about the relative merits of sputum induction (SI) and fiberoptic bronchoscopy (FOB; Brown M et al, 2007, Anderson C et al, 1995). SI is less invasive, cheaper, and unlikely to cause cross-infection, whereas FOB allows visualisation of the bronchial tree and other pathologies—especially cancer. At our hospitals, a diagnostic algorithm was devised to reduce the need for FOB for the diagnosis of pTB. Clinicians only requested bronchoscopy when three induced sputum samples were negative, unsuccessful, or contraindicated.

Method A retrospective cohort study, from 1 January 2008 to 31 December 2010. Patients undergoing SI for suspected pTB were identified from physiotherapy records, and the bronchoscopy database was interrogated for mycobacterial requests.

Results 521 induced sputum samples were sent from 214 patients. In total, 28 patients were diagnosed with pTB, 16 (57%) of whom were smear-positive. Non-tuberculous mycobacteria (NTM) were grown from four patients. Microbiological results of SI are listed in Abstract P53 table 1. Tuberculosis was diagnosed on the first sample in 25 cases (89%), the second in one (4%) case, and the third in two cases (7%). However, only 57% had at least three samples taken. Of 472 patients who underwent SI or FOB, 14 (3.0%) had both. Of those 14, three (21%) had positive samples for mycobacteria, two of which were *Mycobacterium tuberculosis*. All 14 had concordant culture results, whereas one case had a discordant smear result. In this case *Mycobacterium malmoense* was grown at both FOB and SI, although only the FOB sample was smear-positive.

Abstract P53 Table 1 Smear and culture results of sputum induction

	2008	2009	2010	Total
Number of patients referred for SI	64	53	97	214
Smear-pos, culture-pos tuberculosis*	10	1	5	16
Smear-neg culture-pos tuberculosis*	2	5	5	12
Total tuberculosis patients*	12 (19%)	6 (11%)	10 (10%)	28 (13%)

*Excluding four patients from whom non-tuberculous mycobacteria were grown.

Comment In this cohort, FOB carried out after SI did not increase the diagnostic yield. Fewer than 2% of those undergoing SI went on to have FOB, which suggests that clinicians were satisfied with SI and did not feel that bronchoscopy was required. However a systematic review and meta-analysis, and a larger, prospective study would be desirable.

P54 IMPACT OF A RAPID ACCESS SYSTEM FOR EARLY REFERRAL OF SUSPECTED TB CASES

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Introduction Early diagnosis and treatment of infectious tuberculosis (TB) is an important strategy for controlling the burden of disease by minimising the spread of infection and secondary disease in close contacts. Since 2005, we have developed a centralised rapid referral system in Leicester for the early assessment of suspected TB by a specialist physician. The system is triggered by a list of "red-flag" symptoms submitted on a proforma and/or appropriate coding by the reporting radiologist of all abnormal chest radiographs compatible with a possible diagnosis of TB.

Aims To evaluate whether differences exist in disease characteristics and time to diagnosis with availability of the rapid referral system.

Methods A retrospective analysis of data collected from patients referred to the Rapid Access TB clinic between the years 2005 and 2010 was conducted. A sub-group analysis was completed for the years 2007–2009 comparing cases referred to the rapid access clinic with those diagnosed by other (non-rapid referral) pathways.

Abstract P54 Table 1 Summary of sub-group analysis for the years 2007–2009 comparing cases referred to the rapid access clinic with those diagnosed by other (non-rapid referral) pathways

	Rapid access (n=288)	Other pathways to diagnosis (n=300)	Statistical significance (p value; χ^2 test)
Male gender (%)	54.2	51.2	>0.05
Mean age (years)	36.4	41.6	>0.05
Age groups (years)			
0–16	6	5	>0.05
16–36	155	145	>0.05
>36	127	150	>0.05
Ethnicity			
Indian sub-continent	191	226	>0.05
Black	32	43	>0.05
Disease type			
Non-pulmonary	26.4	48.4	0.04
Pulmonary smear negative	41.6	16.2	0.03
Pulmonary smear positive	32.0	35.4	>0.05
Average duration of symptoms (days)			
Non-pulmonary	78.4	122.1	0.03
Pulmonary smear negative	80.4	100.1	>0.05
Pulmonary smear positive	60.2	95.9	0.03
Contact tracing			
% Associated with contacts	81.6	90	>0.05
Mean number of contacts	4.57	4.91	>0.05

