

Conclusion. MT remains a serious form of tuberculosis which may compromise the life-threatening. It was mainly seen in young nonvaccinated children but currently, except among HIV-infected persons, it is more common among older persons who experience more an endogenous reactivation. These findings emphasize the high efficacy of BCG vaccination in developing countries to prevent MT.

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769. An Outbreak of Multidrug-Resistant Tuberculosis, Minnesota 2016–2017

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Thursday, October 4, 2018: 12:30 PM

Background. Multidrug-resistant tuberculosis (MDR TB) is more difficult to treat and outcomes are worse than for drug-susceptible TB disease. MDR TB cases in Minnesota increased from zero in 2015 to nine in 2016. Case investigations suggested an outbreak. We describe the public health response, challenges of contact investigations (CIs), and ongoing management of contacts.

Methods. CDC performed whole-genome sequencing (WGS) to evaluate relatedness of MDR TB isolates. We conducted CIs for infectious cases. We created outbreak specific guidelines for screening and management of contacts, and partnered with various agencies to increase MDR TB awareness.

Results. WGS results were consistent with an MDR TB outbreak that included 10 cases (70% pulmonary) as of April 2018. Limited provider awareness about TB contributed to delayed diagnoses. CIs identified 588 contacts; 8.7% (n = 51) of contacts had previously documented positive TB infection test results, and 14% (n = 74) were newly positive for TB infection (median age: 72 years). Eight cases were epidemiologically linked to one Hmong adult day center. Sixty-two contacts started a fluoroquinolone for latent MDR TB infection. Contacts who declined treatment began a 2-year clinical monitoring program.

Conclusion. In this outbreak, delayed diagnoses resulted in long infectious periods and hundreds of contacts. WGS results were consistent with recent transmission. We discovered adult day centers are an overlooked congregate setting. CIs were complicated by limited public health funding and high underlying TB infection prevalence in the affected community. Increased community and provider awareness and intensified screening of contacts resulted in additional case finding and prevention interventions.

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770. Multi-Drug-Resistant Tuberculosis Cases in Arkansas in 2017: A Tale of Two Threats

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Thursday, October 4, 2018: 12:30 PM

Background. Multi-drug-resistant tuberculosis (MDR-TB) is a threat to TB elimination strategies worldwide. From 1998 to 2016, six cases of MDR-TB were reported in Arkansas. In 2017 alone, three cases were detected. We sought to describe the characteristics of these cases to inform our MDR-TB prevention strategy in AR.

Methods. The surveillance database identified three MDR-TB cases in 2017. A detailed review was done to define the demographics, clinical presentation, and laboratory reports relating to drug susceptibility testing (DST), including molecular detection of drug resistance (MDDR). A search was done in the Genotyping database for genotype patterns of the patient isolates.

Results. All three cases were born outside the United States and developed active disease after arrival in AR. Case 1, age 52, was born in the Marshall Islands, arrived in 2016, and had a history of Type 2 diabetes. He developed MDR-TB in February 2017. Case 2, age 42, was born in Mexico, arrived over 20 years ago, and was HIV positive. He developed TB in July 2016 with a pan-sensitive organism and completed an intermittent treatment regimen. A second TB episode with matching genotype but different drug sensitivities occurred in April 2017, less than 4 months after treatment completion, and was considered treatment failure. Case 3, age 56, was born in the Philippines, arrived in 1990, and was reportedly treated for latent TB infection in 1993 with 6 months of isoniazid. She visited the Philippines April–May 2017 and developed MDR-TB in October 2017. Her isolate was in cluster with a case in Oklahoma who came from Mexico in 2006 and was admitted in an AR hospital with a pan-sensitive organism. There are no epidemiological links between the two cases; only one isolate

in each case. Because both isolates were identified in AR State TB laboratory, a complex contamination has been considered with no definite resolution at this time.

Conclusion. MDR-TB, due to both primary and secondary drug resistance, remains a threat in AR. Cooperation and communication between all levels of healthcare are crucial to avoid delayed diagnosis of MDR-TB. Timely DST via technologies like GeneXpert and MDRR service at CDC is critical. Consultation from Centers of Excellence is vital in the treatment of MDR-TB complicated by diabetes and HIV. Whole-genome sequencing could provide clarity in the cluster with discordant DST patterns.

