

# TB Framework for Scotland

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(v 1.1)

**The Scottish Health Protection Network (SHPN)** is an obligate (jointly owned) network of existing professionals, organisations and groups in the health protection community across Scotland. The aims of the network are:

- To ensure Scotland has a Health Protection service of the highest quality and effectiveness that is able to respond to short term pressures and to long term challenges.
- To oversee the co-ordination of Scotland's health protection services under a network that promotes joint ownership and equitable access to a sustainable and consistent service.
- To minimise the risk and impact of communicable diseases and other (non-communicable) hazards on the population of Scotland and to derive long term public health benefits (outcomes) through the concerted efforts of health protection practitioners across Scotland.

In line with the above, SHPN supports the development, appraisal and adaptation of health protection guidance, seeking excellence in health protection practice.

### **Health Protection Scotland**

Health Protection Scotland (HPS) is a non-profit, public sector organisation which is part of the Scottish National Health Service. It is dedicated to the protection of the public's health.

Health Protection Scotland is part of NHS National Services Scotland.

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## Comments on the published guidance

Comments on this guidance should be sent to the SHPN Guidance Group by emailing [NSS.SHPN@nhs.net](mailto:NSS.SHPN@nhs.net).

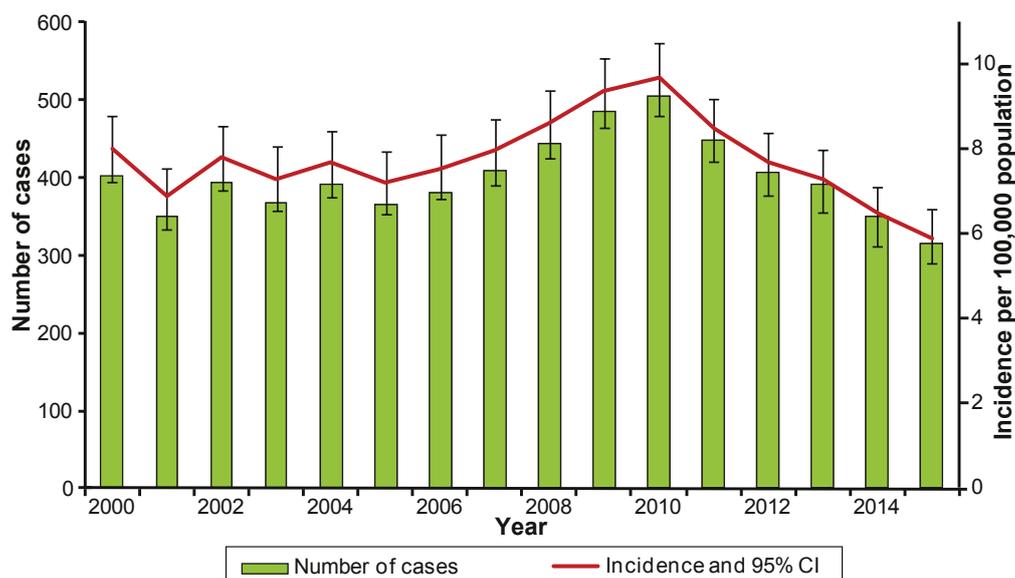
## Foreword

The impact of the global public health threat of tuberculosis (TB) is very much felt in Scotland. The development of drug resistance due to inadequate treatment and higher prevalence of disease in certain countries (due to poor detection and high levels of HIV in the population) has a significant impact on Scotland. While in the recent past the number of TB cases in Scotland has been in decline, epidemiological data from the last five years suggests that cases are becoming more complex e.g. patients who are destitute or have resistant TB. This presents a number of challenges for the NHS in Scotland.

## Case Numbers and Incidence

From 2000 to 2007 Scotland had a relatively stable number of cases of tuberculosis (TB) cases followed by annual increases until a peak in 2010 (503 cases, 9.6 cases per 100,000 population). Since then (see Figure 1 below), the incidence of TB has declined by over one third to the lowest number and incidence recorded since Enhanced Surveillance of Mycobacterial Infections (ESMI) began in 2000 (315 cases, 5.9 cases per 100,000 population). Declines are also being reported in the rest of the UK, and elsewhere in Europe.

FIGURE 1: Numbers of Tuberculosis case and incidence per 100,000 population 2000-2015



