TB Diagnosis And Care Of Patients

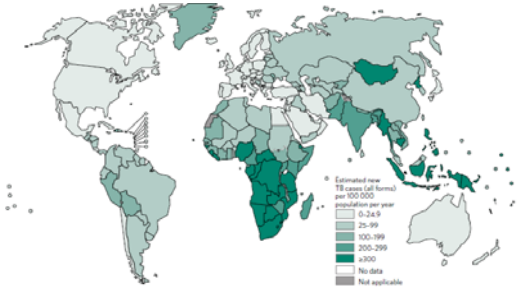
Jan Kehrmann
Institute of Medical Microbiology
Essen
Germany

University Hospital Essen

Institute of Medical Microbiology, „Robert-Koch House“

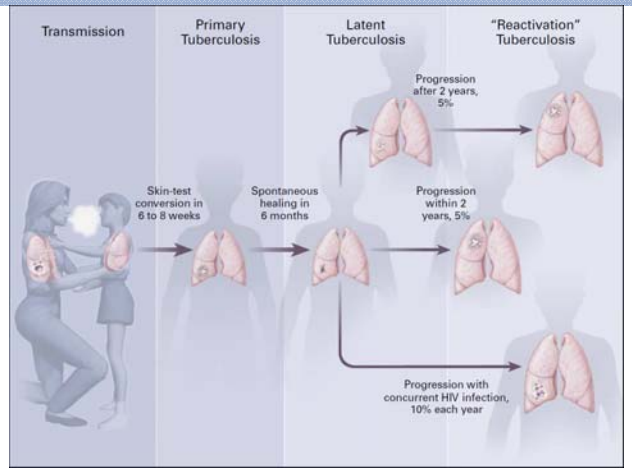
WHO Tuberculosis Report 2016

- About 1/3 of the world´s population is infected with bacteria of *M. tuberculosis* complex (> 2 billion people)
- 5-10% develop active disease
- 10.4 million new TB cases worldwide in 2015 and 1.8 million deaths
- > 4 million undiagnosed TB cases, 70% of TB cases diagnosed get treated



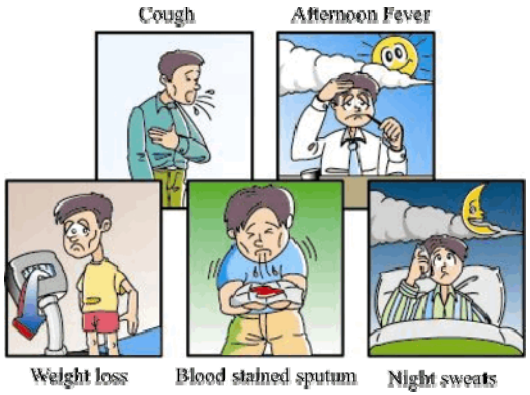
WHO Global Tuberculosis Report 2016

Development of TB infection / disease



Small P., Fujiwara P; NEJM 2011, 345:189-200

Symptoms



Cornerstones of TB infection control

1. Rapid identification of TB patients

2. Adequate treatment of TB

3. Hygiene measures for infection control

Factors that affect the risk of *M. tuberculosis* infection
1. concentration of infectious droplet nuclei in the air
2. duration of exposure

Infection control strategies - WHO
1st Priority: Administrative Controls:
- reduce the risk of exposure to *M. tuberculosis*

2nd Priority: Environmental Controls:
- prevent the spread and reduce the concentrations of infectious *M. tuberculosis* droplet nuclei in the air

3rd Priority: Personal Controls:
- decrease or prevent inhalation of MTB by health staff and patients

Key Points for Tuberculosis Infection Control in Health Care Facilities


Identify Coughers


Prompt/early diagnosis and effective Treatment


Offer Surgical Mask
Educate on Cough Ettiquete


If hospitalization is required:
Isolate in single room with cross ventilation.
Keep door closed at all times

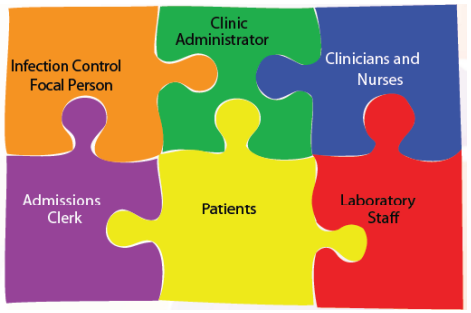

Separate coughers to a ventilated space


Instructions to visitors:
Ask Nurse
Wear N-95 mask before entering room and during visit


