Assessment and treatment of latent tuberculosis infection in high-priority healthcare workers across four tertiary centres

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Background and Rationale

23% of the world's population have latent TB infection (LTBI), with treatment reducing reactivation risk. The Irish Health Protection Surveillance Centre recommends that all HCWs arriving in Ireland from countries with high TB incidence and all HCWs working with patients undergo LTBI screening [1]. There is no accepted national referral pathway in Ireland. We evaluated the characteristics of HCWs undergoing LTBI screening at two hospital sites (St James's Hospital Dublin (SJH) and University Hospital Galway (UHG)) as well as treatment outcomes for HCWs with positive IGRAs at four hospital sites (Mater Misericordiae University Hospital Dublin (MMUH), and St Vincent's Hospital, Dublin (SVUH)) over a 12-month period.

Methods

HCWs undergoing pre-employment TB IGRAs at SJH and UHG in 2023 were identified. HCWs with positive IGRAs were identified at SJH, UHG, MMUH and SVUH. Demographic (age, sex, country of birth) and occupational (job role) factors were recorded, as well as treatment characteristics of those offered therapy. Univariate analysis and multivariable logistic regression assessed factors associated with IGRA positivity, treatment initiation and treatment outcome.

Results: Screening

IGRAs were performed in n=885 HCWs. HCWs at SJH were younger, predominantly female and more likely to be born in Ireland compared to UHG. Positive IGRAs were seen in 17% and were associated with older age, being male and being born in Sub-Saharan Africa (**Table 1**). Multivariable logistic regression demonstrated older age, being in UHG, and being born in Sub-Saharan Africa were independently associated with positive IGRA (**Table 2**).

Table 1: Cohort characteristics by IGRA result

	Total cohort (n=858)	IGRA neg (n=712)	IGRA pos (n=146)	
Age, years; median (IQR)	33 (28 – 38)	33 (28 – 38)	36 (31 – 40)	z=-4.97, p<0.0001
Sex, female; n (%) -data on n=811	629 (78)	526 (79) n=665	103 (71) n=146	X^2=5.03, p=0.03
Region of birth; n (%) South & Central Asia Sub-Saharan Africa Eastern Europe South America South East Asia Other -data on n=537	 303 (56) 67 (12) 21 (4) 10 (2) 66 (12) 70 (13)	n=396 214 (54) 42 (5) 19 (5) 7 (2) 47 (12) 67 (17)	n=141 89 (63) 25 (18) 2 (1) 3 (2) 19 (13) 3 (2)	r^2=0.05 p=0.04
Role, clinical; yes (%) -data on n=538	513 (95)	380 (95) n=400	133 (96) n=138	X^2=0.44, p=0.51
Role; n (%) Nurse Doctor AHP Catering Clerical HCA Other Lab	 387 (72) 44 (8) 24 (4) 4 (<1) 4 (<1) 57 (11) 8 (1) 10 (2)	 289 (72) 26 (7) 21 (5) 3 (<1) 3 (<1) 44 (11) 5 (1) 9 (2)	 98 (71) 18 (9) 3 (2) 1 (<1) 1 (<1) 13 (9) 3 (2) 1 (<1)	r^2=0.02 p=0.21

Table 2: Factors associated with positive TB IGRA

	Likelihood of Positive IGRA	
	Odds ratio (95% CI)	P value
Site, UHG	143.9 (49.3 – 419.8)	<0.0001
Age	1.04 (1.005 – 1.08)	0.03
Sex, male	1.3 (0.6 – 2.6)	0.47
Clinical, no	0.8 (0.2 – 3.2)	0.73
Ethnicity -South & Central Asia -Sub Saharan Africa -Eastern Europe -South America -South East Asia -Other	 1.0 (reference) 2.2 (1.1 – 4.6) 0.9 (0.2 – 4.2) 1.1 (0.2 – 7.8) 1.4 (0.6 – 3.1) 0.2 (0.03 – 0.8)	 0.03 0.90 0.94 0.40 0.02