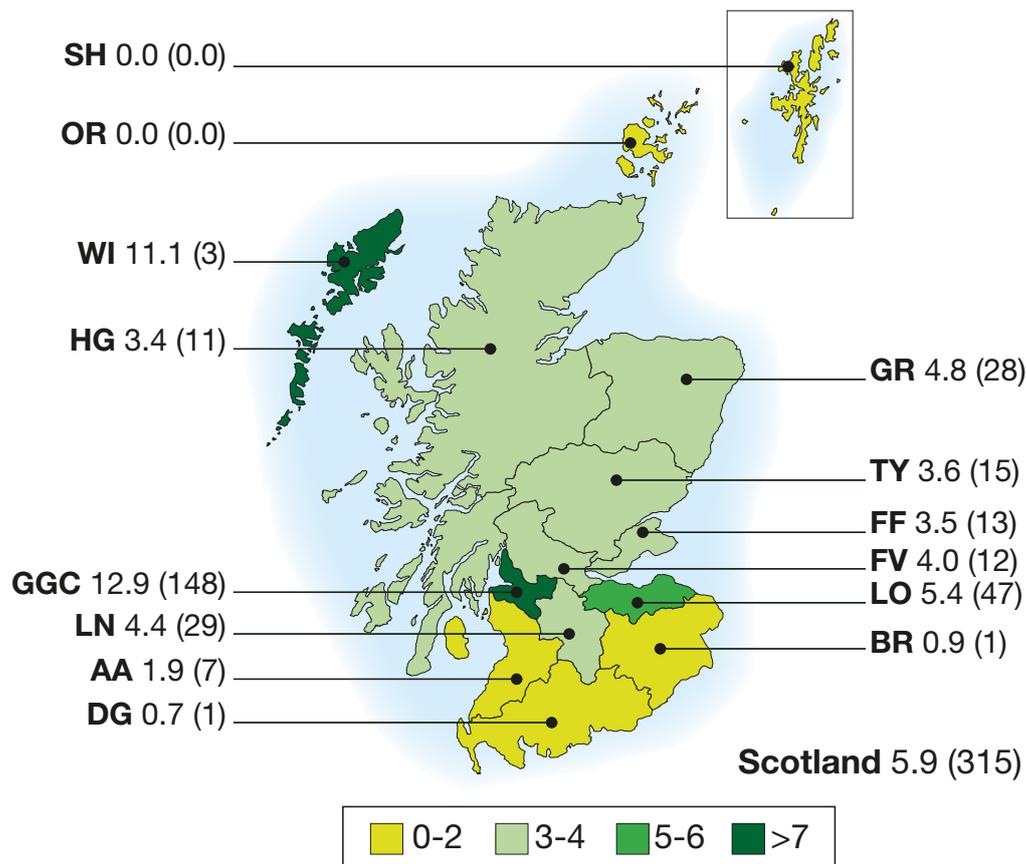
However, it has been recognised that TB cases across Scotland are becoming more complex, with more cases requiring enhanced case management (ECM). A recent retrospective review (undertaken by the Scottish TB Nurse Network) of TB cases notified in Scotland from 2013 to 2016 revealed that approximately 40% of TB cases required ECM.

These cases required significant input and additional time to ensure treatment adherence and or treatment completion. The most common reasons for requiring ECM were patients needing social assistance (e.g. with social benefits), language barriers, direct

observation of TB treatment (DOT), medication interactions, intolerances and side effects. Other reasons included those with mental health problems, alcohol or substance misuse, immigration issues (often people with no recourse to public funds) and housing availability.

Historically, Scottish TB incidence has been higher in large urban areas. In 2015, Greater Glasgow and Clyde notified 148 TB cases (47% of Scotland's total, an incidence of 12.9 per 100,000 of the population) and Lothian had 47 TB cases (15% of Scotland's total, an incidence of 5.4 per 100,000 respectively) (see Figure 2, below).

FIGURE 2: Tuberculosis case reports and incidence by NHS board, Scotland 2015



## Indicators for TB transmission in Scotland

The rate of TB among children aged under five years has decreased from 3.4 cases per 100,000 in 2010 to no cases in 2015. This is important as infections in this age group do not occur from reactivation of latent TB infections, so this implies recent infection with TB.

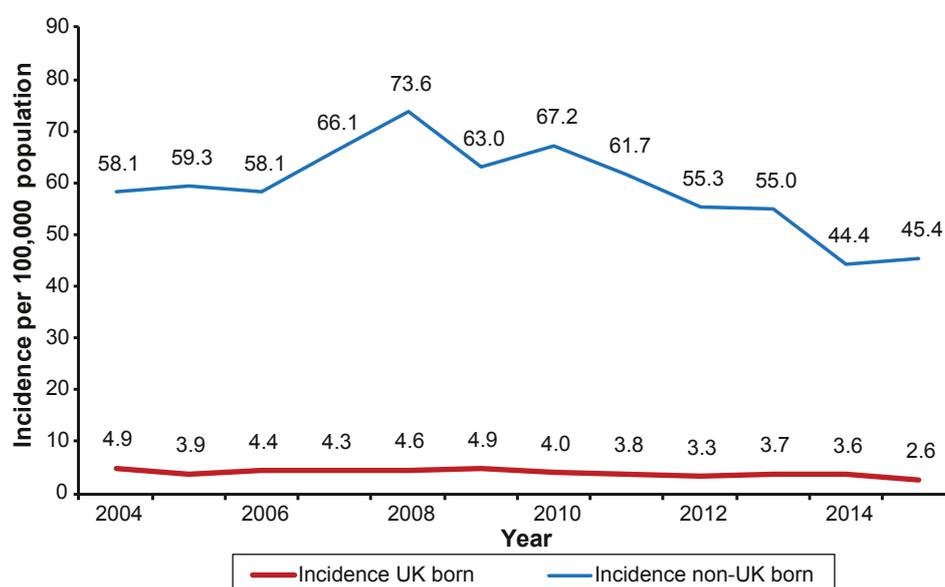
The fact that this figure has decreased therefore suggests that transmission of TB within the population may be declining in Scotland and also indicates improved TB control and management. In addition, the child-to-adult notification rate (which is an accepted indicator of ongoing transmission) decreased from 0.17 in 2010 to 0.14 in 2015. This also suggests that transmission of tuberculosis may be declining in Scotland.

