Historically known as the "white death" or "consumption", tuberculosis is often considered a disease of the past but it still affects developing and developed countries. In the UK, TB rates rose for two decades from the mid-1980s and started to decline from a peak of 8,280 reported active cases in 2011 to 5,664 in 2016 (Public Health England, 2017). This recent decline may reflect improved TB control, but continued effort is required to tackle the global TB burden.

The World Health Organization has recently advised European health professionals to remain vigilant about TB, even in low-incidence settings (WHO, 2018). This article describes a new service offered in general practices in Southampton to identify latent TB infection in recent migrants from high-prevalence countries. It explores the challenges and benefits of moving TB screening to a primary care setting. The Southampton experience shows that offering latent TB testing in primary care is a valuable health promotion tool, as it allows us to identify patients and engage them with treatment before the disease becomes active.

A primary care screening model to identify latent tuberculosis infection

**Key points**
- Although its incidence is declining, tuberculosis remains a serious public health issue.
- Many cases of TB occur in people who have recently migrated to the UK from countries where incidence is high.
- Latent TB infection is asymptomatic, but can become active and, as such, needs to be both identified and treated.
- Screening migrants who are at risk is challenging, particularly as TB infection is often latent.
- Screening in primary care can identify both active and latent TB infection and engage patients with treatment.

**Pathophysiology**
TB is caused by a mycobacterium and most commonly affects the lungs – known as pulmonary TB. However, it can spread via the bloodstream or lymphatic channels and affect other parts of the body, including the pleura, bones, kidneys, urinary tract, intestines, skin, brain and lymph nodes (extrapulmonary TB). Symptoms of active TB may include a cough persisting for more than three weeks, haemoptysis, weight loss, night sweats, fever, fatigue and lymph gland swelling. The disease is only infectious when active in the lungs or larynx, and spreads by droplets produced when an infected person coughs, sneezes, speaks or sings.

When a person is exposed to TB, one of three things may happen:
- The person’s immune system kills the bacteria, preventing them from causing harm now or in the future;
- The bacteria enter the body and cause illness with worsening symptoms – this is known as active TB;
- The bacteria enter the body where they remain dormant inside macrophages – this is known as latent TB infection (LTBI).

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**Abstract**
Although the incidence of tuberculosis has been declining in the UK since a peak in 2011, TB remains a significant public health issue. Infection is often latent but can become active and so requires treatment. Migrants from high-incidence countries are at particular risk, but chest X-ray screening on entry to the UK is not cost-effective and would not identify latent infection. This article describes a new service offered in general practices in Southampton to identify latent TB infection in recent migrants from high-prevalence countries. It explores the challenges and benefits of moving TB screening to a primary care setting. The Southampton experience shows that offering latent TB testing in primary care is a valuable health promotion tool, as it allows us to identify patients and engage them with treatment before the disease becomes active.

**Citation**
People with LTBI feel well and have no symptoms, so they may not know they are harbouring an infection. LTBI is not infectious, but approximately 5-10% of LTBIs become active at some point (O’Garra et al, 2013). Stress, immune suppression and ageing increase the risk of the disease becoming active. Currently, there is no test that can identify which LTBIs are likely to become active.

**National strategy**

Although TB can affect any person from any background, it is more often seen in migrants, homeless people, substance users and people from deprived communities. Overcrowding and poor ventilation – for example, in hostels for the homeless, prisons or houses with multiple occupancy – increase the risk of transmission while malnutrition, neglected health and stress make LTBI more likely to become active.

The disease is preventable and treatable, so raising awareness, educating and providing access to screening and treatment are essential. The Collaborative Tuberculosis Strategy for England 2015 to 2020 (PHE and NHS England, 2015) aims to reduce the incidence of TB and alleviate the harm it causes. Box 1 lists its 10-point action plan.

**Detection in new migrants**

One focus of the national TB strategy is new migrants, with the aim of detecting and treating LTBI in this population. Research indicates that around 70% of active TB cases in the UK occur in individuals with latent infection acquired in other countries (McNerney et al, 2011). In 2016, in the UK, 73.6% of people with active TB whose place of birth was known had not been born in the UK; their most frequent countries of birth were India, Pakistan, Somalia, Bangladesh and Romania (PHE, 2017).

Historically, new migrants may have been offered screening at the port of entry or directed to specialist TB services in secondary care for screening; however, many referred in that way were not screened. In Southampton, referrals of new migrants for TB screening ceased several years ago. A chest X-ray on arrival may identify active pulmonary TB, but not extrapulmonary TB or latent infection. Chest X-ray on arrival is not a cost-effective method to detect TB in new migrants, as they rarely have active disease when they enter the country; most cases of active TB among new migrants occur after their arrival through activation of LTBI (Pareek et al, 2013; 2011).

Detecting LTBI requires either a special blood test or a skin test. In the US, a focus on detecting and treating LTBI (rather than looking only for active disease) in new migrants has been instrumental in reducing the number of cases of active TB; these dropped by 55% between 1993 and 2010 (Ormerod, 2013).

**LTBI screening programmes**

In England, general practices in areas with the highest rates of TB – typically deprived inner-city regions – have started screening new migrants for LTBI. These screening programmes aim to test patients in primary care and refer them to secondary care if the result is positive. Patients must:

- Be 16-35 years old;
- Have been born or have lived for six months or more in a country identified as high risk – that is, a country where the rate of TB is >150 per 100,000; identified countries are listed in the toolkit for new entrant LTBI programmes (TB Alert et al, 2016);
- Have moved to the UK in the past five years;
- Not have had a TB blood test in the UK before.