Multivariable logistic regression model; all variables shown included in model. Performed on n=529 with complete data available

Results: Treating

N=288 IGRA-positive HCWs were assessed for treatment (SJH n=110, UHG n=92, MMUH=16, SVUH=70) by Infectious Diseases services (UHG, MMUH) and respiratory services (SJH, SVUH). Treatment initiation varied significantly across sites (27% SJH, 70% UHG, 88% MMUH, 32% SVUH, p<0.0001). The commonest reason for not initiating treatment was patient preference (**Table 3**). On multivariate analysis, patient sex, age, ethnicity and clinical role were not associated with treatment initiation, with site of attendance associated with commencing treatment (p=0.007). Rifampicin was the commonest treatment choice (96%). Treatment was completed by 82% of HCWs, with no significant differences in completion rates across sites. On multivariate analysis, none of the recorded variables were associated with increased likelihood to complete treatment **(Table 4).**

Table 3: Treatment Outcomes across sites

	Total (n=288)	SJH (n=110)	UHG (n=92)	MMUH (n=16)	SVUH (n=70)	Statistics
Started treatment, yes; n (%)	140 (49)	30 (27)	64 (70)	14 (88)	32 (46)	X^2=46.14, p<0.0001
If not, reason why; n (%) - Declined - DNA - Defer - Prior TB/LTBI - Other	 74 (26) 33 (11) 7 (2) 15 (5) 17 (6)	 47 (43) 18 (16) 5 (5) 6 (5) 4 (4)	 13 (14) 6 (7)d 1 (1) 0 (0) 7 (8)	 0 (0) 1 (6) 1 (6) 0 (0) (0)	 14 (20) 8 (11) 0 (0) 9 (13) 6 (9)	X^2=34.03, p=0.001
	Total (n=140)	SJH (n=30)	UHG (n=64)	MMUH (n=14)	SVUH (n=32)	
Treatment choice; n (%) - Rifampicin - Isoniazid	 134 (96) 6 (4)	 29 (97) 1 (3)	 59 (92) 5 (8)	 14 (100) 0 (0)	 32 (100) 0 (0)	X^2=4.07 p=0.25
Treatment completed, yes; n (%)	115 (82)	22 (73)	52 (81)	13 (93)	28 (88)	X^2=3.34 p=0.34
If not, why; n (%) - DNA - Adverse effect	 13 (9) 12 (9)	 4 (13) 4 (13)	 8 (12) 4 (6)	 0 (0) 1 (6)	 1 (3) 3 (9)	X^2=3.30, p=0.35

Kruskal Wallis ANOVA and Pearson's Chi-squared test used, as appropriate.

Table 4: Associations with treatment commencement and completion

	Commencing treatment		Completing treatment	
	OR (95% CI)	P value	OR (95% CI)	P value
Age	0.98 (0.95 – 1.02)	0.33	1.05 (0.99 – 1.11)	0.08
Sex, male	0.98 (0.57 – 1.67)	0.94	0.78 (0.27 – 2.24)	0.64
Ethnicity	1.06 (0.94 – 1.19)	0.33	1.16 (0.95 – 1.43)	0.15
Clinical role, no	0.97 (0.28 – 3.34)	0.96	N/A	N/A
Hospital site	0.72 (0.57 – 0.91)	0.007	0.66 (0.40 – 1.08)	0.10

Logistic regression, with all variables shown included

Discussion

LTBI is common in high priority HCWs, with 17% having a positive IGRA. Overall uptake by HCWs is significantly lower than that of the general public [2]. The absence of a defined national clinical pathway from screening to treatment completion, as well as absence of minimum recorded datasets, is associated with diversity in treatment initiation rates. However, for HCWs who do commence treatment, completion rates are high, exceeding those reported for the general public [3, 4]. A national approach may improve standardisation and treatment outcomes.

References

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