## Risk Factors for TB in Scotland

The main risk factor for TB infection in Scotland is being non-UK born. In 2015, 57% of TB cases were born outside of the UK, more than double the 27% when enhanced surveillance began in 2000. In 2015, the rate of tuberculosis among those born out with the UK decreased to 45.4 cases per 100,000 population from a peak of 73.6 cases per 100,000 per population in 2008 (Figure 3).

The rate of tuberculosis among those born in the UK decreased to 2.6 cases per 100,000 population in 2015 from a peak of 4.9 cases per 100,000 population in 2009. In 2015, the rate of tuberculosis amongst non-UK born individuals was approximately 17 times higher than the rate in the UK born population (45.4 versus 2.6 cases per 100,000 population). This is the highest rate ratio reported since surveillance began (see Figure 3, below).

FIGURE 3: Tuberculosis notification rates, 2004-2015



Of those born abroad, India and Pakistan were the most commonly reported country of birth accounting for more than half of all cases. Around three quarters of those who were born abroad had entered the UK two or more years before they were diagnosed with TB and one third had entered five or more years earlier. It is not fully understood why individuals develop TB more than two years after arriving in the UK but this could also be related to either latent infection on entry to the UK, infection once within the UK or perhaps frequent travel abroad.

Aside from place of birth, the other main recorded risk factor for TB is problem alcohol use. The incidence of TB is also influenced by – and associated with – adverse social circumstances such as poverty, poor nutrition, reduced access to healthcare, homelessness, problem drug use and imprisonment (although TB is not a significant problem in Scottish prisons, with very few cases in the last ten years). Some countries have reported an increased combination of problem alcohol use and drug resistant TB in people originating from Eastern European countries that are known to have high rates of drug resistant and multi-drug resistant TB.

Looking forward, Scotland remains committed to TB eradication. However, as around half of all TB cases in Scotland are not born in the UK, policies on immigration and freedom of movement mean this is unpredictable. Efforts to eliminate TB will continue to require both intensive case management for increasingly complex cases and international commitment and collaboration.

## 1. Introduction

This Tuberculosis Framework sets out the Scottish Health Protection Network's strategy in relation to tuberculosis control for the next five years 2017-2021. The development of the Tuberculosis Framework reflects the importance of building on our previous successes and continuing work of the TB action plan for Scotland. It adopts an outcomes based approach anchored by effective shared ownership and joint working with a strong focus on challenging inequalities.

The Scottish Government, NHS boards, local authorities and Third Sector organisations all have essential roles to play in progressing the Framework outcomes, both individually and in partnership. All organisations have been fully involved in the development of this framework.

### 1.1 An Outcomes Based Approach

The Framework has been developed to promote an outcomes based approach. The Framework will support progress towards, and achievement of, a small number of high level tuberculosis outcomes. These are outlined in more detail in Section 2 below.

Progress against the outcomes will be monitored nationally through a small set of indicators (Appendix 1) using, wherever possible, nationally generated data and by reviewing progress in the context of NHS board outcomes.

The Scottish Government, the Scottish Health Protection Network and other partners will work together to ensure progress is maintained and that challenges do not become barriers to delivery.

### 1.2 Recommendations

While the Framework takes an outcomes based approach, this document also provides a number of recommendations for NHS boards, Third Sector agencies and other partners which set out the key approaches or deliverables that will support achievement of the outcomes (Appendix 1).

These recommendations are drawn from best practice and are in line with current NICE guidelines where relevant. They outline key issues that service providers need to give consideration to, or key elements of service that providers who are delivering best practice should offer.

## 1.3 A Quality Approach

The development of the Framework supports the ambitions of Scottish Government's *TB action plan for Scotland*, which was published in 2011. The TB action plan aimed to ensure that the highest quality NHS healthcare services were delivered in Scotland.

Specifically, the Framework supports this by:

- Encouraging engagement with those most at risk of tuberculosis (defined in Appendix 1) to ensure that they are able to benefit from our NHS services
- Seeking to ensure that effective treatments, interventions, support and services are provided to people when they need them, while at all times working in partnership with our stakeholders to ensure that services provided are evidence based and appropriate
- Striving to ensure that people are able to maintain high levels of health, good relationships and positive wellbeing including adequate housing and nutrition.

## 2. The Outcomes

In line with the Scottish Government's Quality Strategy, this Framework is focussed on outcomes rather than inputs or processes. This approach will ensure that all partners, nationally and locally, are working to the same shared agenda while having the freedom to take different approaches in the way things are done. We want to foster innovation and imaginative collaborative solutions to delivery, while retaining a focus on what we ultimately want to achieve.

The Framework Outcomes are:

1. Fewer cases of active TB via person to person transmission or reactivation of latent TB infection (LTBI).

The Framework intends to improve public health at a population level through reducing the harm that can be caused by preventable TB infections. This will be achieved through the selective use of BCG, early detection of latent TB infections amongst new entrants from high risk countries ( $\geq 150$  TB cases per 100,000 population) and further strengthening of the TB surveillance system in Scotland.