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771. Drug Resistance Tuberculosis (DR-TB), Comorbidities and Risk Factors Identified in a Prospective Multicenter Cohort Study in Indonesia

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Session: 70. Tuberculosis and Other Mycobacterial Infections

Thursday, October 4, 2018: 12:30 PM

Background. The numbers of patients with drug resistance TB (DR-TB) increased annually by over 20% globally in the last decade. However, data on the prevalence of DR-TB in Indonesia are limited. The objective of this study to estimate the proportion of DR-TB in new and previously treated TB cases, and to identify comorbidities and risk factors.

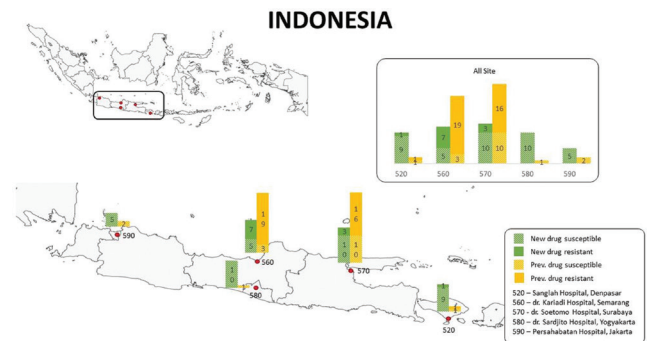
Methods. This study has been conducted at seven hospitals throughout Indonesia since March 2017. Clinically TB patients ≥18-year-old were enrolled and followed until 6 months after treatment completed. Demography and clinical data were recorded; sputum, blood, urine, and PBMC were collected at several time points. AFB smear, sputum culture, Xpert MTB/RIF, and drug sensitivity tests were performed. Drug resistance TB is determined by Xpert MTB/RIF.

Results. Of 151 enrolled patients, 103 (68%) were confirmed *M. tuberculosis* by Xpert MTB/RIF, and 47 (46%) were confirmed rifampicin resistance. The distribution of DR-TB in each study site is shown in Figure 1. Among those with comorbidities (38%), comorbidity with diabetes (based on HbA1c level and diabetes history), HIV, and cancer was 9%, 26%, and 7%. Demography, nutrition status, contact and treatment history, and comorbidities are shown in Table 1. DR-TB primary infection contributes to 23% of DR-TB cases. Biomarkers that may predict treatment failure and TB-genotyping are underway.

Conclusion. The proportion of DR-TB in both new and previously treated patients in our cohort was significantly higher than the estimated number from the WHO and Ministry of Health. TB is a serious threat for public health and mitigation plan must be implemented at all levels.

Table 1: Demography, Nutrition Status, Contact History, TB Treatment History and Comorbid Status

	520	560	570	580	590	All
Demography						
Age (Median, IQR)	38 (20)	41 (21)	42 (25)	37 (45)	22 (3)	40 (25)
Male (n, %)	9 (75)	16 (47)	26 (67)	9 (82)	4 (57)	64 (62)
BMI						
<18.5	7 (58)	17 (50)	20 (51)	5 (45)	5 (71)	54 (52)
18.5 to <25	5 (42)	13 (38)	13 (33)	5 (45)	2 (29)	38 (37)
≥25	0	4 (12)	6 (15)	1 (10)	0	11 (11)
Contact history with TB patients	2 (17)	1 (3)	8 (21)	2 (18)	2 (29)	15 (15)
TB treatment history						
New	10 (83)	12 (35)	13 (33)	10 (91)	5 (71)	50 (49)
Previously treated	2 (17)	22 (65)	26 (67)	1 (9)	2 (29)	53 (51)
Comorbid						
HIV	2 (18)	0	0	2 (18)	0	4 (4)
DM	1 (9)	14 (41)	13 (33)	0	1 (14)	29 (28)



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772. Factors Associated With Healthcare Delay of Active Pulmonary Tuberculosis After Hospitalization

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Session: 70. Tuberculosis and Other Mycobacterial Infections

Thursday, October 4, 2018: 12:30 PM

Background. Hospitals are undesirable reservoirs for a respiratory outbreak. Active pulmonary tuberculosis (TB) can be readily transmitted among hospitalized patients. Early recognition of pulmonary TB is an essential priority against transmission. The aim of this study was to evaluate factors associated with delayed identification of pulmonary TB in hospital settings.