Triage


Ask patients to wear surgical mask if transportation outside room is required

TB infection control: a Team approach



Infectiousness

Patients can be considered non-infectious when they meet all of the following criteria:

- Received adequate treatment for 2-3 weeks
- Symptoms have improved
- 3 consecutive negative sputum smears from sputum collected in 8-24 hours intervals

Tuberculosis in Germany

Year	Reported Incidence
1950	137.721 (West Germany)
1960	70.325 (West Germany)
1970	48.262 (West Germany)
1980	27.845 (West Germany)
1993	14.161
1996	11.814
2000	9.064
2006	5.402
2008	4.543
2010	4.330
2012	4.220
2013	4.319
2014	4.488
2015	5.865
2016	5.915

World Health Organization

Improving early detection of active TB through systematic screening

RECOMMENDATIONS ON RISK GROUPS TO SCREEN

The following risk groups should always be screened for active TB, in all settings:

1. Close contacts of people with TB;
2. People living with HIV;
3. Workers in silica exposed workplaces.

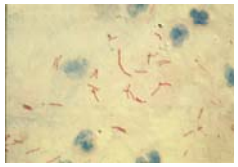
In addition, the following risk groups may be prioritized for screening based on local TB epidemiology, health systems capacity, resource availability, and feasibility of reaching the risk groups:

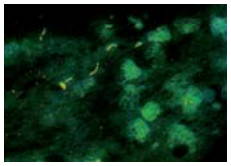
4. People in prisons and other penitentiary institutions, and prison staff;
5. People with untreated fibrotic CXR lesion;
6. People in high TB burden settings (estimated TB prevalence >100/100,000 in the general population) who are seeking care or who are in care and belong to selected risk groups (see table), and health care workers.
7. Geographically defined sub-populations with extremely high levels of undetected TB (>1% prevalence), and other sub-populations with very poor health care access.

Tuberculosis risk groups	
Community	Geographical areas with a high prevalence and subpopulations with poor access (poor populations, urban slums, remote areas, refugees, homeless, etc)
Hospital outpatient and inpatient departments, and primary health-care centres	People previously treated for TB
	People with an untreated fibrotic lesion
	People living with HIV and people attending HIV testing
	People with diabetes mellitus
	People with chronic respiratory disease and smokers
	Undernourished
	People with gastrectomy or jejunoileal bypass
	People with an alcohol- or drug-use disorder
	People with chronic renal failure
	People with immunocompromising treatments
	Elderly people
	People in mental health clinics or institutions
Residential institutions	Prisoners and prison staff
	People residing in shelters
	Other congregate settings (such as the military)
Immigration and refugee services	Immigrants from settings with a high prevalence of TB
	People in refugee camps
Workplaces	Health-care workers
	Miners or others who are exposed to silica
	Other workplaces with a high prevalence of TB

Microbiologic diagnostics of active tuberculosis

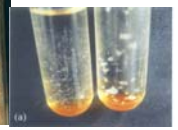
1. Microscopy of acid fast bacilli (Sensitivity for lung TB: 50%)





2. PCR

3. Culture



The NEW ENGLAND JOURNAL of MEDICINE

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Rapid Molecular Detection of Tuberculosis and Rifampin Resistance

Catharina C. Boehme, M.D., Pamela Nabeta, M.D., Doris Hillemann, Ph.D., Mark P. Nicol, Ph.D., Shubhada Shenai, Ph.D., Fiorella Krapp, M.D., Jenny Allen, B.Tech., Rasim Tahirli, M.D., Robert Blakemore, B.S., Roxana Rustomjee, M.D., Ph.D., Ana Milovic, M.S., Martin Jones, Ph.D., Sean M. O'Brien, Ph.D., David H. Persing, M.D., Ph.D., Sabine Ruesch-Gerdes, M.D., Eduardo Gotuzzo, M.D., Camilla Rodrigues, M.D., David Alland, M.D., and Mark D. Perkins, M.D.

