
Fact file: examining Tuberculosis trends in the UK

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Robert Pratt examines current trends in TB in the UK and strategies to prevent and control the disease.

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During 1980–2005, more than 90 million people with TB were reported to the World Health Organization (WHO). However, data collected during this period suggests that TB prevalence and death rates have been decreasing globally for many years and that incidence rates may have peaked during 2000–2005.

In 2005 there were an estimated 8.8 million new TB cases, most of them (7.4 million) in Asia and sub-Saharan Africa, and 1.6 million TB-related deaths (WHO, 2007a). Someone in the world is newly infected with *Mycobacterium tuberculosis* every second and, today, one-third of the world's population is infected with TB bacilli (WHO, 2007b).

In the UK, 8,555 people were diagnosed with TB in 2006. The vast majority of cases – 7,942 – were in England, with London accounting for the highest proportion. Wales and Northern Ireland reported 168 and 61 new cases respectively. In Scotland, the annual numbers of cases continues to fluctuate between 350 and 400; in 2006, 384 TB cases were reported (Health Protection Agency, 2007).

The highest rates of TB in the UK are seen in particular risk groups. Over half of reported cases are in people born overseas, especially in Asia and sub-Saharan Africa. The rates are higher in certain ethnic groups in the first few years after they enter the UK, and remain high in the children of these immigrants. Other risk groups include: contacts of people with active respiratory TB; homeless people; and, people with HIV infections (Department of Health, 2005).

BCG immunisation

The Bacille Calmette-Guérin (BCG) vaccine has been used for 80 years to protect against childhood TB meningitis and miliary TB (generalised tuberculosis) and recent research has confirmed that it is extremely effective in doing this (Trunz et al, 2006). The WHO recommends the vaccine should be given to all newborn babies as protection against the most severe forms of childhood TB.

BCG vaccination does not prevent primary infection and, more importantly, does not prevent reactivation of latent pulmonary infection (post-primary TB) later in life (Grange, 2005). Consequently, it has a very limited effect in protecting adults against primary and post-primary TB and a minimal effect on the annual global incidence of TB.

BCG vaccination was first introduced in the UK in the 1950s and recommended for secondary school-age children. In 2005, following an extensive review of all available scientific and epidemiological data, the UK Joint Committee on Vaccination and Immunisation recommended that an improved targeted neonatal and 'other at risk' based programme should replace the national schools-based programme for older children (DH, 2005).

New guidelines for offering BCG vaccination have been developed by NICE (2006) and the DH (Salisbury et al, 2006). More detailed information on offering and administering this vaccine, along with detailed information on the contraindications for BCG vaccination, can be found in the Department of Health's Green Book on immunisations against infectious disease (Salisbury et al, 2006) (Box 1).

Prime boost BCG

A new vaccine based on a modified vaccinia virus (MVA) has been developed by Oxford University researchers and is now entering clinical trials in England. This will be given alongside the BCG vaccine in an effort to enhance its efficacy in stimulating very high levels of the type of immune response that is thought to protect against TB. This immunisation strategy is known as 'prime boost' – the BCG is the prime vaccine that will be boosted by the new MVA vaccine.

Animal studies have shown that this approach is effective in producing a significantly higher level of immunity with better levels of protection against TB (Wellcome Trust, 2007). If the vaccine can be shown to be equally successful in human trials, it could be one of the most dramatic and significant advances in global TB prevention since the early 20th century when BCG was first used to vaccinate children against TB in France.

Tuberculin skin testing (TST)

Both the Heaf and Mantoux methods of administering tuberculin have been used in the UK to determine if BCG vaccination was needed. Mantoux testing is the international standard to determine immunity to TB and is now exclusively recommended (DH, 2005). Heaf-strength tuberculin is no longer available.

New serological tests for TB

Since 2005, new interferon-gamma blood tests have been approved for use in the diagnosis of TB (Centers for Disease Control and Prevention, 2005). These tests can be used in place of TST.

The advantages of these new tests are that the results can be available with 24 hours without a second visit to a healthcare professional, whereas the TST requires a second visit for reading between 48 to 72 hours.

False positive test results from interferon-gamma blood tests are less likely than when using the TST, especially in people who have received the BCG vaccination (Ferrara et al, 2006).

Treatment adherence

Modern anti-TB drug treatment for people with fully drug-sensitive TB is administered in two phases: an initial phase of two months using four drugs; and, a continuation phase of six months using two drugs (Box 2). The use of four drugs in the initial phase is designed to reduce the bacterial population as rapidly as possible and to prevent the emergence of drug-resistant bacteria. Recommended regimens for both unsupervised and supervised treatment are described in the British National Formulary (Martin, 2007).