2. A reduction in the health inequalities gap in people diagnosed with TB.

Health inequalities remain a significant challenge in Scotland. This is clearly illustrated with TB, where the greatest impact is on those most vulnerable in society, from socio-economic inequality to the impact of ethnicity and country of birth. This outcome will support focussed improvement and targeted intervention locally and nationally in order to ensure that nobody is inappropriately disadvantaged in prevention, treatment and care.

Often, resources required to provide enhanced case management and interventions in vulnerable populations are higher than standard TB control interventions. For example, screening programmes, outreach work, increased social support are more human resource intensive. Thus, a decline in TB epidemiology will most likely require a change in public health focus towards reaching these vulnerable groups. The Framework will refer to Under Served Populations (USPs) as defined in the NICE Guidelines.

3. People affected by TB will lead longer healthier lives.

Early diagnosis and effective treatment and care of those with active TB disease and LTBI is underpinned by high quality TB care are essential in trying to ensure long-term health. Effective treatment will help reduce onwards transmission.

### 3. Where We Are Now

TB is a major public health challenge for Scotland. Recognising this, the Scottish Government published the TB Action Plan in 2011. This was published at a time when TB case numbers were increasing and the action plan made recommendations on all aspects of TB care and control. Now, in 2017, the epidemiology of TB in Scotland has changed with a sustained reduction in cases over the last five years. However, there are still significant challenges for TB for example, increasing management complexities for resistant TB, those that are homeless, amongst people not born in the UK, people with lifestyles that make them more at risk of TB and the global nature of TB. This means there is a possibility that TB cases could rise again if we become complacent, as described in the 'U shaped curve of concern'<sup>i</sup> in New York in the 1990s. Therefore, TB remains a priority area in Scotland.

### 4. Where We Want To Be

The TB Framework follows on from the *TB Action Plan* and will build on work initiated in that Plan. It is intended that the Framework approach will support multi-agency organisations to continue to focus on the key aims of the Action Plan:

- Reducing new active TB disease diagnoses;
- Reducing reactivated TB infections through increased testing for LTBI;
- Ensuring universal access to high quality TB diagnostics, treatment and care
- Supporting those living with, and affected by, TB in Scotland.

Many of the actions in the TB Action Plan remain integral and will be a key part of the delivery of this Framework, including:

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i Reichman, L. The U-shaped Curve of Concern. *American Review of Respiratory Disease*, 1991; 144(4), pp. 741–742. Available at <http://www.atsjournals.org/doi/pdf/10.1164/ajrccm/144.4.741>

# Annex 1: The Evidence-Based Areas For Action

## 1.1 Improve BCG vaccination uptake

There is strong evidence to support the selective use of BCG in preventing the most serious forms of TB such as tuberculosis meningitis and miliary tuberculosis in children. Reported efficacy in preventing adult pulmonary TB has been variable between trials and settings, although recent research indicates this may be in part explained by infection prior to vaccination. Vaccination with BCG is cost-effective when used as part of a targeted immunisation strategy for high-risk groups including healthcare workers.

## 1.2 Detection and Treatment of Latent TB Disease

The majority of active TB cases diagnosed in Scotland are a result of reactivation of LTBI. Individuals with LTBI are at increased risk of developing active TB, especially if they are recently infected or immunocompromised. The systematic screening and treatment of individuals with LTBI is therefore expected to significantly decrease the incidence of active TB disease in Scotland.

LTBI screening for new entrants (including healthcare workers and students) from TB high incidence areas is an effective and cost-effective public health intervention and is recommended by NICE. While systematic LTBI screening requires an initial resource investment, it has been shown in England that the prevention of cases will yield budget savings after about four years. Each NHS board should identify resources locally for this.

A co-ordinated, local screening programme in areas of high incidence, targeted at new entrants to detect and treat asymptomatic TB infection would avert morbidity and mortality in the affected individuals and reduce the incidence of TB disease in the UK. A costed service specification should be considered locally and co-ordinated nationally to inform this work.

## 1.3 Surveillance and Monitoring

Health Protection Scotland (HPS) coordinates national TB surveillance, with data provided by local clinical services and the Scottish Mycobacterium Reference Laboratory (SMRL). Good quality surveillance data provides the foundation for understanding the epidemiology of TB in Scotland, which is required to direct appropriate TB control activity and monitor its impact. This includes describing trends in incidence and drug resistance, identifying high-risk groups for disease and transmission, and identifying outbreaks. In addition, TB surveillance collects many data items relevant to monitoring the performance of TB control activities, including treatment outcome monitoring.

Currently, ESMI is a paper-based system but there is an appetite for a real time, dynamic surveillance system that meets the needs of the TB service in Scotland. An appropriate system, similar to the Enhanced Tuberculosis System (ETS) in England should be implemented within the next five years.

## 2.1 TB in Under-Served Populations

The rates of TB and the risks of delayed diagnosis, drug resistance, onward transmission and poor treatment outcomes are greatest amongst the impoverished, socially marginalised, under-served populations. Diagnosing, treating and preventing transmission of TB among under-served populations will pay a community dividend by preventing transmission of infection to the wider population and reducing health and social inequalities.