Results 1552 suspected cases of tuberculosis were referred through the rapid access system, with a positive diagnosis made in 566 (36.5%). Radiological coding of CXR reports was the primary trigger for 93.8% of referrals. No differences existed in age, gender or ethnicity of patients identified through rapid access or other pathways. A significantly higher proportion of cases identified through rapid access were pulmonary (Abstract P54 table 1). The rapid access system was associated with a significant reduction in the time to specialist assessment for both non-pulmonary and smear positive pulmonary TB.

Conclusions A rapid access system of referral that incorporates a red-flag coding system of potentially abnormal CXRs effectively identifies a significant proportion of pulmonary TB cases and reduces the time to assessment and treatment of smear positive pulmonary TB.

P55 TB RISK AFTER NEW IMMIGRANT GP REGISTRATION: A RETROSPECTIVE COHORT ANALYSIS

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Introduction Although 80% of all TB cases in the UK occur in foreign born persons, TB risk in the immigrant population is largely unknown due to uncertain estimates of migration. The evaluation of screening models to prevent immigrant TB depends on informed estimations of this risk.

Objective To evaluate TB risk in a cohort of immigrants with new immigrant GP registration status (Flag-4) in Leicestershire; and to estimate efficacy of a screening model that uses Flag-4 registration and testing with interferon gamma release assays (IGRAs) for identifying latent infection with *M tuberculosis* (LTBI).

Methods All Flag-4 registered immigrants between January 2000 and December 2010 were included and collated with TB notification data for the same period. TB cases arising in registered immigrants were included for estimation of case rate using Kaplan–Meier

curves. Cumulative TB rates were expressed as time after UK entry and time after GP registration and compared between immigrant subgroups stratified by WHO incidence in country of origin (150—499/100 000 or 500+/100 000) and age group at time of registration (<16, 16—35 or =36 years). The number needed to screen was calculated using an overall prevalence estimate of 25% IGRA positivity, with all cases occurring in this subgroup.

Results 564 cases were recorded in 34 764 immigrants. The median (IQR) observation was 2198 (982—3329) days after UK entry and 956 (358—1888) days after GP registration. There was no difference in risk with time after UK entry or GP registration and the TB rate rose linearly over 10 years. In our cohort, the 5-year cumulative TB rate was significantly higher for immigrants from regions with incidence of 150—499 than those from 500+. The TB rate was also significantly higher in adults than children, and highest in adults aged 16—35 years (Abstract P55 table 1). For this age band, the estimated number needed to screen (95% CI) with IGRAs to identify one immigrant developing TB in 5 years was 78.8 (73.2—85.2) persons.

Abstract P55 Table 1   Five-year TB rate after GP registration in immigrant subgroups

	WHO incidence in country of origin		Age at GP registration		
	150—499	500+	0—15	16—35	36+
5 year rate (SE)/ 100 000 person years	1421 (76.8)	1045 (193.7)	493 (98.7)	1691 (104)	1347 (151)

Conclusions A new immigrant screening model using the Flag 4 GP registry and IGRA testing may be effective for identifying at-risk immigrants.