The drugs used in these regimens are referred to as 'first-line' anti-TB drugs. Most TB in the UK is fully sensitive to standard first-line anti-TB drugs (HPA, 2006).

Six months of treatment will effect a cure in almost all patients with drug-sensitive TB. However, this is dependent on patient adherence (taking the medication exactly as prescribed).

The role of the nurse in facilitating patient adherence has been well described by Loveday (2005), who stresses the importance of concordance and partnership in developing treatment regimens and the use of various approaches to support both directly observed therapy and self-managed therapy.

Drug resistance

There are many reasons why resistance to anti-TB drugs occurs. The most common is patients failing to adhere to their drug regimen and not completing their course of treatment. The most frequent cause of nonadherence is patients simply forgetting to take their medication.

In many parts of the world, incompetent medical prescribing, inadequate patient education and support, counterfeit drugs, poverty, transportation difficulties and unreliable drug supplies all potentiate the emergence of drug resistance.

Multi-drug resistant (MDR) and extensively drug-resistant (XDR) forms of TB (Box 3) are a serious threat to public health and global TB control. Treating patients who have MDR-TB requires the use of 'second-line' anti-TB drugs. These are more expensive, less effective and associated with more frequent and serious side-effects than first-line anti-TB drugs.

The WHO (2007c) estimates that over 400,000 cases of MDR-TB emerge every year because of under-investment in basic TB control, poor management of anti-TB drugs and transmission of drug-resistant strains. Because second-line TB drugs are not widely available and affordable in the poorer regions of the world where most MDR-TB occurs, patients with this condition are consigned to chronic illness and death.

XDR-TB is a type of MDR-TB that is resistant even to second-line anti-TB drugs and it is virtually untreatable (Centers for Disease Control and Prevention, 2006a). Although neither MDR-TB nor XDR-TB is more infectious than drug-sensitive TB, patients with these resistant forms of disease are infectious for a longer period of time, potentially infecting many more people with a primary resistant strain of TB (Pratt, 2007). MDR-TB and XDR-TB are frequently found in patients who are also infected with HIV. XDR-TB is now being identified in all regions of the world. This raises the possibility that current epidemics of mostly drug-sensitive TB will be replaced by a form of untreatable TB, especially but not only in countries with a high prevalence of HIV infection (WHO, 2007c).

HIV-related TB

TB is the most common opportunistic infection in people with HIV infection. Coinfection with HIV and *M. tuberculosis* compounds the progressive loss of effective cell-mediated responses to both infections. Consequently, the clinical course of both infections is rapidly worsened.

People with HIV who become newly infected with *M. tuberculosis* are at a significantly greater risk of progressing to active disease (primary TB) than are those who are not infected with HIV. If a person has latent *M. tuberculosis* infection (as one-third of the world's population has) and then becomes infected with HIV, the progressive loss of immune function caused by HIV replication significantly increases the risk of reactivation (post-primary TB). In both circumstances, co-infected people are more likely to have a rapid, more severely progressive form of TB and an acceleration of HIV disease (Pratt, 2003).

Considering that there are currently more than 40 million people in the world living with HIV disease, and that over four million people become infected with HIV each year (UNAIDS, 2006), the future burden of tuberculosis in this population is daunting.

Conclusion

Exposure to patients with infectious TB is a well-recognised hazard of healthcare and, although the risks associated cannot be completely eliminated, they can be controlled and minimised. Information on infection control issues can be found on nursingtimes.net.

Box 1. UK BCG Vaccination Programme

Those recommended to receive BCG are:

- All infants (0–12 months) living in areas where the annual incidence of TB is 40/100,000 or greater.
- All infants (0–12 months) and previously unvaccinated children (1–5 years of age) with a parent or grandparent who was born in a country with a TB annual incidence of 40/100,000 or higher.
- Previously unvaccinated tuberculin (Mantoux)-negative children (from 6 to under 16 years of age) with a parent or grandparent who was born in a country with a TB annual incidence of 40/100,000 or higher.
- Previously unvaccinated tuberculin-negative new entrants to the UK under 16 years of age who were born in or who have lived for a prolonged period (at least three months) in a country with an annual TB incidence of 40/100,000 or greater.

- ▶ Any previously unvaccinated tuberculin-negative new entrants up to the age of 35 years from a sub-Saharan African country or a country with the very highest rates of TB (an annual incidence of 500/100,000).
- ▶ Previously unvaccinated tuberculin-negative contacts of persons with active respiratory TB.

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