CHAPTER 7 – CONTACT TRACING AND CASE FINDING

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SUMMARY OF RECOMMENDATIONS

- The diagnosing physician and/or clinical director of the relevant diagnostic laboratory are statutorily obliged to notify a regional Medical Officer of Health (within the regional Department of Public Health) of all TB cases (i.e. both clinically suspected and confirmed).
- The Public Health Risk Assessment (PHRA) informs the case finding and contact tracing activities.
- Contact tracing should be conducted according to the concentric circle or 'stone-in-the-pond' approach. Contact investigation should be prioritised according to the infectiousness of the source case, extent of exposure and immunologic vulnerability of those exposed and guided by timelines outlined in Table 7.1 below.
- For infectious or presumed infectious cases of TB: assessment of the period of contact exposure should extend to three months before symptom onset or first positive finding consistent with TB disease (e.g. abnormal chest X-ray), whichever is longer.
- A multidisciplinary team approach is required to investigate a TB incident of infectious TB reported in a hospital setting.

7.1 Introduction

Contact tracing following a TB case notification is a core function of Public Health. The aims of TB contact tracing are to identify:

- A possible source of TB infection.
- Secondary cases of TB.
- Contacts that should be offered TB preventative treatment (TPT) especially where there is evidence of recent transmission, as indicated by infection in children.

Contact tracing in TB should be guided by **Public Health Risk Assessment (PHRA)** - a systematic process for gathering, assessing and documenting information to assign a level of risk (1). Following notification of a case of TB to the Department of Public Health (PH), they will conduct a PHRA to inform contact tracing activities.

Contact investigation should be prioritised according to the infectiousness of the source case, extent of exposure and immunologic vulnerability of those exposed (2).

The PHRA will inform any decision to screen/or not screen, who to screen and may support a decision on where to screen (e.g. workplace, school etc.). The PHRA should consider the following which increase the probability of transmission (3)

PHRA factors should include the following:

Index case factors

- Type of TB (Laryngeal, Pulmonary, Extrapulmonary, Pulmonary and Extrapulmonary, and TB cases that are treated empirically). Laryngeal and pulmonary smear positive cases are the most infectious. Some people have symptoms of TB but no microbiological findings but improve when treated with TB drugs- these empirically treated cases are notifiable by the treating clinician but are considered of very low risk of transmission.
- Duration of symptoms in the patient especially productive cough (amount and severity) and haemoptysis.
- Country of Birth (**high incidence countries**).
- History of past TB disease or infection.
- Recent contact with an infectious TB case.

- Living conditions e.g. own house, shared accommodation, in a prison or other custodial setting, in a congregate setting etc.
- Occupation e.g. laboratory worker, working with animals, abattoir workers etc.
- Participation in social activities e.g. choir, sporting activities.
- Other social factors including whether in school or other educational institution; homeless shelter accommodation, or other setting.
- Previous foreign travel to **high incidence countries**.
- History of ineffective/incomplete TB treatment.

Microbiological and Radiological factors

- Bacterial burden (smear positivity) in the index case and time to culture positivity. Longer time to culture suggests lower infectiousness.
- Cavitary or upper lung-zone disease on chest x-ray in the index case.
- Cavitation on computed tomography (CT) Thorax in the index case.

Environmental factors

- Duration of exposure of the contact to the index case.
- Overcrowding and poor room ventilation.
- Proximity of the contact to the index case.

