Talking TB
Evonne Curran, Health Protection Scotland
A Webber Training Teleclass

Why ask me?

- I do not consider myself to be a TB expert
- But I do consider it my role to:
  - Ensure that the environment is safe for practitioners to practice – and that includes when TB is suspected or known to be present.
- I have written several articles on respiratory protection from the practitioners perspective

I have been asked to consider respiratory protection when caring for TB patients

In this presentation today

- Optimising care of patients with TB to make the environment safe for practitioners
- Understanding the science, the gaps in the science and implications for recommendations

What we have to consider the international context

- The international context in which we practice healthcare
  - Post SARS
  - Pre next pandemic
  - Potentially (but hopefully never) in a bioterrorism response
  - CA-MRSA – wear masks for intubation + physio
  - An ever evolving world of organisms
  - MDR-TB in an unknown number of patients
  - In a world where we cannot always identify for some considerable time the risk posed by patients with a respiratory infection.

Hazard Warning

It is complicated!
For TB care - one size does not fit all!

It is not black and white
there are many many many
shades of grey

Think globally – act locally

You must understand your **local context**
What you should do / recommend depends on the risks presented in your establishment and the resources you have to negate them.

**The Basics**

- *Mycobacterium tuberculosis* causes pulmonary TB.
- *M. tuberculosis* is disseminated on small (<5 microns) airborne droplet nuclei that can remain suspended in the air.
- These airborne droplet nuclei are inhaled into the alveoli of susceptible individuals.
- In some people infection develops.

**Progression to TB infection**

- **Usually** 2-12 weeks later an immune response develops and suspends disease development
  - At this point the patient will **test positive and be infected** but will not be infectious and not have TB disease.
  - Viable MTB can remain life-long in these patients which can be reactivated.
  - 5-10% progress at some point in their lives to TB disease. [Most within the first 5-10 years]
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It is important to recognise the difference between TB infection and TB disease.

- **TB infection**: A condition in which living tubercle bacilli are present in the body but the disease is not clinically active. Infected persons usually have positive tuberculin reactions, but they have no symptoms related to the infection and are not infectious.

- **TB disease**: A clinically active symptomatic disease usually caused by the organism *Mycobacterium tuberculosis*.

**TB infection & TB disease**

- **TB Infection**
  - Asymptomatic
  - Not infectious
  - Can progress to TB disease

- **TB Disease**
  - Symptomatic
  - Infections (how infectious varies)

The probability that a person exposed to TB gets TB infection depends primarily on

- Concentration of infectious droplet nuclei in the air
- Duration of exposure
- The closer the proximity and the longer the duration the greater the risk

Those at higher risk of infection

- Close contacts: family (might not be a traditional family – might be a 'pub family')
- 'HCWs who serve populations at high risk'
- 'HCWs with unprotected exposure to a patient with TB disease before precautions are instigated.'
- Those living in overcrowded/poor facilities
- Infants and children of adults with TB disease
- Source CDC.gov

The probability that a patient with TB infection gets TB disease depends on

- How exposed
- Immune system function: HIV, infants & children <4 years, diabetes mellitus, renal failure, haematological disorders, prolonged steroid or other immune suppressant drug use, etc., etc

Understanding results.

- *Mycobacterium tuberculosis* grows very slowly.
- In the lab a smear test is done (result 30 mins) to distinguish infectious TB from TB which is not thought to be currently infectious.
- Culture results will follow 2-6 weeks later.
- The smear result determines infectiousness
- New tests are speeding up these times.

Smear positive = infectious

Smear negative but culture positive = low infectivity risk

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What are the symptoms of TB disease:
- Unexplained cough lasting more than 3 weeks – with or without these other symptoms
- Weight loss and anorexia
- Fever and night sweats
- Haemoptysis

Pulmonary tuberculosis:
- Is a slowly progressive, chronic infection, usually of the lungs, but many other organs may be infected. Only pulmonary tuberculosis (disease) is considered infectious.

What increases the risk of infectiousness:
- Cough
- Cavitation
- Smear positive
- Respiratory tract infection with involvement of the larynx
- Failure to comply with hand over mouth when coughing
- Previous poor antimicrobial therapy
- Aerosol generating procedures: sputum induction, aerosolised medications

Do patients with TB disease pose a risk to other patients? Yes
Do patients with TB disease pose a risk to healthcare workers? Yes
Do patients with TB disease pose a risk to visitors? Potentially

A risk to other patients:
- TB outbreak reports continue to be published in the literature – in the main involving nursing homes and long-term care places.
- Outbreak reports in wards caring for patients with HIV or other immune suppressing diseases.
A risk to visitors

- Two community outbreaks – one visitor diagnosed 2 years later


A risk to HCWs

- Post mortem staff (highest risk)
- Depends on how good the care
- Outbreaks common when
  - TB not suspected
  - Basic care not taken
  - Treatment not started early
  - During ‘high-risk’ procedures where the high risk was not identified, e.g. irrigating a wound

Why did outbreaks occur?

- Failure to recognise the signs and symptoms of tuberculosis early, and, sputum inducing procedures were done on the main ward.

Others

- Laboratory waste processing inadequate and 3 cases of TB were traced back to the lab via DNA.

  - Transmission of tuberculosis from contaminated waste Johnson et al JAMA 2000

So what do we have to do to optimise care and make the environment safe?

