

In conclusion, outcome should be reported for all definite pulmonary cases notified, regardless of treatment history. The 12-month maximum period of observation should be applied for the classification of all outcomes. Cases treated beyond 12 months and having MDR tuberculosis (identified at start or during the current treatment episode) would form the subject of continued monitoring with a longer period of observation (24-36 months).

The eight outcome categories proposed can be used for national outcome monitoring. Owing to the incomplete differentiation of 'cured' from 'completed', and to the non-uniform use of 'defaulted', 'transferred' and 'unknown' in classifying cases lost to follow up, analysis of outcome monitoring at European level and inter-country comparison should be based on five categories: 'success', 'death', 'failed', 'still on treatment' and 'others'. European countries should further standardise their parameters for tuberculosis outcome monitoring in order to enable a more meaningful comparison of programme performance between countries and over time. In the West, where tuberculosis patients are older and deaths are thus expected to be higher, it is all the more imperative to bolster patient follow up if countries are to approach the 85% success target.

The WHO and EuroTB should continue working together to harmonise monitoring methodology, promote the evaluation of control programmes and support countries to provide nationwide, complete data. In order to better understand the determinants of outcome, collection of tuberculosis notification data on an individual case basis should be promoted.

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ORIGINAL ARTICLES

Surveillance report

EPIDEMIOLOGY AND RESPONSE TO THE GROWING PROBLEM OF TUBERCULOSIS IN LONDON

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As in other countries with low tuberculosis incidence, tuberculosis in England and Wales tends to be concentrated in some subgroups of the population, and is mainly a problem in large cities. In 2003, almost half of all tuberculosis cases reported in England and Wales were from London, where the incidence was almost five times higher

than in the rest of England and Wales. While the highest proportion of cases occur in foreign born patients, evidence from a large outbreak of drug resistant tuberculosis points to ongoing active transmission among marginalised groups including homeless people, hard drug users, and prisoners. Increasing rates of disease and levels of drug resistance, combined with a concentration of disease in hard-to-reach risk groups now present a major challenge to tuberculosis control in the city. To respond to the changing epidemiology observed in recent years, treatment and control services are being reconfigured,

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surveillance has been improved with the implementation of the London TB register, and the utility of mobile digital x ray screening for at risk populations such as homeless people and prisoners is being evaluated. However, tuberculosis in London is not yet under control and more needs to be done. Services must adapt to the needs of those groups now most affected. This will require continued improvements to surveillance and monitoring, combined with improved access to care, better case detection, rapid diagnosis and active social support for people undergoing treatment.

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Introduction

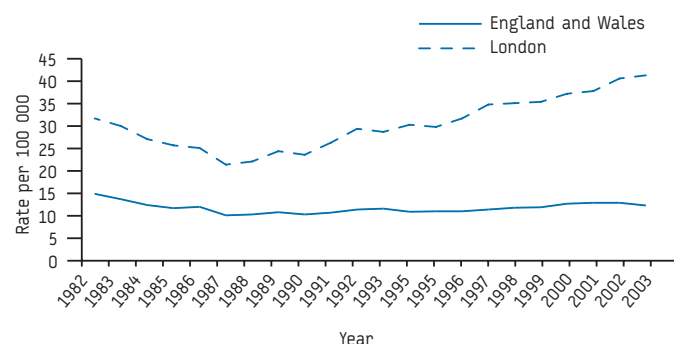
As in other countries with low tuberculosis incidence, tuberculosis in western European countries tends to be concentrated in subgroups of population and is mainly a problem in large cities [1]. London, with around 7.4 million habitants in 2003, represents 14% of the total population in England and Wales (52.8 million) and shares with other large cities marked contrasts in economic wealth with high levels of deprivation and social exclusion. Population groups most at risk of tuberculosis, such as the homeless, recent immigrants from high tuberculosis incidence countries and people with HIV infection, are more common in London than in other large cities.

Following a decline over more than two centuries, the incidence of tuberculosis cases has increased since 1988 in England and Wales. This changing epidemiology has been accompanied by a concentration of the disease in major urban centres, particularly London. The proportion of tuberculosis cases reported in London has increased from 28% in 1987 to 45% in 2003 of all tuberculosis cases reported in England and Wales. In the last decade, the tuberculosis notification rate in London has continued to increase, while it has remained stable or declined in the rest of the country [FIGURE 1].

This paper describes the epidemiological pattern and trends in tuberculosis in London and outlines the efforts to control tuberculosis that have been made to date.