- Multi-center study with 1730 patients, Analysed performance of GeneXpert from sputum samples
- Correct identification of 98.2% of microscopic positive samples (551 von 561)
- Correct identification of 72.2% of microscopic negative samples by one GeneXpert (124 of 171)
- Specificity of 99.2 %

Maynard-Smith et al. BMC Infectious Diseases (2014) 14:709
DOI 10.1186/s12879-014-0709-7

BMC Infectious Diseases

RESEARCH ARTICLE Open Access

Diagnostic accuracy of the Xpert MTB/RIF assay for extrapulmonary and pulmonary tuberculosis when testing non-respiratory samples: a systematic review

Laura Maynard-Smith[1], Natasha Larke[2], Jurgens A Peters[1] and Stephen D Lawn[1,3*]

Sample	Statistical model for pooled estimates	Number of studies	Sensitivity		Specificity	
			Pooled estimate (95% CI)	Median (IQR)	Pooled estimate (95% CI)	Median (IQR)
CSF	Cannot calculate	10		0.85 (0.75 – 1.00)		1.00 (0.98 – 1.00)
Pleural fluid	Bivariate	9	0.34 (0.24 – 0.44)	0.37 (0.27 – 0.72)	0.98 (0.96 – 0.99)	1.00 (0.98 – 1.00)
Non-pleural serous fluid	Cannot calculate	4		0.67 (Range 0.00 – 1.00)		1.00 (Range 1.00 – 1.00)
All tissue	Bivariate	12	0.88 (0.77 – 0.95)	0.90 (0.73 – 0.99)	0.98 (0.87 – 0.99)	1.00 (0.89 – 1.00)
Lymph node biopsy/FNA	Bivariate	7	0.96 (0.72 – 0.99)	0.97 (0.71 – 1.00)	0.93 (0.70 – 0.99)	1.00 (0.94 – 1.00)
Gastric aspirate	Bivariate	8	0.78 (0.69 – 0.86)	0.85 (0.74 – 1.00)	0.99 (0.98 – 0.99)	1.00 (0.99 – 1.00)
Smear positive	Random effects	9	0.95 (0.91 – 1.00)	1.00 (0.98 – 1.00)		
Smear negative	Random effects	10	0.69 (0.60 – 0.80)	0.69 (0.61 – 0.83)		

→ High sensitivity for tissue samples, low sensitivity for pleural fluid

WHO RECOMMENDATIONS ON THE USE OF XPERT MTB/RIF

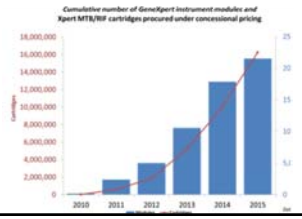
END TB

POLICY RECOMMENDATIONS

- WHO recommends the use of Xpert MTB/RIF as the **initial diagnostic test** to detect pulmonary TB and rifampicin resistance, instead of conventional microscopy, phenotypic culture and drug-susceptibility testing (DST), for all patients with signs and symptoms of TB;
- WHO recommends the use of Xpert MTB/RIF as the **initial diagnostic test** in patients with suspected TB meningitis, instead of conventional microscopy, phenotypic culture and DST; treatment should follow immediately if the result is positive; additional testing is needed if the initial Xpert MTB/RIF result is negative;
- WHO recommends the use of Xpert MTB/RIF as the initial diagnostic test, instead of conventional microscopy, culture and histopathology for testing lymph nodes or other tissue from patients with suspected extrapulmonary TB; treatment should follow immediately if the result is positive; additional testing is needed if the initial Xpert MTB/RIF result is negative.

COSTS

- Preferential pricing is available to the public sector in eligible countries, comprising USD17,000 for the GeneXpert four-module device with desktop computer) and USD9,98 for the Xpert MTB/RIF cartridges;



WHO Meeting Report of a Technical Expert Consultation: Non-inferiority analysis of Xpert MTB/RIF Ultra compared to Xpert MTB/RIF 2017

Conclusions from multi-center study FIND with 1520 TB suspects

- Higher overall sensitivity of compared with MTB/RIF, especially in smear-negative culture-positive patients and in HIV patients; sensitivity comparable to liquid culture methods
- Specificity-decrease in patients with history of TB due to „trace calls“

World Health Organization

Thank you for your attention!