Individuals in under-served groups commonly have multiple health morbidities, requiring access to integrated screening and care packages. The aim of holistic care should be to simultaneously address the patient's clinical needs and the social and environmental factors, which increase the risk of disease and poor treatment outcomes. These factors include, but are not limited to, mental health issues, homelessness, addiction, detention, destitution and exclusion from care services.

NICE, [ECDC](#), and [PHE](#) have issued guidance on identifying and managing tuberculosis among hard to reach groups, now renamed as under-served populations, which should form the basis for action in Scotland. A sub-group of the Scottish TB network will be convened to make specific recommendations on how to tackle TB in the underserved populations in Scotland. This will include strengthening cross-sectoral and political support.

## 2.2 Enhanced Case Management (ECM) and Directly Observed Therapy (DOT)

ECM is co-ordinated by the named case manager working alongside a specialist multidisciplinary TB team able to provide expert clinical and psychosocial care and to engage effectively with the client group in the community. ECM should be provided for all socially complex cases with suspected TB to reduce the risk of patients disengaging with services prior to a diagnostic conclusion. There should be a risk/needs assessment prior to commencement of a planned course of treatment to identify cases that require ECM from the start of treatment.

DOT is resource intensive and includes delivering the prescribed medication, checking for adverse effects, watching the patient swallow the medication, completing a DOT log of medications observed, documenting the visit and answering questions. TB services should aim to ensure that all TB patients who are likely to benefit from DOT receive DOT and/or video-observed therapy (VOT).

## 2.3 Address the TB-related stigma experienced by people living with and affected by TB

Delays in presentation may occur due to low levels of symptom awareness exacerbated by high levels of TB-related stigma among certain populations, in particular under-served populations and new entrants. This is further compounded by reluctance to engage with statutory health services among some migrant populations.

## 3.1 Access to High Quality and Appropriate Diagnostics

Clinical suspicion of active TB needs to be supported by laboratory and radiological investigations. In Scotland, standards for microscopy were achieved in 2015, and 74% of all TB cases (81% of pulmonary and 65% of non-pulmonary TB cases) were confirmed by culture. This just meets the 80% target set by the European Centre for Disease Prevention and Control for culture confirmation of pulmonary TB.

Maintaining a high-quality TB diagnostic service, including communication, turnaround times, technology adoption and workforce competence are important.

Rapid direct molecular detection of TB in specimens is an approved WHO alternative to microscopy, differentiating TB and non TB cases in microscopy positive patient and is our aim. Molecular testing can also detect rifampicin and isoniazid resistance. Timely confirmation of TB and drug susceptibility testing is crucial to direct appropriate treatment, and reduce the period of infectiousness to protect others (through appropriate use and release of negative pressure isolation facilities). Negative results reduce the likelihood of an underlying diagnosis of TB, while positive aid immediate patient management. Both speed appropriate clinical management and use of resources which otherwise can be delayed and suboptimal. Thus the use of rapid molecular detection can release other resources used for other clinical, infection control and public health. This helps overcome diagnostic and treatment delay, case management and facilitates better care for under served populations. Molecular typing allows detection and interruption of transmission between patients, and underpins the management of incidents and outbreaks. Whole genome sequencing (WGS) has the potential to demonstrate within days of culture, not just the species identification, but also the drug sensitivities and resistances and chain of transmission. Appropriate application of WGS will lead to better public health control with the identification of “super spreaders” and of individuals with latent disease, so reducing transmission events. WGS should be introduced in Scotland as soon as is reasonably practical.

## 3.2 Diagnostic and Treatment Delay

Poor access and late diagnosis result in more advanced and complex disease with greater morbidity, mortality and cost, and higher rates of onward transmission of TB. Late diagnosis reinforces pre-existing health and social inequalities, which affect under-served populations to a greater degree.

Late diagnosis may be caused either by delays in presentation to health services or in the diagnostic process. An additional factor that would appear to frequently delay diagnosis is the lack of TB awareness among health professionals and appropriate training among social care staff. Efforts to raise awareness among healthcare practitioners will be supported nationally by the National Education for Scotland. To help support staff working in this area, NHS Education for Scotland in partnership with stakeholders will provide national workforce educational opportunities aligned with the Scottish Health Protection Network priorities.

### **3.3 HIV and BBV Testing and Management**

Because HIV weakens the immune system, people with both TB and HIV infection are at high risk of developing TB disease. HIV positive individuals are 30 times more likely to get active TB once infected than someone infected with TB who is HIV-negative and treatment may be more difficult. HIV status is not currently collected in ESMI. HIV status has to be collected by data linkage and is not matched back to the patient record.

Among HIV infected patients, HBV or HCV co-infection can also be present due to overlapping transmission routes. Therefore, testing for all BBVs is recommended.

### **3.4 Access to a specialist in TB care, including Negative pressure facilities**

Clinically complex TB, such as neurological or spinal TB, MDR-TB, HIV-TB co-infection and TB in children, requires specialist multidisciplinary expertise and often additional social and community support. However, there is considerable variation in the structure and quality of TB services across Scotland including provision of specialist TB services, TB nurse specialists and those who provide directly observed therapy (DOT), in addition to a mixture of acute and community provision. Not all TB services participate in, or have access to, a TB clinical network to support expert review of complex TB cases. An audit of the TB nurse workforce against Royal College of Nursing standards could be undertaken in Scotland.