Approach to contact tracing: The stone in the pond approach

In common with many other countries where there is a low incidence of TB (<10 cases per 100,000 population), contact tracing in Ireland is usually conducted according to the risk-stratified **concentric circle or stone-in-the-pond approach** (4-7). Contacts are prioritised for testing in concentric circles around the index case, depending on the level of exposure and vulnerability of the contacts, Factors that can influence extending the contact tracing process include finding of high rates of TB disease or infection amongst contacts (cognisant of rates of TB infection expected in such a population e.g. if born in a country of high TB incidence) and the increased vulnerability of the contacts (e.g. renal dialysis, patients on immunosuppressive treatment etc)

Close contacts of infectious TB cases (those with most exposure) are screened first. These include:

- Household contacts, who regularly sleep in the same household as the infectious case on an ongoing basis (e.g. 3 or more times per week) and can include members of an extended family, roommates, boarders, couch-surfers, etc.
- Household-like contacts in congregate settings, such as State-provided accommodation[1] for refugees and applicants seeking protection, emergency accommodation for people who are homeless, prisons and custodial institutions, and long-term care facilities.
- Caregivers with extensive/daily exposure to the index case.
- Contacts who are at high risk of progression to TB disease (e.g. aged less than 5 years, HIV, dialysis, transplant, silicosis, healthcare professionals exposed during bronchoscopy, sputum induction, autopsy or other aerosolizing medical procedures.)

Once a person has been diagnosed with TB disease, the diagnosing physician and / or clinical directors of the relevant diagnostic laboratory is statutorily obliged to notify the Department of Public Health of the area of residence of the patient (as required under Medical Officer of Health (MOH) legislation (8-10)). Prompt notification is required so that contact tracing can be commenced without delay. Timeframes for completion of the various stages of contact tracing are outlined in **Table 7.1**.

[1] Accommodation provided by IPAS (International Protection Accommodation Services), UCTAT (Ukraine Crisis Temporary Accommodation Team) or IRPP (Irish Refugee Protection Programme).

Table 7.1: Recommended Timeframes for completing various stages of the contact investigation

Case notification	Case should be notified as soon as possible by the treating clinician or relevant diagnostic laboratory, and not later than one working day following diagnosis. The patient should be informed of their diagnosis by the treating clinician to ensure public health action can take place.
Contact tracing interview	Should be conducted no later than: • 1 working day after notification of an infectious/presumed infectious case • 3 working days after notification for all other pulmonary and extra-pulmonary cases .
Site investigation	Should be conducted no later than 3 working days after the contact tracing interview if deemed appropriate following a PHRA.
First screening of priority contacts	Should be conducted no later than: • 7 working days for close contacts of an infectious/presumed infectious case • 14 working days for all other contacts (i.e. casual contacts of infectious cases/contacts of non-infectious cases) after the contact tracing interview.

7.2 Determining the infectious period

Cases of pulmonary TB are generally considered to become infectious at the time of onset of cough. As the start of the infectious period cannot be determined with precision by available methods, a practical estimation is necessary.

For infectious or presumed infectious cases: assessment of the period of contact exposure should extend to three months before symptom onset or first positive finding consistent with TB disease (e.g. abnormal chest X-ray), whichever is longer. The decision about the period of

infectiousness, therefore, will need to be determined for each case according to these guidelines and to the clinical situation.

If screening identifies secondary cases of TB disease, treat additional cases as index cases for contact tracing purposes.

For contacts of cases of extrapulmonary TB, screening should be undertaken in household type settings to identify source of infection following PHRA.

Symptomatic close contacts should be assessed for TB disease (see **National TB Guidelines for Ireland Chapter 4.)**

7.3 Contact tracing in specific settings

This section outlines recommendations for contact tracing in specific settings which are commonly notified to Departments of Public Health.

7.3.1 Cases on an aircraft

Contact tracing should be considered if the index case is confirmed as having infectious pulmonary or laryngeal TB when:

- The duration of the flight is equal to or exceeding eight hours, including delays experienced by passenger's whilst on the plane
- **AND** the time elapsed between flight and diagnosis of the case is no longer than three months. (11)

Passenger-to-passenger transmission of *M. tuberculosis* has been documented only among close contacts seated in the same section as the index case. Informing those passengers seated in the same row as the index case and those seated in the two rows (from one side of the aircraft to the other because of ventilation patterns) in front of and behind is usually sufficient (12). This should include evaluating seating configurations such as narrow-body vs wide-body aircrafts (i.e. 2:2, 3:3, and 3:4:3 patterns) as these can impact the inclusivity of passengers, particularly those who need to be included in contact tracing efforts (11).

