Tuberculosis among Adults Aged 65 Years and Older—Alameda County, California, 2016 – 2019

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Background

- Adults aged 65 and older (**older adults**) comprise a rising proportion tuberculosis (TB) cases in the United States (U.S.)
- Atypical symptoms and increased clinical complexity complicate TB care

Objective: To characterize the clinical, diagnostic, and treatment outcomes in older adults with TB to guide interventions to improve care

Methods

Study Population: All confirmed adult TB cases (ages ≥15) reported to the Alameda County Public Health Department (ACPHD) from 2016-2019

Setting: Alameda County, California has a population of 1.7 million and TB incidence rates ranging from 7.4-10 cases per 10,000 population in 2016-2019

Data Sources:
- Report of Verified Case of Tuberculosis (RVCT) data
- ACPHD public health case management charts for TB cases aged ≥65

Definitions and Analysis:
- Younger adults (15-64 years old) were compared to older adults (≥65 years). Within older adults, 65-74 years old were compared with those aged ≥75.
- All comparisons were made with Fisher's exact test, Chi-squared test, or Mann-Whitney U test, significance defined as p-value < 0.05
- A multivariable model was built to evaluate demographic and clinical risk factors for failure to complete treatment in older adults

Results

Demographics and Clinical Characteristics
- A total of 517 adult TB cases were reported between 2016–2019
- 172 cases (33.3%) occurred among adults aged ≥65
- Older adults vs. younger adults were more likely to be male (68.6% vs 56.2%), Asian (89.0% vs. 67.0%), and non-U.S. born (98.3% vs. 88.1%)
- Older adults were more likely to have **comorbid diabetes** (32.6% vs. 20.9%)
- Adults aged ≥75 years had higher Charlson Comorbidity Index scores than adults aged 65-74 years (median[interquartile range], 2[1,3] vs. 1[0.2])

Disease Characteristic and Diagnostic Testing (Table 1)
- Older adults were more likely to be **IGRA negative** at time of diagnosis (24.6%)
- Older adults were less likely to have cavitary disease (18.6%)

Table 1. Disease characteristics and diagnostic testing among all age groups

	Overall	15-64 years	≥65 years	*P-value*
IGRA negative, n (%)	70 (18.6)	42 (16.0)	28 (24.6)	0.01
Pulmonary sputum smear positive, n (%)	168 (42.6)	108 (43.0)	60 (42.0)	0.92
Sputum culture or PCR positive, n (%)	342 (66.2)	220 (63.7)	122 (70.9)	0.24
Multidrug-resistant, n (%)	6 (1.4)	6 (2.2)	0 (0.0)	0.09
Cavitary disease on radiography, n (%)	124 (24.0)	92 (26.7)	32 (18.6)	<0.001

Older adults are more likely to have **false-negative** TB testing

Advanced age is associated with higher risk for **failure to complete** TB treatment and **death** during treatment

Key Points for Clinicians and Patients

- Clinicians should have a low threshold to perform a TB evaluation in older adults with risk factors
- Greater guidance is needed on best practices to reduce complications of TB disease and treatment for older adults

Table 4. Treatment outcomes among all age groups

	Overall	All Adults: 15-64 years	All Adults: ≥65 years	*P-value*	Older Adults: 65-74 years	Older Adults: ≥75 years	*P-value*
Completed TB therapy, n (%)	434 (84.9)	305 (88.4)	129 (77.7)	<0.01	59 (84.3)	70 (72.9)	0.04
Died during TB therapy, n (%)	37 (2.0)	10 (2.9)	27 (16.3)	<0.001	5 (7.1)	22 (22.9)	0.01

Results *(cont'd)*

Adverse Events (Table 2)
- Adverse events occurred in 32.1% of older adults
  - Elevated liver enzymes and rash as the most common reactions
- 98.1% of older adults with adverse events were on a pyrazinamide (PZA)-containing regimen
  - 50% of those rechallenged tolerated 8 weeks

Table 2. Treatment characteristics and adverse events among older adults

	≥65 years	65-74 years	≥75 years	*P-value*
Treatment duration days, median (IQR)	202 (187,280)	202 (187, 281)	202 (188, 279)	0.83
At least one adverse event, n (%)	53 (32.5)	25 (35.7)	28 (29.1)	0.50
Adverse event type, n (%)				
Rash	17 (32.1)	7 (28.0)	10 (35.7)	0.77
Elevated liver enzymes	30 (56.6)	14 (56.0)	16 (57.1)	1.00
Nausea/vomiting/GI symptoms	10 (18.9)	1 (4.0)	9 (32.1)	0.02
Hematologic abnormalities	6 (11.3)	2 (8.0)	4 (14.3)	0.68

Factors associated with Treatment Non-completion (Table 3)

- On multivariable testing, we found that **dementia** was significantly associated with failure to complete treatment among older adults (adjusted OR 5.05, 95% CI [1.3-20.3])

Table 3. Risk factors for failure to complete TB treatment among older adults

	aOR	95% CI	*P-value*
Aged ≥ 75 years	1.16	[0.45, 3.07]	0.76
Male vs. female	1.26	[0.47, 3.65]	0.65
CCI, per 1 unit increase	1.17	[0.94, 1.46]	0.16
Dementia	5.05	[1.33, 20.32]	0.02
Smear positive at baseline†	2.06	[0.78, 5.70]	0.15
Cavitary disease on radiography	1.20	[0.39, 3.50]	0.74
Initial PZA-containing regimen	1.01	[0.10, 11.55]	0.99

Discussion

- Advanced age is associated with increased clinical complexity, negative diagnostic testing, and higher likelihood of poor outcomes including failure to complete treatment and death
- Dementia is an age-associated comorbidity that significantly increases the risk of treatment noncompletion. These patients may require additional support and resources to successfully complete treatment.
- There is a great need for more evidence-based screening and interventions in the age group to improve TB detection, morbidity, and mortality

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