### **3.5 Treatment Completion**

Treatment outcomes in Scotland are generally lower than the rest of the UK, with 80% treatment completion at 12 months (compared with 85% in England) and 9% case fatality rate (CFR) (compared with 5.5% in England). Without treatment, TB can be fatal, while those who survive without treatment can experience long-term health problems and remain infectious. A high treatment quality standard and treatment completion rate needs to be ensured to help to avoid the development of drug-resistant TB and to help improve TB control.

### **3.6 Multi Disciplinary Team (MDT) Review**

MDT meetings provide an opportunity to co-ordinate care across the different professional disciplines to discuss newly notified TB cases, their treatment pathways and outcomes of contact identification and investigations. These meetings also provide the opportunity for case managers or clinicians to discuss particularly complex cases such as those with drug resistant TB. MDT meetings should be attended by the physician and case manager overseeing the care of the patient.

### **3.7 Cohort Review**

Cohort review describes the retrospective review of all TB cases within a specified period of time in order to assess the standard of the service by way of outcomes and key performance indicators (KPIs). It is a regular systematic review, or audit, of all TB cases notified by a TB service in order to monitor the management and ascertain the outcomes for patients in terms of treatment completion and number of contacts screened.

### **3.8 Contact Tracing**

Contact tracing, the screening of people exposed to a case of active TB, has the potential to improve early diagnosis and prevent further transmission. Consequently, contact tracing is an established strategy to find and treat active and latent TB cases.

The benefits of latent TB case finding and treatment are even more pronounced in contacts at higher risk of disease progression such as children and people with HIV.

In some communities, identification of contacts may be incomplete due to high mobility, TB-related stigma (which may deter index cases from providing information about who they live, work or socialise with), and the lack of social relationships between individuals in shared occupancy accommodation or other reasons for not sharing contact details.

### **3.9 Supporting a confident and competent workforce to deliver TB control, including primary and secondary care**

We must ensure that both staffing capacity and knowledge and skill sets are appropriate, so that services can deliver high-quality care and the best possible outcomes for patients. A comprehensive workforce review across Scotland will inform the way the delivery of TB services should be implemented.

## Appendix 1: TB Framework for Scotland

Outcome	Recommendations (processes/interventions)	Indicators
<p>1. Fewer cases of active TB via person to person transmission or reactivation of latent TB infection.</p>	<p><b>1.1 BCG Vaccination</b></p> <p>Identification and BCG vaccination of eligible infants as early as possible</p> <p>Identification and BCG vaccination of eligible HCWs</p> <p>Continue to monitor BCG supply and implement BCG prioritisation when appropriate.</p>	<p><b>1.1 BCG Vaccination</b></p> <p>Vaccination uptake &gt; 85% for eligible children by age 12 months (KPI).</p> <p>% BCG vaccine uptake for eligible HCWs</p>
	<p><b>1.2 Detection and treatment of latent TB infection.</b></p> <p>New entrant screening of people moving into Scotland from high incidence countries (<math>\geq 150</math> TB cases per 100,000 population). A costed service specification should be considered locally and co-ordinated nationally to inform this work.</p> <p>Latent TB screening of healthcare workers who have been born a high incidence country.</p> <p>Ensure LTBI screening for patients embarking on immunocompromising treatments is written into relevant care pathways.</p> <p>Interferon gamma release assay (IGRA) and mantoux testing should be available to all clinicians when used within a validated diagnostic pathway.</p>	<p><b>1.2 Detection and treatment of latent TB infection.</b></p> <p>Number of new entrants screened for TB.</p> <p>% positive for LTBI and active disease (KPI).</p> <p>% LTBI of eligible new entrants offered and started on prophylaxis (KPI).</p> <p>% LTBI eligible new entrants who completed prophylaxis (KPI).</p> <p>All new healthcare workers from a high risk country (<math>\geq 150</math> TB cases per 100,000 population) are offered screening for LTBI.</p>

Outcome	Recommendations (processes/interventions)	Indicators
<p>1. Fewer cases of active TB via person to person transmission or reactivation of latent TB infection. (Contd)</p>	<p><b>1.3 Surveillance and monitoring</b></p> <p>Implement an updated dynamic surveillance system that is efficient and easy to use to significantly improve TB monitoring across Scotland.</p>	<p><b>1.3 Surveillance and monitoring</b></p> <p>An updated, dynamic and efficient TB surveillance system will be in place.</p> <p>A decreasing trend in the TB notification rate, including the MDR-TB notification rate (ECDC indicator).</p> <p>A general increase in mean age of TB cases (ECDC indicator).</p> <p>A decreasing trend in TB notification rates in children compared to adults (ECDC indicator).</p> <p>Less than 10% of TB cases should have mono-resistant TB.</p> <p>Less than 2% of TB cases should have MDR-TB.</p> <p>Less than 5% of cases will be lost to follow up (RCN).</p>