TB Alert et al (2016) outlined known barriers to testing, including:

- Language;
- Previous negative testing for active TB at port of entry or in country of origin;
- False belief that bacillus Calmette-Guérin (BCG) vaccination gives 100% protection against TB infection;
- Absence of symptoms in those with LTBI;
- Fear or shame of being diagnosed with TB due to associations with poverty, poor hygiene and witchcraft;
- Unfounded concern that information about the person will be passed on to immigration authorities;
- Person not registered with GP and, as such, unknown to primary care services.

**The Southampton experience**

Southampton was identified as a TB hotspot due to a 2011 outbreak in the SO14 postcode area. In August 2016, 11 Southampton general practices began offering screening. Testing is undertaken using a Quantiferon blood test, which uses antigens from Mycobacterium tuberculosis to stimulate white blood cells overnight. A high release of interferon gamma indicates TB infection, but does not allow for differentiation between active and latent disease. Unlike the traditional Mantoux test, the Quantiferon test requires only one appointment. It also has minimal cross-reactivity with previous BCG vaccination.

Eligible patients are identified by searching each practice’s register looking at date of birth, country of birth, UK entry date and previous blood tests. However, this is a labour-intensive process and patient notes may not always feature all the information. Patients who register with a practice can be asked, via a questionnaire or at their new-patient health check, whether they qualify.

**Box 1. England’s tuberculosis strategy: 10-point action plan**

- Improve access to services and ensure early diagnosis
- Provide universal access to high-quality diagnostics
- Improve treatment and care services
- Ensure comprehensive contact tracing
- Improve bacillus Calmette-Guérin (BCG) vaccination uptake
- Reduce drug-resistant TB
- Tackle TB in underserved populations
- Systematically implement latent TB screening for new entrants
- Strengthen surveillance and monitoring
- Ensure an appropriate workforce to deliver TB control

Adapted from PHE and NHS England (2015)

**Box 2. Case study 1: latent tuberculosis infection (LTBI)**

Mohammad Nabi* is a 16-year-old refugee from Afghanistan. He travelled through many countries before reaching the UK and spent time in the Calais migrant camp known as “the Jungle”. His parents and immediate family are deceased and he is currently living with extended family. His health has been neglected and he has experienced malnutrition and extreme stress. He does not speak English and relies on relatives and an interpreter for explanations and support. After undergoing a test in general practice and testing positive for latent TB infection, he was referred to the TB consultant for assessment and treatment. He has successfully completed a three-month treatment course with a combination of the antibiotics rifampicin and isoniazid, and oral vitamin D, with no side-effects.

*The patient’s name has been changed

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Screening template
One GP surgery developed and shared a screening template that includes asking the patient about cough, night sweats and weight loss. Eight of the other practices have adopted it. Although using this template increases the length of the screening appointment, symptoms of active disease can be spotted, thereby speeding up TB diagnosis – this is critical for the patient’s health and to prevent transmission. The template has an urgent referral pathway for suspected active disease and a routine referral pathway for suspected LTBI.

Patients with a negative Quantiferon blood test result receive a letter informing them and advising them to be vigilant for TB symptoms – false negatives can occur at extremes of age because of immuno-suppression or for technical reasons (Tebruegge et al, 2014). Patients who have a positive result are informed and assessed by a GP, have a chest X-ray and routine blood tests, and are then referred to the TB consultant clinic.

Results so far
At the time of writing, 1,024 tests had been performed since August 2016. Of these, 133 were positive (this figure includes both LTBI and active disease) and seven were indeterminate: this gives a 15% positivity rate. Case study 1 describes a patient with LTBI and case study 2 a patient with active extrapulmonary TB.

We have had excellent engagement from the patients diagnosed with LTBI, most of whom are attending their clinic appointments and completing treatment. Extra consultant clinics have been required to manage the increased workload. This is encouraging, as previous research has raised concerns about poor treatment uptake in migrants diagnosed with LTBI (Hargreaves et al, 2014). However, even if patients decline LTBI treatment, it is still useful to have identified their infection, as this will have raised their awareness and be recorded in their notes, which may increase the speed of diagnosis if the disease becomes active.

Improving eligibility criteria
Eligibility criteria are important in any screening programme, and more research is needed to determine whether and how the eligibility criteria for LTBI screening in general practice could be improved. As an example, it may be helpful to include other countries if they are major drivers of local transmission.

It may also be helpful to extend the age criteria at both ends of the spectrum, as well as the period since arrival in the UK. We have already extended our criteria to include patients who arrived in the UK more than five years ago but have, in the last five years, gone back to their countries of origin for holidays. This has enabled us to engage with migrants who have had time to settle in the country and register with GPs.

Conclusion
Identifying recent migrants with LTBI through screening in general practice is a viable alternative to waiting for cases of active TB to emerge. The approach reflects current guidance, which states that one principle of TB control should be active case finding (National Institute for Health and Care Excellence, 2016). It can avoid harm to patients’ physical, emotional and social wellbeing, save the NHS the cost of hospital care, and prevent the spread of infection.

Raising awareness of TB among primary care staff and patients with latent disease may speed up diagnosis if active TB occurs. This new health promotion method can be used to identify patients’ health needs and optimise their future health outcomes. Recent migrants should be routinely tested for LTBI in general practice.

References


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