Methods. Medical records of newly diagnosed TB patients admitted to a referral hospital from January 2015 through December 2017 were reviewed. Delayed recognition of pulmonary TB was defined as failure to initiate airborne isolation within the first 3 days after admission. We analyzed clinical, microbiological, radiological, and healthcare factors associated with delayed recognition of pulmonary TB. Patients who were not suspected of having active pulmonary TB had no remarks about TB on their initial chest radiograph interpretation by radiologists. Multivariate logistic regression analysis was performed with significant factors included.

Results. A total of 136 patients were analyzed who had positive sputum acid-fast bacilli (AFB) cultures. Of these, 45 (33%) patients were isolated 3 days after admission and had longer days of exposure before isolation (median 9, interquartile range [IQR] 6–14, $P < 0.001$) in comparison to others (median 0, IQR 0–1). Patients with older age (odds ratio [OR] = 1.04, 95% confidence interval [CI] 1.01–1.08, $P = 0.01$), patients who were admitted to departments other than infectious diseases or pulmonology (OR = 6.23, 95% CI 2.17–17.89, $P = 0.001$) and patients who were not suspected of having active pulmonary TB by radiologists (OR = 11.36, 95% CI 4.11–31.39, $P < 0.001$) were more likely to have delayed recognition of pulmonary TB.

Conclusion. In a country with intermediate TB prevalence, better awareness for pulmonary TB is required for all hospitalized patients who are admitted to departments other than infectious diseases or pulmonology. Although active pulmonary TB is not suspected by a radiologist, sputum AFB smear, and culture are necessary when new lesions are present in chest radiographs.

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773. Statins Decrease the Risk of Active Tuberculosis: A Propensity Score-Matched Analysis

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Session: 70. Tuberculosis and Other Mycobacterial Infections

Thursday, October 4, 2018: 12:30 PM

Background. Statins, which are lipid-lowering agents, have anti-inflammatory and immunomodulatory properties that may affect the development of tuberculosis (TB). We assessed the association between statins and the risk of active TB with propensity score-matching.

Methods. The study was based on the National Health Insurance database and its subset database of the “medical check-up” population of South Korea. These cohorts consist of about one million and 570,000 people, respectively, representative of the entire population of South Korea. We identified 107,689 statin users and 433,067 non-statin users. After propensity score matching, 26,036 statin users and the same number of nonstatin users were finally analyzed. The development of active TB was monitored in these matched pairs over the 11 years from 2003 to 2013.

Results. The number of active TB cases was 150 in 31,645 person-years (4.74 per 1,000 person-years; 95% CI, 3.98 to 5.50) in the statin users, and 902 in 153,401 person-years (5.88 per 1,000 person-years; 95% CI, 5.50 to 6.26) in the nonstatin users. Statin users had a significantly lower risk of TB than nonstatin users: hazard ratio (HR) 0.78 (95% CI, 0.65 to 0.93) ($P = 0.006$). A subgroup analysis showed that statin use reduced the risk of TB significantly in subjects without diabetes but not in subjects with diabetes: HRs were, respectively, 0.73 (95% CI, 0.56 to 0.95) ($P = 0.018$) and 0.83 (95% CI, 0.54 to 1.28) ($P = 0.40$).

Conclusion. These epidemiologic findings provide strong evidence that statin use decreases the risk of active TB. The protective effect of statins against TB was attenuated by diabetes. Further studies about the effect of statins on TB incorporating experimental and clinical researches are required.

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774. Extrapulmonary Tuberculosis: Impact of Early Diagnosis and Treatment on Mortality

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Thursday, October 4, 2018: 12:30 PM

Background. Pakistan has a high burden of endemic *Mycobacterium tuberculosis* is complex (MTC) disease. Extrapulmonary tuberculosis (EPT) is defined as MTC infection involving any part of the body other than the lung. Extrapulmonary tuberculosis (EPT) is seen 20% of MTC infection in Pakistan, diagnosis is often delayed, and timeliness of initiation of treatment is extremely varied. We conducted a retrospective review of all cases of EPT presenting to a large public hospital in Islamabad, Pakistan to identify the role of early diagnosis and clinical treatment on patients with extra pulmonary tuberculosis.