Outcome	Recommendations (processes/interventions)	Indicators
<p>2. A reduction in the health inequalities gap in people diagnosed with TB.</p>	<p><b>2.1 Under-Served Populations ( USP)</b></p> <p>A sub group of the Scottish TB Network will be convened to make specific recommendations on how to tackle TB in the USP in Scotland. Recommendations made by the sub group are initiated locally and evidenced through annual reporting and sharing case studies at the Scottish TB network meetings.</p> <p>Local TB Services should engage with primary care teams, Local Authority and the Third sector to highlight the increased risk of TB amongst the USP.</p> <p>Local best practice should exist to show how boards are approaching this issue.</p>	<p><b>2.1. Under- Served Populations ( USP)</b></p> <p>Risk information is recorded for all cases via ESMI Cohort forms that should be completed locally (ECDC indicator).</p> <p>All people with active TB who are homeless should be offered accommodation for the duration of treatment.</p> <p>All people with active TB should be offered support with finances/benefits for the duration of treatment.</p>
	<p><b>2.2. Support during treatment</b></p> <p>People with active TB are offered Enhanced Case Management (ECM), Directly Observed Therapy (DOT) or Video Observed Therapy (VOT) as indicated.</p>	<p><b>2.2. Support during treatment</b></p> <p>An assessment of risk/needs is undertaken prior to commencement of treatment for all cases to identify those who require additional support. All cases requiring ECM and or DOT/ VOT have access to this service (KPI).</p>
	<p><b>2.3 Address the TB-related stigma experienced by people living with and affected by TB.</b></p> <p>A society and culture whereby the attitudes of individuals, the public, professionals and the media in Scotland towards TB are positive, non-stigmatising and supportive</p>	<p><b>2.3 Address the TB-related stigma experienced by people living with and affected by TB.</b></p> <p>Attitudinal surveys of service users should be undertaken regularly to inform the needs of local service users and to allow for further refinement of the framework.</p>

Outcome	Recommendations (processes/interventions)	Indicators
3. People affected by TB lead longer healthier lives	<p><b>3.1 Access to high quality care, and appropriate diagnostics.</b></p> <p>The TB service should consider moving to a six or seven day testing service.</p>	<p><b>3.1 Access to high quality care, and appropriate diagnostics.</b></p> <p>Culture confirmation &gt;80% of pulmonary cases (ECDC indicator).</p> <p>Drug sensitivity testing of all culture confirmed cases (ECDC indicator).</p> <p>Molecular testing should be undertaken on all specimens (SMVN recommendation).</p>
	<p><b>3.2 Diagnostic and treatment delay.</b></p>	<p><b>3.2 Diagnostic and treatment delay.</b></p> <p>All people with active pulmonary TB starting treatment within 2 months of symptom onset.</p> <p>Diagnosis to treatment within 7 days (KPI).</p>
	<p><b>3.3 HIV and BBV testing and management.</b></p>	<p><b>3.3 HIV and BBV testing and management.</b></p> <p>100% of TB cases have a known HIV status (ECDC indicator).</p> <p>Hepatitis B and C testing offered to all TB cases.</p>
	<p><b>3.4 Access to a specialist in TB care, including Negative pressure facilities.</b></p>	<p><b>3.4 Access to a specialist in TB care, including Negative pressure facilities.</b></p> <p>All adult and Paediatric cases should be managed by, or in consultation with, a specialist in TB (KPI).</p> <p>All suspected and confirmed inpatient MDR/XDR-TB cases managed in (or transferred to) a board with a negative pressure facility (KPI).</p> <p>All MDR/XDR-TB cases are discussed with colleagues from the MDR-TB Clinical Advice Service (CAS) Forum with an expertise in managing such cases.</p>

Outcome	Recommendations (processes/interventions)	Indicators
3. People affected by TB lead longer healthier lives (Cntd)	<b>3.5 Treatment completion.</b>	<b>3.5 Treatment completion.</b> Outcomes information available on all cases via completion of an ESMI Cohort forms (ECDC indicator). More than 85% of TB cases complete treatment (ECDC indicator). More than 70% of pulmonary MDR-TB cases complete treatment (ECDC indicator).
	<b>3.6 MDT review.</b>	<b>3.6 MDT review.</b> All TB cases are reviewed at MDT review aiming for review within 6-8 weeks of initial diagnosis using nationally agreed MDT standards (KPI).
	<b>3.7 Cohort Review.</b>	<b>3.7 Cohort Review.</b> All TB cases to be reviewed as part of a systematic cohort review, at least annually (KPI).
	<b>3.8 Contact tracing.</b>	<b>3.8 Contact tracing.</b> At least 95% of PTB cases will have one or more contacts identified (RCN). At least 80% of PTB cases will have 5 or more contacts identified (RCN). All Eligible contacts with LTBI infection offered prophylaxis (KPI). % positive for LTBI and active disease (KPI). % LTBI of eligible contacts offered and started on prophylaxis (KPI). % LTBI eligible contacts who completed prophylaxis (KPI).
	<b>3.9 Supporting a confident and competent workforce to deliver effective TB detection, diagnosis and management services (including primary and secondary care).</b> NHS Education for Scotland working with Health Protection Scotland and Scottish Health Protection Network members will develop a workforce education development plan and thereafter agreed educational interventions.	<b>3.9 Supporting a confident and competent workforce to deliver effective TB detection, diagnosis and management services (including primary and secondary care).</b> Each NHS board should continue to be a member of and linked into the Scottish TB Network and at national CPD events.