FIGURE 1

Tuberculosis rate, London and England and Wales, 1982 - 2003



From: Statutory Notifications (NOIDs) and London 2000-2003: Enhanced Tuberculosis Surveillance

Methods

London is defined as the Greater London region, including inner London and outer London.

Epidemiological data presented in this article are mainly based on case reports from the statutory notification of suspected tuberculosis (NOIDs), collected since 1913, and from the Enhanced Tuberculosis Surveillance (ETS) system implemented in 1999 in England and Wales and in 2000 in Northern Ireland. The ETS provides more detailed information on

each case and allows more accurate notification since cases can be better checked and duplicates identified and removed. Surveillance of treatment outcome at one year following start of treatment has been implemented since 2002 on tuberculosis cases reported in 2001. Outcome is considered to be successful if the treatment has been completed and if the patient is considered cured and discharged by a clinician.

In London, ETS information on tuberculosis cases is collected through a web-based register, the Health Protection Agency London Tuberculosis Register (HPA LTBR), which was implemented in 2002 in each of the 33 tuberculosis clinics across the city.

Cases to be reported include culture confirmed cases with *Mycobacterium tuberculosis* complex (*Mycobacterium tuberculosis*, *M. bovis* or *M. africanum*) and non-culture confirmed cases treated with a full course of antituberculosis treatment on the basis of other clinical, radiological or histopathological evidence.

Information on culture, drug susceptibility testing and species is collected through a national network of Mycobacterium reference laboratories by the MycobNet system. Laboratory information is then linked with tuberculosis case reports. Drug resistance at the start of treatment is reported as a proportion of case reports, using as the denominator cases with drug susceptibility results. Multidrug resistance (MDR) is defined as resistance to at least isoniazid and rifampicin.

The proportion of HIV infection among tuberculosis cases reported has been estimated by linking HIV reports with tuberculosis cases reported between 1998 and 2000 in persons aged 15 to 64 years.

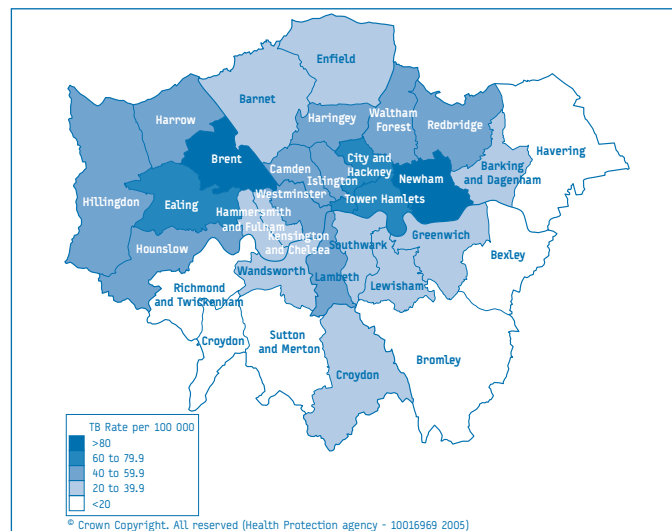
In addition to information on tuberculosis cases reported, in London a cross sectional survey was performed by the London tuberculosis nurses on tuberculosis cases who were or should have been taking tuberculosis treatment on 1 July 2003.

Tuberculosis epidemiological situation

6780 tuberculosis cases were reported in England and Wales in 2003, of which 3049 (45%) were in London. The tuberculosis incidence in London is almost five times higher than in the rest of England and Wales (respectively 41.3 and 8.2/100 000 in 2003). Local prevention and control of tuberculosis in England and Wales rests with the local Primary Care Trust (PCT), which is part of the National Health Service (NHS). London is composed of 31 Primary Care Trusts (PCTs). In 2003, in 16 PCTs the tuberculosis incidence was below 40 per 100 000 and reached 40 per 100 000 population or more in 15 PCTs [FIGURE 2].

FIGURE 2

Tuberculosis rate per 100 000 by Primary Care Trust, London, 2003



Note: Tuberculosis rate for England and Wales was 12.8 in 2003
From: Enhanced Tuberculosis Surveillance

In London incidence peaks in young adults for both sexes and rises again in old age in males. In 2003 tuberculosis rates were 71.3 per 100 000 population in men aged 20 to 39 years, 40/100 000 in men aged 40 to 59 years, and 44/100 000 in men aged 60 years and over.