7.3.2 Cases in schools

The contact tracing for an infectious smear positive pulmonary TB case in a school setting can be guided by whether a staff member or student has acquired TB and whether the setting is a primary or secondary school.

If a case occurs in a staff member in a primary school setting all children and adults that they have been in contact with should be screened.

If a case occurs in a student a primary school setting the students should be screened and all staff in that setting should be assessed by symptom questionnaire and a single Chest X-ray to out rule a source of infection.

In secondary schools contact tracing is more likely to be complicated by students and staff involvement in extracurricular activities (e.g. sports, choir, afterschool classes etc). Mode of transport to school may also need to be taken into consideration (e.g. Pupils travelling to school/ extracurricular activities by bus etc).

If the index case of TB is an adult member of staff, the purpose is to detect secondary cases elsewhere in the school, while if it is a pupil, the purpose is not only to detect secondary cases but also to find the source case, if it is not already known.

If a case occurs in a staff member in a secondary school setting all children and adults that they have been in contact with should be screened.

If a school pupil is diagnosed with smear positive pulmonary TB, carry out a risk assessment of the need to screen the rest of their class (if there is a single class group), or the rest of the year group who share classes, as part of contact tracing.

Consider extending contact tracing in schools to include children and teachers involved in extra-curricular activities, and nonteaching staff, on the basis of:

- The degree of infectivity of the index case.
- The length of time the index case was in contact with others.
- Whether contacts are unusually susceptible to infection.
- The proximity of contact.

If the index case of a school pupil's TB infection is not found, contact tracing and screening (by either symptom enquiry or chest Xray) should be considered for all relevant members of staff at the school.

7.3.3 Cases in Preschool settings

Children, particularly of pre-school age, are more likely to acquire TB infection, and progress to TB disease, than older children and adults if they are exposed to infectious tuberculosis - usually from adults. If a child under five years of age attended a preschool, and the initial source has not been found in the family/household setting then all adults in the pre-school should be screened by symptom questionnaire and a single chest X –ray.

When an adult who works in childcare (including people who provide childcare informally) is diagnosed with smear positive TB the PHRA will guide the contact tracing investigation and may involve screening of all children and adults that they have been in contact with.

7.3.4 Cases in hospital inpatients

The yield from contact tracing exercises in a hospital setting is very low, so it is important to avoid unnecessary screening and only contact trace in those very rare instances where the PHRA has identified risk of transmission. There are incidents where patients with tuberculosis are not appropriately isolated, especially when TB was not suspected or a provisional diagnosis of TB was made, leading to potential exposure of other patients. Such incidents may consume considerable resources in identifying potentially exposed patients and staff, where the identified risk of transmission is very low.

A multidisciplinary team approach is required to investigate a TB incident of infectious TB reported in a hospital setting. An IMT should be convened by hospital management. This is usually chaired by the hospital manager or the Consultant Microbiologist. Other members of the IMT should include Infection Prevention and Control, treating clinician, Director of Nursing Consultant in Public Health Medicine, Occupational Health, and Hospital Communications etc). Of note this is not exhaustive list and other staff members may need to be included.

The IMT should consider the factors outlined above that increase the possibility of transmission before any contact tracing commences. The PHRA will inform the extent of contact tracing, and the appropriate response required for both patients and staff.

Furthermore, consideration should be given to whether other potentially exposed patients have underlying medical conditions that increase their risk of acquiring TB disease.

The wide variety of settings and possibilities mean that narrowly drawn guidelines are not appropriate and contact tracing investigations should largely be guided by PHRA. Whilst eight hours room sharing has been used in the past to identify close patient contacts in a healthcare

setting the evidence base behind this is poor. Papers quoting eight hours are generally associated with associated with aircraft travel.

