent transmission estimates as counts to describe the relative numbers of cases attributed to recent TB transmission. An additional map of counties with ≥10 genotyped cases shows extensive recent transmission estimates as percentages of all genotyped cases to identify areas disproportionately affected by extensive recent transmission. Nationally, CDC attributes about 14% of genotyped cases reported during 2015–2016 to overall recent transmission and an estimated 5% of genotyped cases to extensive recent transmission. As these estimates are refined and increasingly adopted into routine program use, it should become possible to monitor trends in control of recent TB transmission over time.

COUNTS AND RATES BY GEOGRAPHY

California (2,062 cases, 22.2%), Texas (1,250 cases, 13.5%), New York (768 cases, 8.3%), and Florida (639 cases, 6.9%) reported the greatest number of cases in 2016, and Hawaii (8.3), Alaska (7.7), California (5.3), and Texas (4.5) reported the highest incidence rates per 100,000 persons. While case counts were comparatively low in the U.S. territories and freely associated states, reported incidence rates per 100,000 persons ranged from zero in the U.S. Virgin Islands to 243.9 in the Republic of the Marshall Islands.

Among Metropolitan Statistical Areas (MSA) with ≥500,000 population in 2016, the New York-Newark-Jersey City MSA reported the greatest number of cases (917), followed by Los Angeles-Long Beach-Anaheim (756 cases), Houston-The Woodlands-Sugar Land (350 cases), and San Francisco-Oakland-Hayward (337 cases). However, McAllen-Edinburg-Mission, Texas (9.9), Urban Honolulu (8.9), San Jose-Sunnyvale-Santa Clara (8.1), and San Diego-Carlsbad (7.8) reported the highest incidence rates per 100,000 persons.

CONCLUSIONS

TB remains a serious problem in the United States even though it is both preventable and curable. Persons with TB are in every state, in rural areas and cities, in schools, workplaces, homes, and many other places where people are in close contact.

TB elimination (defined as <1 TB case per 1 million persons) would have widespread health, economic, and social benefits in the United States. The overall number of TB cases in the United States decreased from 2015 to 2016, after having increased from 2014 to 2015. While the United States continues to make slow progress toward TB elimination, statistical modeling suggests that new and expanded approaches will be required to achieve TB elimination in the United States.[1]

Current efforts to rapidly diagnose and treat TB disease are essential but insufficient to eliminate this lethal health threat. The United States needs to implement major new efforts to address latent TB infection (LTBI) to accelerate progress toward TB elimination. New essential programs consist of a surveillance system to monitor progress, scale-up of screening for LTBI in at-risk populations, increased adoption of short-course treatment regimens, engagement of affected communities and medical providers who serve those communities, and increased public health staffing for implementation and oversight. Such an effort would benefit greatly from the development of new tools, such as improved tests that indicate TB reactivation risk, and even shorter LTBI treatment regimens than currently exist.[4]

TB has afflicted individuals and communities for at least 9,000 years. It remains the leading infectious cause of death in the world, and TB infects one third of the world's population. The United States must implement increased LTBI-related activities concurrently with sustained, effective programs to diagnose and treat patients with TB disease and protect communities. This will require continued engagement with existing and new partners to better reach high-risk groups, conduct TB testing, and connect persons with LTBI or TB disease to care in order to prevent future TB cases.

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