P56   **TREATMENT OF MULTIDRUG RESISTANT TUBERCULOSIS: WHERE ARE THE GUIDELINES FOR MONITORING?**

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Introduction Complex treatment strategies are necessary to tackle multi-drug resistant tuberculosis (MDR-TB). Adverse drug reactions (ADRs) are well documented but currently there are very few guidelines for drug monitoring aimed specifically at the durations of treatment used in MDR-TB.[1]

Methods We retrospectively reviewed all MDR-TB patients seen at our Trust over the last 5 years to determine which ADRs were most common and how they are assessed. We examined epidemiological factors (age, sex, ethnicity, and duration in UK), drug regimens, duration of treatment, treatment completion, ADR monitoring, and ADRs reported. All patients had baseline blood tests, visual acuity and Ishihara plates.

Results 18 patients were reviewed (12 male) with a mean age of 34.4 (range 10—80) years. One was HIV positive. Thirteen had lived in the UK for <10 years (2>10 years). Three were born in the UK (1 white ethnicity). Treatment regimens included a combination of 4—5 drugs selected from first line oral agents (pyrazinamide or ethambutol), 2nd line oral bacteriostatics (PAS, prothionamide, cycloserine), a fluoroquinolone (moxifloxacin or ofloxacin), drugs which have an unclear role, (clarithromycin) and an aminoglycoside used during the first intensive phase. Planned duration of treatment for all patients was 24 months. Nine completed 2 years, two

completed > 2 years, six are on-going and one died. Reported ADRs included nausea and vomiting (38.9%), visual impairment (38.9%), hearing loss (27.8%), tinnitus (27.8%), hypothyroidism (16.7%), arthralgia (16.7%), hepatic impairment (11.1%), renal impairment (5.6%) and also fatigue, headache, rash, pruritis and dizziness. ADRs were detected through a combination of self-reporting of symptoms and direct questioning. Appropriate blood tests and drug levels were taken regularly but not following a recognised protocol.

Conclusions MDR-TB treatment regimens use toxic drugs over long periods. We support the development of a series of systematic evidence-based protocols for assessing ADRs and organisation of monitoring tests in MDR-TB patients which can be used by both physicians and specialist nurses. This should include baseline screening, regular blood tests, audiometry and visual testing as well as drug level monitoring.

REFERENCE
1. *Treatment of Tuberculosis: Guidelines*. 4th ed. Geneva: World Health Organization, 2009 (WHO/HTM/TB/2009.420).

P57   **THE AWARENESS, PERCEPTIONS AND ATTITUDES AMONG MIGRANTS TOWARDS TB SCREENING**

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Introduction There is a wide variation in the provision of TB screening services for migrants worldwide. New entrant screening for TB helps to identify and treat active and latent TB at an early stage, reduce risk of transmission and identifies those at a high-risk. It is common practice to screen new entrants from countries where the prevalence is high. However, it is sometimes perceived that screening for immigrants can be stigmatising. In addition, there is a poor understanding of this disease and large cultural differences in perceptions exist. This study explores the different attitudes towards screening and the current awareness, perceptions and attitudes towards TB, in order to tailor the current screening programme to different cultural backgrounds.

Methods 27 participants (63% male) were recruited at the weekly multi-disciplinary Liverpool TB contact-tracing clinic. Semi-structured interviews (18% interpreter help) exploring the attitudes towards screening and the disease were conducted.

Results 59% of participants were aware of the causative agent, 74% identified at least 1 associated symptom and 89% recognised that transmission was air borne. 89% considered TB curable, 33% were aware of the link with HIV and 44% stressed that a greater awareness of TB among the general public is needed. The main source of information about the disease was family and friends (43%) and clinic (42%). The majority (59%) felt there was a stigma attached with fear of social isolation and an impact on occupation. 59% expressed a positive attitude towards screening and perceived it to be acceptable due to the availability of free treatment. The majority of the participants regarded screening as prevention of transmission and felt it was their responsibility in society. 22% of the participants thought it was unnecessary or were unsatisfied with the current screening process. Seven per cent of the participants demonstrated poor understanding of the screening process, having already undergone screening.

Conclusions The majority of the migrants found TB screening to be acceptable and demonstrated a positive attitude, although some barriers still exist. Improving TB awareness in the communities will help increase the acceptability of screening.