Methods. Retrospective review of EPT diagnosed at Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan. All cases diagnosed and treated as EPT from January to June 2016 were included. Demographic, clinical and laboratory data were extracted from PIMS Medical records and TB01 cards from the National TB Control Program Pakistan. All patients were contacted to determine outcome status. Study was approved from National TB control Program.

Results. Two hundred seventy-five patients were identified who received a diagnosis of EPT. Mean age was 34.4 years; ratio of men to woman was 1.3:1. Pleural tuberculosis was the most common site involved (28.7%). The next most frequent site involved was lymphatic disease (20.3%). 47.6 percent of patients (113/275) were diagnosed by clinical criteria alone (i.e., symptoms and radiographic imaging). There were only three cases of culture confirmed EPT in the cohort. The overall cure rate was 82.9%. There was no difference of cure rates between the cure rates of males and females. Diagnosis based on clinical criteria was associated with significantly higher cure rate (87.6% vs. 79.6%, $P = 0.038$) and lower mortality (5.3% vs. 9.3%, $P = 0.041$) compared with laboratory-based diagnosis (5.3% vs. 9.3%, respectively). Improved outcomes and mortality benefit was seen in patients who were treated based on clinical criteria as compared with those in whom treatment was delayed due to biochemical confirmation (Odds ratio 0.28, 95% CI: 0.086–0.95). Sixteen cases were lost to follow-up.

Conclusion. Early initiation of treatment based on clinical criteria was associated with lower mortality and overall outcome benefit in our study cohort. However, further larger studies of patients with EPT are required to validate our observations.

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775. An Epidemiological Analysis of Patients With Multidrug-Resistant Tuberculosis Among Tibetan Refugees in India

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Session: 70. Tuberculosis and Other Mycobacterial Infections

Thursday, October 4, 2018: 12:30 PM

Background. Globally, refugee populations face an increased risk for tuberculosis (TB) due to malnutrition, overcrowding, and poor living conditions. Compared with the general Indian population, Tibetan refugees in India display a higher incidence rate of both TB and multidrug-resistant TB (MDR-TB). The high incidence of MDR-TB in younger population is a serious public health concern.

Methods. We retrospectively reviewed the medical records of patients with MDR-TB treated from January 2010 to December 2013 in Tibetan Delek Hospital, which is the center of TB control among Tibetan refugees. Patients were classified into either new cases (suspected infection by exposure to MDR-TB) or previously treated MDR-TB cases (suspected acquisition of MDR-TB through anti-TB treatment or by MDR-TB exposure after treatment). We compared patients' age, sex, birthplace, residence type, occupation, contact history, and treatment outcome.

Results. Of 749 patients with TB, we enrolled 134 patients with MDR-TB [median age, 26 (interquartile range: 22–35) years; males, 55%]. The Tibetan ethnicity comprised 96% of the study population, whereas Indians (trans-Himalayan) comprised 4%. The birthplace was Tibet for 22% patients, India for 75%, and Nepal for 2%. New MDR-TB cases were 28% and previously treated MDR-TB cases were 72%. Failure was observed in 42% patients and cured and completed in 54% patients, during their previous TB treatment. The median age was significantly lower in new cases than in previously treated MDR-TB cases (24 vs. 28.5 years; $P < 0.01$). Tibet was the birthplace of 34% new cases and 18% in previously treated cases ($P = 0.04$). The residence was of the congregated type in 58% of new cases and 30% in previously treated MDR-TB cases ($P = 0.01$). The occupation was “student” and “unemployed” in 58% and 8% in new cases and 33% and 24% in previously treated cases, respectively ($P = 0.03$). Contact history with TB type and treatment outcome were not considerably different, although the rates of cured and completed were high in both new (82%) and previously treated (84%) MDR-TB cases.

Conclusion. This study shows that new MDR-TB correlates with younger age, birth in Tibet, congregated residence, and student occupation. Targeting the