In 2003, tuberculosis incidence in London was 11 times higher in people born abroad, who represented 83% of cases reported, than in those born in the United Kingdom (respectively 111 versus 10 per 100 000). The tuberculosis incidence between 1998 and 2003 has increased in young adults (20 to 39 years) both in persons born in the UK and in those born abroad [FIGURE 3].

In 2003, 59% of all cases reported in London were culture confirmed. The proportion of isoniazid resistant cases at start of treatment among all cases reported with drug susceptibility testing results was 9.7% (162/1671) in London and the MDR cases represented 1.8% (30/1671). The level of MDR at start of treatment has remained stable in London until 2002 but has increased in 2003. The proportion of isoniazid resistant cases has steadily increased between 1998 and 2003 (5.8% versus 9.7%). This increase is mainly linked to an outbreak of isoniazid resistant tuberculosis first recognised in 1999-2000. A unique genetic fingerprint on restriction fragment length polymorphism (RFLP) typing, has allowed tracking of the strain. As of January 2006 this strain has been recovered from 261 cases, of which 222 were diagnosed in London. Many of the cases are from groups at high risk of tuberculosis, including the homeless, users of heroin and crack cocaine and prisoners [2,3].

In London, the proportion of HIV infection among tuberculosis cases aged 15 to 64 years reported between 1998 and 2000 has been estimated to be 5.3% (307/5781) (D Antoine, personal communication, February 2006).

The proportion of tuberculosis cases reported in London in 2002, having treatment completed by 12 months after the start of treatment was 82% (78% in England and Wales). The proportion of patients who died was 6% of which 40% were cases in which tuberculosis caused or contributed to death. Patients who were lost to follow up represent 5.6% of cases and those still on treatment 2.8%. For 1% of the cases the treatment was stopped, for 2.2% patients were transferred out to other clinics in the country or abroad and for 0.4% outcome was not reported [4].

From the cross sectional prevalence survey performed in London, results were available for 2010 of 2080 patients with tuberculosis on 1 July 2003 (97%). The overall prevalence of disease in London was 27 per 100 000, but reached 788 in homeless people, 550 in prisoners, 354 in drug users and 878 in patients diagnosed HIV positive. This survey demonstrated a prevalence of disease in recent migrants of 149/100 000 and among refugees and asylum seekers of 92/100 000 [5].

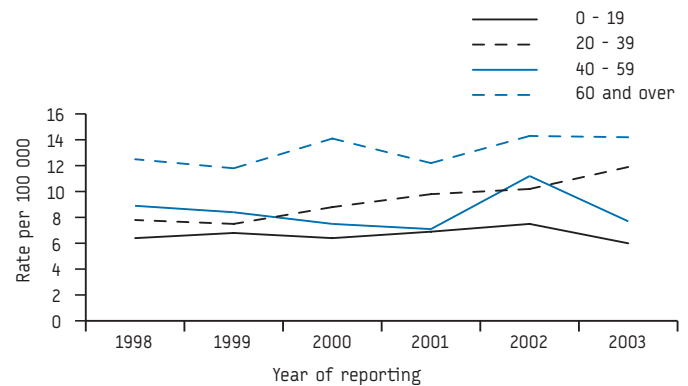
Discussion

Tuberculosis incidence in London has continued to increase since 1987. Changes in the surveillance systems with the implementation of Enhanced Tuberculosis Surveillance in 1999 and the London TB register in 2002 may have contributed to improve case reporting. However a previous study has demonstrated that the increase observed in tuberculosis cases reported was corroborated by other sources [6]. Other indicators such as the consistent increase in incidence in young adults and of proportion of isoniazid resistant tuberculosis at start of treatment up to 2003 indicate a deterioration of the tuberculosis situation in the city. The proportion of HIV infection among tuberculosis cases of 5.3% in London between 1998 and 2000 represents a minimum estimate due to limitations in the linkage process and possible under reporting of tuberculosis cases among people with HIV infection. Two studies conducted in London during the same period have estimated a higher proportion

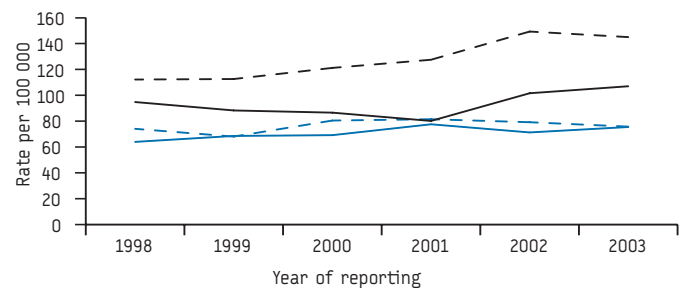
FIGURE 3

Tuberculosis rate by age group and by place of birth, London, 1998-2003

Tuberculosis cases in persons born in the UK



Tuberculosis cases in persons born abroad



From: Enhanced Tuberculosis Surveillance

of co-infection (11.4% and 13%) [7,8].