Action required

- Early recognition
- Early assessment for drug resistance
- Early isolation
- Sending specimens ASAP
- Asking for urgent processing of specimens
- Early instigation of therapy
- Early referral to a respiratory physician
- Early referral to a TB liaison nurse
- Early referral to public health
- No sputum inducing procedures on the main ward.
- Use of close fitting respiratory – not surgical - masks for prolonged care / aerosol generating procedures.
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Early recognition

- All patients must be assessed for all infection risks
  - Do your pro formas do it?
  - Looking for direct questions: Cough, weight loss, night sweats, haemoptysis
  - Looking for follow-up:
    - previous treatment for tuberculosis?
    - contact with a person with known drug resistant disease?
    - been resident overseas?

Early isolation

- Whilst assessment is ongoing
  - Don’t keep in hospital unless necessary
  - Get them to the team (Resp phy + TB nurse)
- Isolation = a room with 4 walls, a door and a ceiling, with negative pressure ventilation.

- What facilities do you have?
- What facilities do you need?
- How do you know what state your facilities are in, e.g. does the negative pressure work

To prevent spread from patients with infectious TB

For how long must isolation precautions be applied?

- Until confirmed sputum negative or if sputum smear positive,
- 14 days therapy and definite clinical improvement.
- After this, provided there are no immunocompromised patients in the area where the patient is to be discharged to isolation may be discontinued.

You need a care plan for patients with TB
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Therapy

- How long does it take for the first dose?
  - Should be (could be) a couple of hours.
- Urgent referral to a respiratory physician
- Urgent referral to a TB nurse

Specimen

- Urgently taken
- Urgently processed
  - 30 minutes X 3 on the same day is ok not the same spit.
  - How long does it take in your facility?
  - How long does it take if a patient is admitted at 5pm on bank holiday Friday.

Danger 1

- Patient has no spit
- Get the physio
- Do a sputum induction
- Error assumption: No diagnosis of TB therefore no risk and no precautions required
- Question:
  - where is sputum induction done in your facility?
  - what air changes are available in this area?
  - Who is at risk as a consequence?

Danger 2

- Patient does not have recognised risk factors for MDR-TB but there is no improvement after 2 weeks therapy!

If we could guarantee optimal care – do HCWs need to wear masks for non MDR-TB?
Risk would be very low

Optimal care: = early diagnosis, isolation in neg pressure + indications of working, therapy, compliance

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There are things we know we know and things we know we don’t know. D. Rumsfeld (abridged)

What do we know
- The patient has (probably) TB

We do not know
- If its drug resistant  
  – Until sensitivities back  
  – Until no response to therapy
- How infectious the patient is
- If the ventilation in the room is optimal (unless continuously reading gauge)

To prevent outbreaks
- Administrative controls  
  – What you do  
  – What you have  
  – QA
- Clinical controls  
  – Time to isolation / therapy
- Engineering controls  
  – Sufficient for patient population?
- Personal Protective Equipment

You must have a Respiratory Risk Assessment for your facility

For a respiratory assessment consider under 4 headings
- People: patients / family / members of the public healthcare workers
- Environment – controlled / uncontrolled
- Methods - procedures
- Equipment – decontamination, PPE
- Excellent examples of how in the guidelines

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Should HCWs wear masks?

- What does the evidence say
  - HCWs are at risk
  - Risk significantly reduced by optimal care (administrative, clinical, engineering)
  - Risk cannot be eliminated by these controls.

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What do the guidelines say?

What respiratory protection?

- Masks where to put them
- Fit testing
- Training
- Beards
- Costs

Why for sensitive TB and not MDR-TB?

- Is it anymore infections that drug sensitive?
- Is it acceptable for HCWs to get drug sensitive TB?
- Do they work for MDR-TB and not drug sensitive TB
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Moving to the solution

- Quantify the size of the problem through a respiratory assessment.
- Bring it to the Risk Management – collectively, get it on the register (if required)
- (Are we where we were in the should we all wear gloves debate for blood and body fluids only this time is respiratory protection)
- Clear uniform guidance or better evidence – commission research.

Key points

- Optimal care is required for effective protection of staff
  - Early clinical care (assessment, diagnosis, therapy, isolation, public health)
  - Engineering controls (effective, obvious)
  - Respiratory protection until risk is negated.
- The Evidence Based Guidelines are not in agreement

Thank you for your attention

Useful resources

- http://www.dh.gov.uk/AboutUs/MinistersAndDepartmentLeaders/ChieMedicalOfficer/Features/FeaturesArticle/en?CONTENT_ID=4133241&chk=oW8s4w
- http://www.gfmer.ch/Guidelines/Tuberculosis/Tuberculosis_mt.htm

The Next Few Teleclasses

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<td>Voices of CHICA (a FREE teleclass)</td>
<td>CHICA-Canada Board Members &amp; Guests</td>
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<td>March 22</td>
<td>A Year of Cleaner, Safer Care – A Worldwide Experience</td>
<td>Dr. Didier Pittet, World Health Organization, Geneva</td>
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<td>March 29</td>
<td>Environmental Control Strategies for C. diff</td>
<td>Dr. Lynne Sehulster, CDC</td>
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<td>April 12</td>
<td>Who’s Afraid of the CIC Exam? (a FREE teleclass)</td>
<td>Sharon MacDonald and Sharon Krystofiak, CBIC</td>
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<td>April 19</td>
<td>Bacterial Resistance to Biocides in the Healthcare Environment</td>
<td>Dr. Jean Yves Maillard, University of Cardiff, UK</td>
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