If a patient contact is identified as a contact, hospital management should inform the patient of their possible exposure to a person with TB disease during their hospital admission. The patient's treating clinician and GP should also be informed. If the patient remains in hospital, screening should be carried out before the patient is discharged by the treating clinical team, with advice from Public Health if required. If a patient has been discharged before being identified as a contact the hospital should inform the patient, and their GP. The Department of Public Health will then carry out screening

After a potential exposure, the names of the staff members that have had prolonged close contact, or had significant exposure who participated in high risk procedures without appropriate personal protective equipment: (e.g. induced coughing/ intubation, bronchoscopy) or are in a high risk setting (e.g. post-mortem examination of an undiagnosed TB case where airborne precautions were not implemented) should be referred to their occupational health service.

7.3.5 Cases in complex settings for underserved populations

7.3.5.1 Congregate accommodation settings

Congregate settings refer to settings where people (most or all of whom are not related) live or stay overnight and use shared spaces (e.g. kitchens, bathrooms, communal living areas, common sleeping areas). These include:

- State-provided accommodation[2] for refugees and applicants seeking protection.
- Emergency accommodation for people who are homeless such as hostels, family hubs, night shelters, domestic abuse refuges.
- Prisons and custodial institutions.

[2] Accommodation provided by IPAS (International Protection Accommodation Services), UCTAT (Ukraine Crisis Temporary Accommodation Team) or IRPP (Irish Refugee Protection Programme).

Challenges common to these populations and/or settings may present additional complexity in the public health response to a case or outbreak of TB. These include:

- Exposure to TB on their transit journey to Ireland and/ or if coming from a high incidence country for TB.
- Increased vulnerability to TB disease, due to poor health, co-morbidities, underlying immunosuppression and malnutrition.
- Lack of access to timely clinical assessment.
- Higher risk of TB exposure/ transmission due to overcrowded rooms or facilities, sharing rooms/ facilities, inadequate ventilation, poor or non-existent isolation facilities, staff/resident turnover.
- Implementing isolation and infection prevention and control measures, given that the primary function of these settings is the provision of accommodation and related supports, rather than responding to a healthcare need.
- Identifying contacts in these settings, due to the transient nature of accommodation, lack of bed management systems[3], challenges in getting up-to-date resident lists, and ancillary services attending in these settings.
- High degree of mixing may lead to the need for widespread screening.
- Language, literacy and cultural barriers to understanding.

The public health response in these settings is supported by multiple stakeholders including: HSE Social Inclusion Migrant Health in-reach team, local GP services, accommodation centre managers, and the respective government department team or homeless service provider. Further advice is available from the respective Ukraine Crisis Temporary Accommodation Team (UCTAT) and **International Protection Accommodation Service (IPAS) Infectious Disease Protocol**. A site visit to understand layout, mixing of individuals, languages spoken etc. can yield valuable information.

[3] In February 2025, IPAS implemented a bed management system in IPAS accommodation centres

7.3.5.2 Complex domestic settings

Other complex domestic settings include overcrowded accommodation, or accommodation that is unfit for human habitation[4]. These may be settings: e.g., with large multi-generational families, with migrant workers in meat processing plants or mushroom factories, or with other vulnerable migrants, including undocumented migrants. These settings can be managed as per the usual management of household contacts, but additional supports may be required to meet language and literacy needs, to liaise with affected persons (via a trusted provider/advocate), to identify contacts, to provide wrap-around support etc.

In addition, the Irish Traveller community can live in various settings in accommodation provided by the local authority (13, 14).Other support services for the Traveller community include **Primary Healthcare for Traveller Projects** and **Regional Traveller Health Units (THUs)**.

Information on Traveller-specific accommodation and other types of accommodation can be found **here.**

7.4 Incident and outbreak response in non-healthcare settings

Outbreaks of TB are statutorily notifiable to the Medical Officer for **Health**5.