The proportion of cases with treatment completed was higher in London compared with the rest of the country. This is despite a higher incidence of tuberculosis and higher proportions of patients with complex needs that may complicate treatment, such as being homeless, being a recent immigrant, or having an HIV co-infection. Differences in the age structure and case characteristics of the tuberculosis cases as well as in methods used for data collection could explain this result, but from the information currently available it is not possible to give clear explanation for this difference [9].

The epidemiological situation observed in London in 2003 is similar to that in other large cities in western Europe. Results of a study performed on epidemiology and control of tuberculosis in western European countries showed that in 1999 the tuberculosis rates in Brussels (Belgium), Copenhagen (Denmark), Milan (Italy), Thessalonica (Greece), Amsterdam and The Hague (the Netherlands) were more than twice the national rates in those countries [1]. In most cities, isoniazid resistant cases represented less than 10% of cases and MDR less than 2%, but HIV co-infection was estimated to be over 10% in Rome (Italy), Amsterdam (the Netherlands), Lisbon (Portugal) and Milan (Italy). In London, tuberculosis incidence continues to increase while in most other western European cities it seems to have stabilised or declined in recent years. The increase in cases is likely to be multifactorial, with increased risk associated with HIV co-infection, changing patterns of immigration, increased opportunities for international travel, homelessness, and alcohol and other substance misuse.

Local prevention and control of tuberculosis in England and Wales rests with the local PCT, which is part of the National Health Service. The local Consultant in Communicable Disease Control (CCDC) employed by the Health Protection Agency (HPA) works with and supports the PCT in this role. All tuberculosis cases should be under

the care of physicians and specialist nurses with full training in the disease. Specialist tuberculosis nurses are recognised as key to the prevention and control of tuberculosis [10].

Treatment for tuberculosis in London is currently provided from more than thirty centres across the city mainly located in acute hospitals. These centres offer a diverse range of approaches to service delivery. Routes of access to treatment vary: a few centres offer walk in appointments, while the majority require a referral from either a general practitioner or consultant physician. Most centres are currently working towards providing a named case manager responsible for each patient's care. Efforts to implement this approach across the city have been limited by a shortage of qualified nursing and allied professional staff and problems in accessing local funding.

The European framework for tuberculosis control in low incidence countries recommends Directly Observed Therapy (DOT) to those groups known at increased risk of poor treatment adherence and for all patients during the intensive phase of treatment [11]. In the UK, DOT is recommended for patients 'who are unlikely to comply with treatment'. These include homeless people, alcohol and drug abusers and people with previous history of poor adherence to treatment [12].

Despite these recommendations, the use of DOT is not yet common or standardised in London as in other European cities [1]. The cross sectional survey performed in London in July 2003 has demonstrated high prevalence of tuberculosis in subgroups of the population who are underserved by health and social services. This survey has prompted recent calls for an increased emphasis on outreach, the use of DOT and active case finding to strengthen control among higher risk groups of tuberculosis. While DOT can improve medication adherence it is unlikely to lead to improved treatment outcomes unless initiated in conjunction with a package of supportive care tailored to patients' needs [13].

In October 2004 the Chief Medical Officer published the action plan Stopping Tuberculosis in England [14]. This plan has initiated the formation of a national tuberculosis programme and recognises that public health efforts need to be better organised and targeted where they are most needed and that the capability to detect tuberculosis at the earliest opportunity needs to be strengthened. A mobile screening project using targeted digital radiography is being piloted within London to evaluate how this approach could strengthen screening defined populations, including, for example, prisoners or hostel dwellers.

Tuberculosis in London is not at present under control and tuberculosis services in the city seem to have difficulties adapting to changing needs of those groups most affected by tuberculosis. Treatment and control services need to be tailored to the specific needs of the capital and its at risk groups in order to ensure control and improve the tuberculosis situation in London.

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Surveillance data are available on the web site of the Health Protection Agency: http://www.hpa.org.uk/infections/topics_az/tb/menu.htm for England and Wales and on <http://www.hpa.org.uk/london/> for London.

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