## Appendix 2: Contributors to the framework

Name	Job Title/Role	Organisation
Margaret Somerville	Director of advice & support	Chest Heart & Stroke Scotland
Jill Adams	Respiratory Co-ordinator	Chest Heart & Stroke Scotland
Dr Elvira Garcia	Consultant in Public Health Medicine	NHS Ayrshire & Arran
Dr Anur Guhan	Consultant Respiratory Physician	NHS Ayrshire & Arran
Chris Faldon	Nurse Consultant (Health Protection)	NHS Borders
Dr Andrew Riley	Consultant in Public Health Medicine	NHS Borders
Dr Stuart Little	Consultant in Respiratory Medicine	NHS Dumfries & Galloway
Sara Bartram	Nurse Consultant in Health Protection	NHS Dumfries & Galloway
Dr Neil Hamlet	Consultant in Public Health Medicine	NHS Fife
Dr Derek Sloan	Consultant ID Physician/academic	NHS Fife/St Andrews University
Dr Jennifer Champion	Consultant in Public Health Medicine	NHS Forth Valley
Dr Billy Newman	Consultant Respiratory Physician	NHS Forth Valley
Dr Robert Weir	Consultant Microbiologist and Infection Control Doctor	NHS Forth Valley
Dr Robin Brittain-Long	Consultant in Infectious Diseases, General Medicine and Acute Medicine	NHS Grampian
Susan Duthie	TB Specialist Nurse	NHS Grampian
Dr Gillian Penrice	Consultant in Public Health Medicine	NHS Greater Glasgow & Clyde
Una Lees	TB Nurse Specialist	NHS Greater Glasgow & Clyde
Catriona Paterson	TB Nurse Specialist	NHS Greater Glasgow & Clyde
Brian ChooKang	Chest Physician	NHS Greater Glasgow & Clyde
Dr Ken Oates	Consultant in Public Health Medicine	NHS Highland
Lorraine McKee	Senior Health Protection Nurse	NHS Highland
Dr Nick Kennedy	MDT Lead/Infectious Diseases Consultant	NHS Lanarkshire
Linzi Millen	HP/TB Nurse	NHS Lanarkshire
Professor Adam Hill	Consultant in Respiratory Medicine	NHS Lothian
Ceri McSparron	TB Nurse Specialist	NHS Lothian
Susan Vaughan	TB Nurse Specialist	NHS Lothian
Dr Jim McMenamin	Consultant Epidemiologist	NHS National Services Scotland
Dr Arlene Reynolds	Senior Epidemiologist	NHS National Services Scotland
Eisin McDonald	Epidemiologist	NHS National Services Scotland
Lesley McGuire	Project Manager	NHS National Services Scotland
Wendy Hatrick	Public Health Specialist	NHS Shetland

<b>Name</b>	<b>Job Title/Role</b>	<b>Organisation</b>
Dr Daniel Chandler	Consultant in Public Health Medicine	NHS Tayside
Margaret Ramsay	Senior Specialist Nurse (Health Protection)	NHS Tayside
Dr Maggie Watts	Director of Public Health	NHS Western Isles
Isabell MacInnes	Health Protection and Screening Nurse Specialist	NHS Western Isles
Christina Morrison	Health Protection and Screening Nurse Specialist	NHS Western Isles
Dr Ian Laurensen	Consultant Microbiologist & Director of SMRL	Scottish Microbacteria Reference Laboratory/NHS Lothian
Dr Michael Lockhart	Consultant Microbiologist	NHS National Services Scotland
Mary Stewart	Team Leader	Scottish Government
Lynsey MacDonald	Policy Officer	Scottish Government
Ruth Robertson	Health Protection Education Programme Manager	NHS Education for Scotland/ NHS National Services Scotland
Dr Joe Patterson	Occupational Health Physician	NHS Ayrshire and Arran

## Glossary

BBV:	Blood Borne Virus
BCG:	Bacillus Calmette–Guérin
BTS:	British Thoracic Society
CFR:	Case fatality rate
DOT:	Directly observed therapy
ECDC:	The European Centre for Disease Prevention and Control
ECM:	Enhanced case management
ESMI:	Enhanced Surveillance of Mycobacterial Infections
HBV:	Hepatitis B Virus
HCV:	Hepatitis C Virus
HIV:	Human Immunodeficiency Virus
IGRA:	Interferon Gamma Release Assay
KPI:	Key performance indicator
LTBI:	Latent TB infection
MDR:	Multidrug-resistant
MDT:	Multidisciplinary Team
NHS:	The National Health Service
NICE:	The National Institute for Health and Care Excellence
PHE:	Public Health England
PTB:	Pulmonary tuberculosis
RCN:	The Royal College of Nursing
SHPN:	The Scottish Health Protection Network
SMRL:	The Scottish Mycobacteria Reference Laboratory
TB:	Tuberculosis
USP:	Under-served population
VOT:	Video observed therapy
WGS:	Whole genome sequencing
XDR:	Extensively drug-resistant