In general, two or more apparently related cases of TB constitute an outbreak until proven otherwise (15). Outbreak cases can be distinguished from other cases only when certain associations in time, location (place), patient characteristics (person) or M. tuberculosis attributes (e.g. drug resistance or genotype) become apparent. In low-incidence areas, any temporal cluster may be suggestive of an outbreak. In places where cases are more common, clusters can be obscured by the baseline incidence until suspicion is triggered by a noticeable

[4] These are residential settings where people are living in (a) overcrowded accommodation, as defined in the Housing Acts (1966, 1988), or (b) accommodation that is unfit for human habitation or is materially unsuitable for adequate housing, such as substandard private rented accommodation, where standards are set out in the **Housing (Standards for Rented Houses) Regulations 2019 (13).**

[5] Outbreaks of TB are statutorily notifiable under the **Infectious Diseases (Amendment) (No.3) Regulations 2003 (S.I. No.707 of 2003).**

increase, a sentinel event (e.g. paediatric cases) or genotypically related *M. tuberculosis* isolates.

Appropriate representation on the OCT/IMT is crucial. In outbreaks affecting two health regions the chair should be agreed by those regional Departments of Public Health. If three or more regions are involved, the National Health Protection Office may on occasion chair the OCT/ IMT.

The **Medical Officer of Health** has overall responsibility for investigation and control, and for managing an outbreak. Individual members of the outbreak control team (OCT) have responsibility for managing clearly defined aspects of the outbreak. Where a TB outbreak indicates potential extensive transmission, the investigation may involve several overlapping contact investigations, with a need for a surge in public health resources**.**

Departments of Public Health should coordinate incident or outbreak contact investigations at places where the person with TB disease spends significant amounts of time, including workplaces, schools, colleges, universities, childcare settings, and congregate accommodation settings (such as for refugees and applicants seeking protection, people who are homeless etc.).

7.4.1 Outbreak closure

In general, TB outbreaks may be considered for closure if no new linked cases have been identified within a 6-month period. However, outbreaks may remain open beyond this timeframe if epidemiological or microbiological evidence (e.g. whole genome sequencing) indicates ongoing transmission or links between cases. Closure decisions should be informed by local risk assessment and, where appropriate, in consultation with the HPSC. Outbreaks can be re-opened if new cases emerge that are epidemiologically or microbiologically linked to the original cluster.

7.4.2 Outbreak control team/ Incident Management Team

The membership of the OCT/IMT Is dependent on the individual setting. The OCT/IMT will be chaired by the Consultant in Public Health Medicine. Other member would include senior management of the individual organisation, human resources department, and on occasion the relevant treating clinician. For large outbreaks Communications Department from both HSE Communications and the relevant organisation may be involved. In addition, although not members of the IMT/OCT, liaison may be required with the relevant union bodies.

The main objectives of the OCT/ IMT will include:

- Identification of the source/ cause of the outbreak, formulating a hypothesis to explain the most likely source, site and time of infection.
- Formulating a case definition.
- Identifying further cases of TB disease and infection.
- Monitoring the effectiveness of prevention and control measures.
- Providing information to patients, patients' contacts, GPs, the general public, the media and appropriate staff.
- Coordinating the investigation.
- Liaising with appropriate health bodies and statutory services.
- Evaluation of the overall work of controlling the outbreak and implementation of the lessons learned, and
- Producing interim reports as required and a final outbreak report three months after closure of the outbreak.

7.5 Communications

Communications often present an intensely challenging aspect of outbreak investigation and management. TB outbreak investigations can be complex and protracted. Communications may extend over lengthy periods. Apart from providing regular information to patients, contacts and their families, which takes into account their literacy and language needs, there are also regular professional and media aspects to be addressed. All media communications should be coordinated by the press officer. The setting up of a helpline to give specific advice and information may need to be considered.

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